ComAp
The heart of smart control

InteliLite 4 AMF 9

Controller for single gen-set applications

SW version 1.4.0

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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 InteliLite 4 family controllers which must be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate InteliLite 4 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 software	License name	License condition web address
Mbed TLS	Apache 2.0	license
Aladin MD5	Zlib	license
EmbOS	Segger License Agreement v. 150515	license
emFile	Segger License Agreement	license
emUSB Device	Segger License Agreement	license
emUSB-Host	Segger License Agreement	license
Tiny Mersenne Twister (tinymt32)	BSD 3	license

1.4 General warnings

1.4.1 Remote control and programming

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

Make sure:

- Disconnect remote control
- Disconnect binary outputs

1.4.2 SW and HW versions compatibility

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

1.4.3 Dangerous voltage

Under no circumstances should you touch the terminals for voltage and current measurement! Always connect grounding terminals! Under no circumstances should you disconnect controller CT terminals!	

1.4.4 Adjusting the setpoints

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

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

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

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

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

1.5 Functions and protections

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

Description	ANSI code	Description	ANSI code
Master unit	1	**Incomplete sequence relay**	48
Stopping device	5	**Overcurrent**	50/50TD
Multi-function device	11	**Earth fault****	50G
Overspeed	12	**Breaker failure**	50BF
Underspeed	14	**Overcurrent IDMT**	51
Starting-to-running transition contactor	19	**AC circuit breaker**	52
Thermal relay	26	**Overvoltage**	59
Undervoltage	27	**Aux Over Voltage**	59X
Aux Battery Under Voltage	27X	**Pressure switch**	63
Annunciator	30	**Liquid level switch**	71
Overload (real power)	32P	**Alarm relay*****	74
Reverse power	32R	**Reclosing relay**	79
Master sequence device	34	**Overfrequency**	81O
Unit sequence starting*	44	**Underfrequency**	81U
Current unbalance	46	**Auto selective control/transfer**	83
Voltage unbalance/Negative sequence voltage	47		

*Dual-operation **Extension module EM-BIO8-EFCP required *** extension module IGL-RA15 required

1.6 Certifications and standards

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

Supplier's Declaration of Conformity **47 CFR § 2.1077 Compliance Information**
Unique identifier: IL4AMF9XBAA
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
6	1.4.0	5.1.2022	Michal Slavata
5	1.3.0	30.4.2022	Jan Liptak
4	1.2.0	12.11.2021	Jan Liptak
3	1.1.1	9.7.2021	Jan Liptak
2	1.1.0	18.6.2021	Jan Liptak
1	1.0.0	28.2.2021	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

InteliLite 4 family controller are a comprehensive Gen-set controllers for single Gen-set operating in prime power source (MRS) or back-up (AMF) applications. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications.

2.1.1 The key features of InteliLite 4

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

2.2 True RMS measurement

This controller measures AC values based on True RMS principle. This principle corresponds exactly to the physical definition of alternating voltage effective values. Under normal circumstances, voltage should have a pure sinusoidal waveform. However some nonlinear elements can produce harmonic waveforms with frequencies of multiples of the basic 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.

2.3 Configurability and monitoring

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

2.3.1 Supported configuration and monitoring tools

- InteliConfig – complete configuration and single 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.

2.3.2 Configuration parts

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

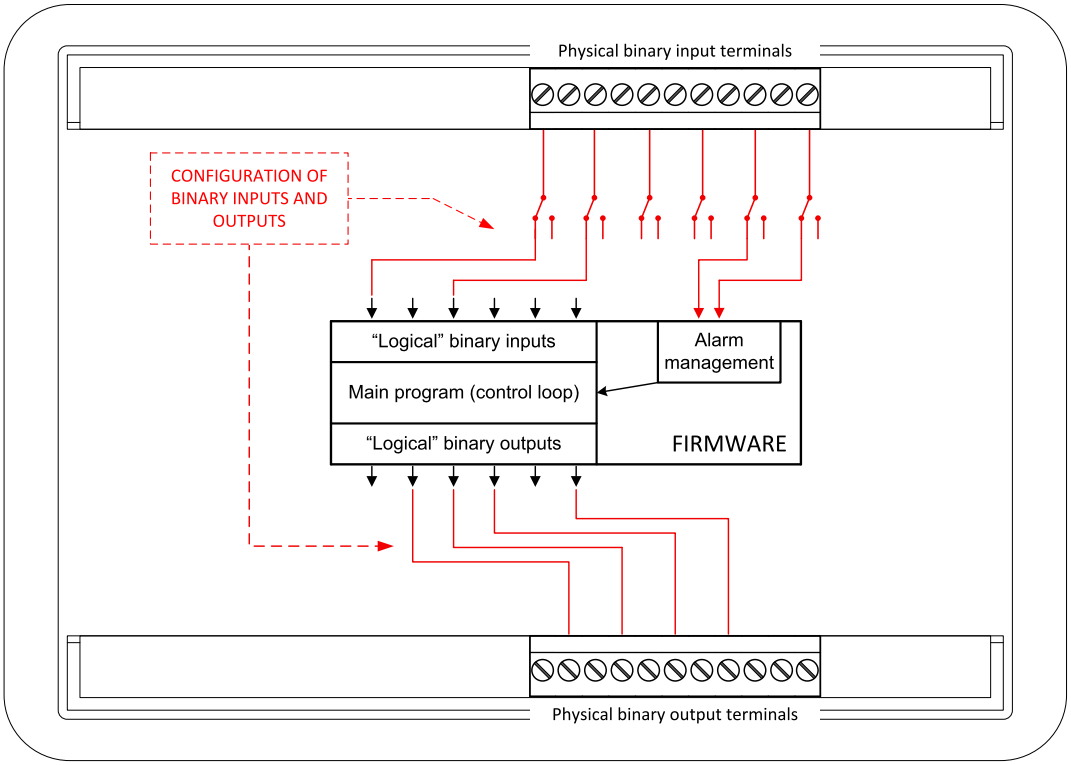


Image 2.1 Principle of binary inputs and outputs configuration

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

Once the configuration is modified, it can be saved to a file for later usage with another controller or for backup purposes. The file is called archive and has the file extension .ail4. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides

configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

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

2.4 PC Tools

2.4.1 InteliConfig

Configuration and monitoring tool for 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

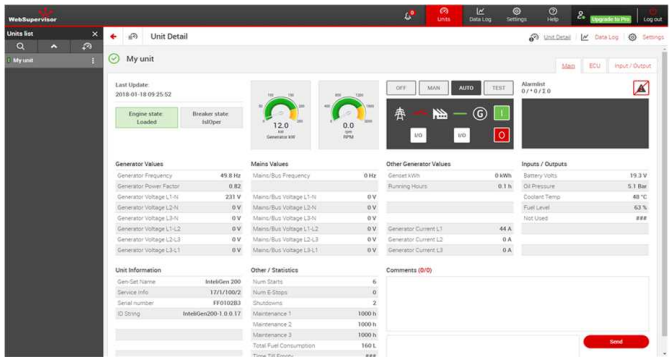


2.4.2 WebSupervisor

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

This tool provides the following functions:

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



WebSupervisor available at: www.websupervisor.net

Demo account:

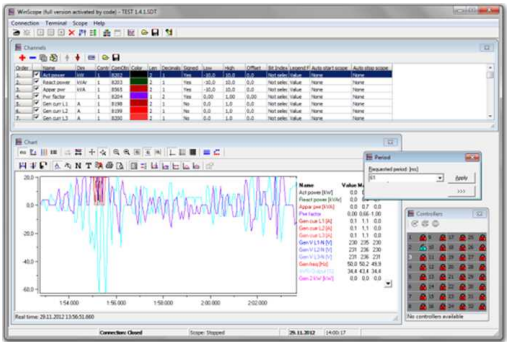
- Login: comaptest
- Password: ComAp123

2.4.3 WinScope 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



2.4.4 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

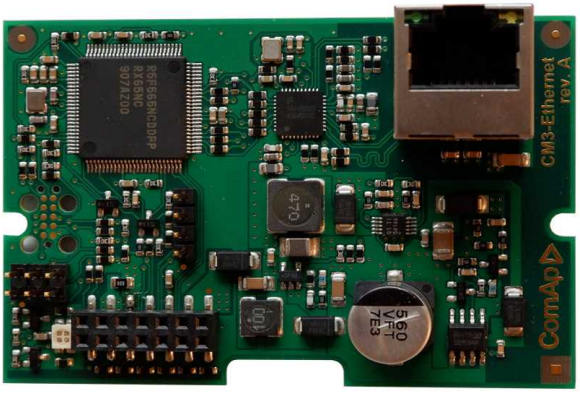


2.5 Plug-in Modules

2.5.1 CM3-Ethernet

Internet/Ethernet module.

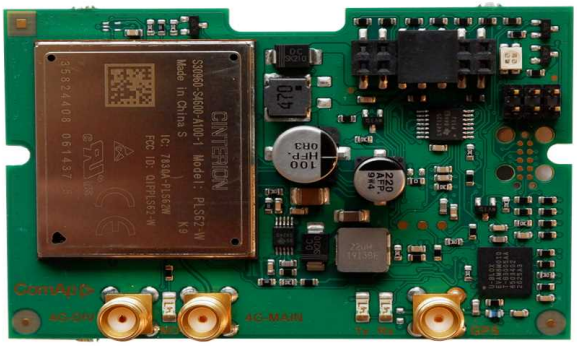
- 10/100 Mbit interface over RJ45 socket
- Remote control and monitoring of the controller via InteliConfig, WebSupervisor
- Modbus TCP support
- Full SNMP support including traps (v1 & v2c)
- Active e-mail sending
- AirGate 2.0 technology support for easy connection – no need of public and static IP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



2.5.2 CM2-4G-GPS

GSM/4G module

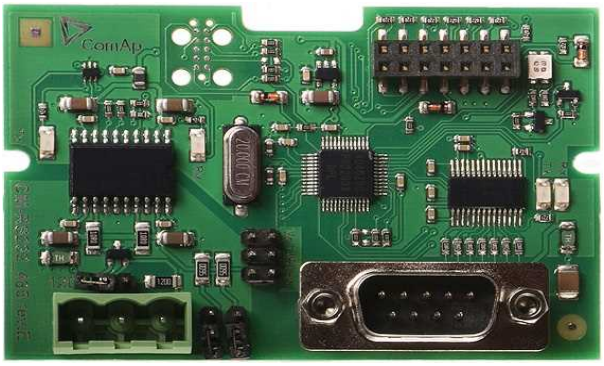
- GSM/4G Internet module and GPS locator
- Global 4G (LTE) module with 3G/2G backup
- Remote control and monitoring of the controller via InteliConfig, WebSupervisor
- Active e-mail and SMS support
- AirGate 2 technology support for easy connection – no need of public and static IP address
- Tracking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



2.5.3 CM-RS232-485

Communication module with two communication ports.

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

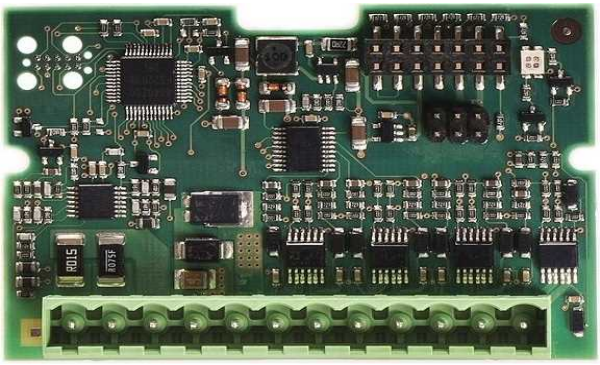


2.5.4 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

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

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



2.6 CAN modules

2.6.1 Inteli IO8/8

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

Configuration 8/8

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

Configuration 16/0

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



2.6.2 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)



Impulse/RPM sensor:

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

2.6.3 Inteli AIN8TC

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

- 8 analog input channels for measuring temperature by thermocouples



2.6.4 Inteli AIO9/1

9 Analog Inputs and 1 Analog Output Module

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



2.6.5 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



2.6.6 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



2.6.7 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



2.6.8 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



2.6.9 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



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3 Applications overview

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3.2 MRS – Manual Remote Start 22

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3.1 AMF – Automatic Mains Failure Start

The typical schematic of Automatic Mains Failure Start application is shown below. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is not necessary. InteliLite 4 controllers can also work without breaker feedback.

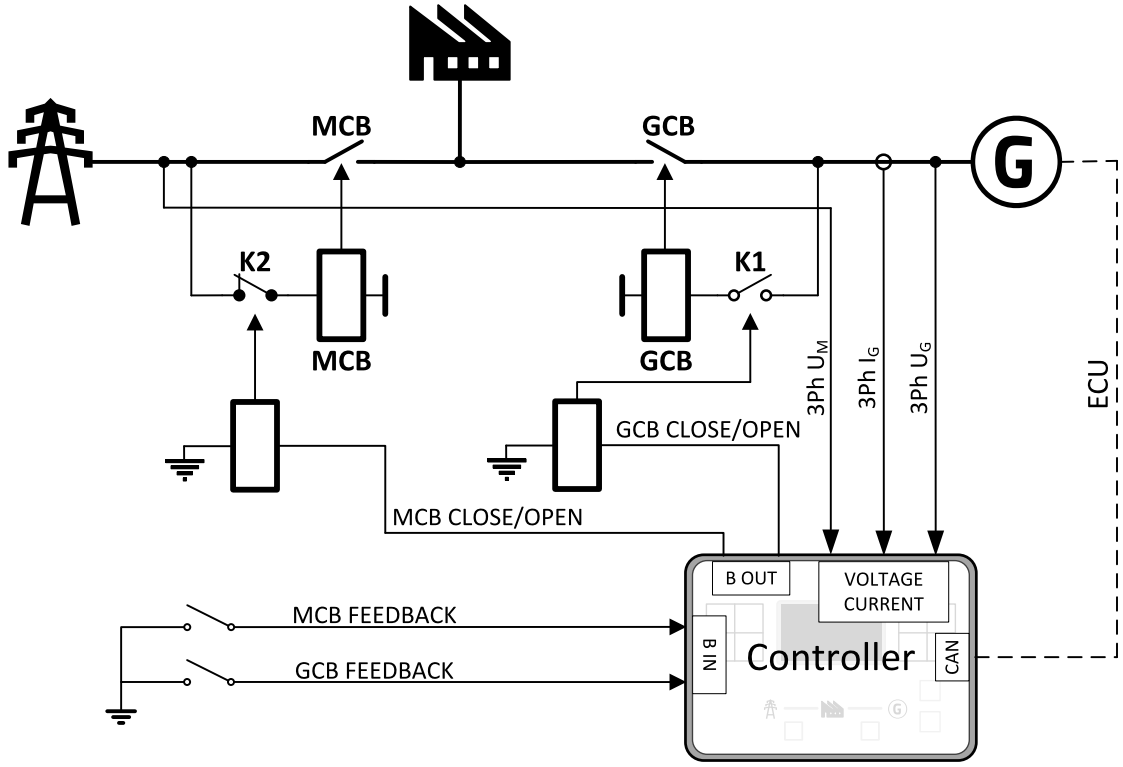


Image 3.1 AMF application overview

3.2 MRS – Manual Remote Start

The typical schematic of Manual Remote Start application is shown below. The controller controls one breaker – a generator breaker. Feedback from the breaker is not necessary. InteliLite 4 controllers can also work without breaker feedback.

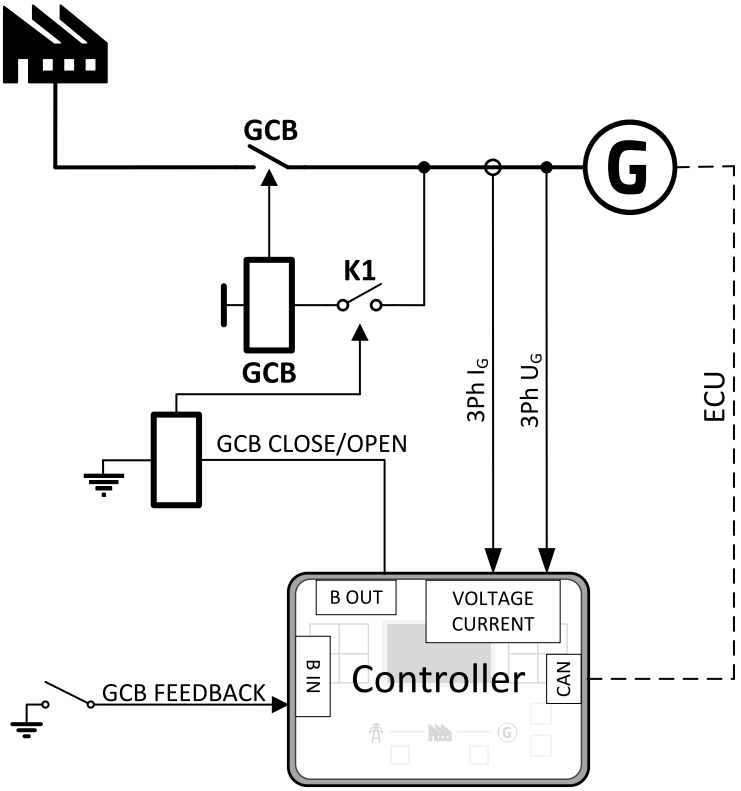


Image 3.2 MRS application overview

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4 Installation and wiring

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4.4 Recommended wiring 26
4.5 Plug-in module installation 59
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4.1 Package content

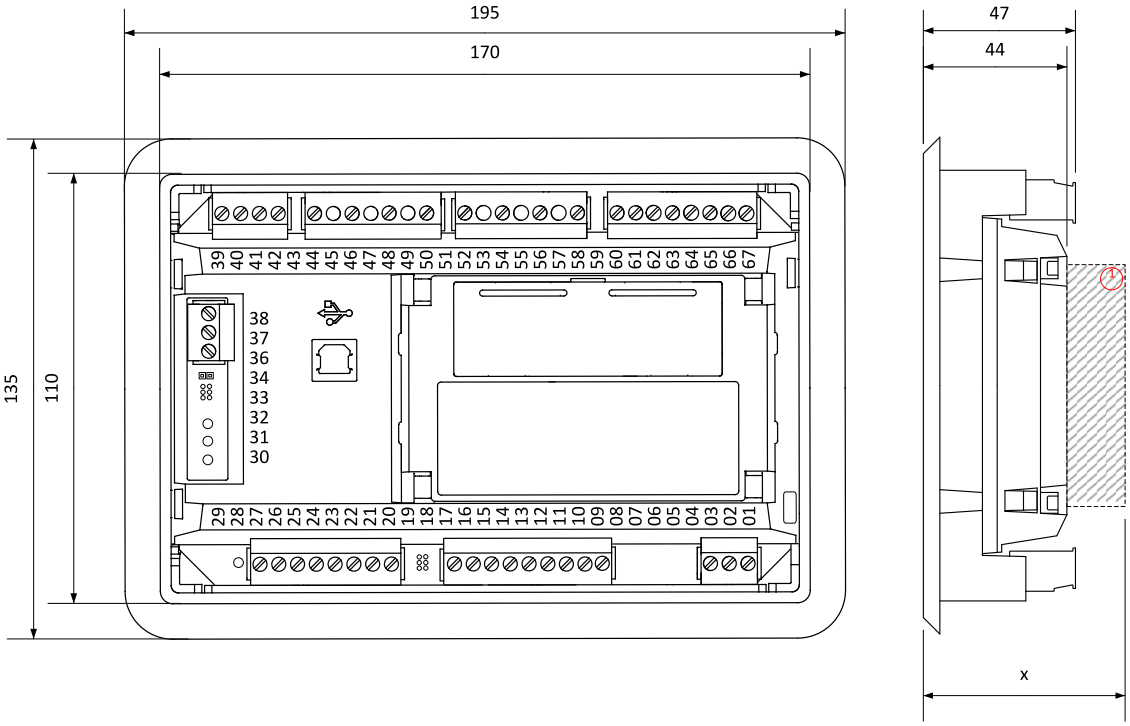
The package contains:

- 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

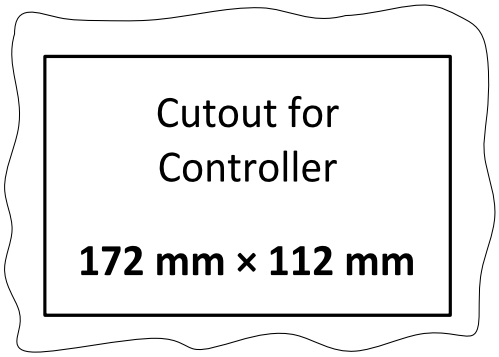
4.2.1 Dimensions



① Plug-in module

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

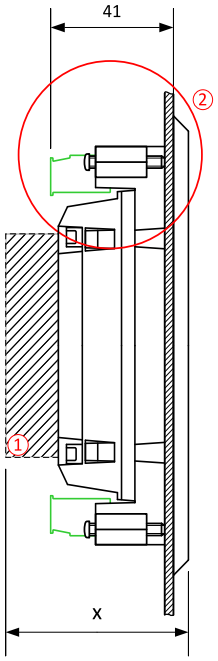
Note: *Dimensions are in millimetres.*



4.2.2 Mounting

The controller should be mounted onto the switchboard door. Requested cutout size is 172 × 112 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 GENERATOR CURRENT MEASUREMENT		② GENERATOR VOLTAGE MEASUREMENT		③ MAINS VOLTAGE MEASUREMENT		④ BINARY INPUTS	
T39	COM	T44	N	T52	N	T60	BIN1
T40	L1	T46	L1	T54	L1	T61	BIN2
T41	L2	T48	L2	T56	L2	T62	BIN3
T42	L3	T50	L3	T58	L3	T63	BIN4
						T64	BIN5
						T65	BIN6
						T66	BIN7
						T67	BIN8

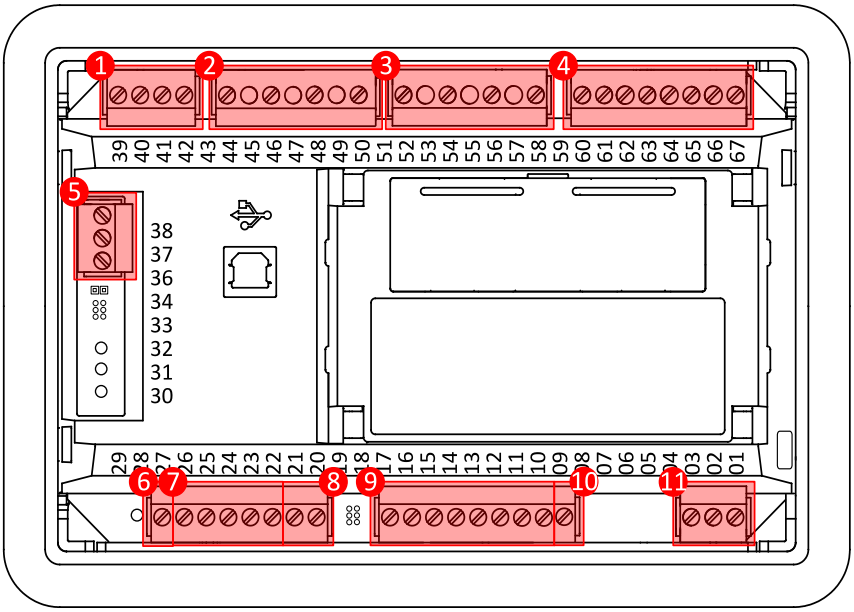
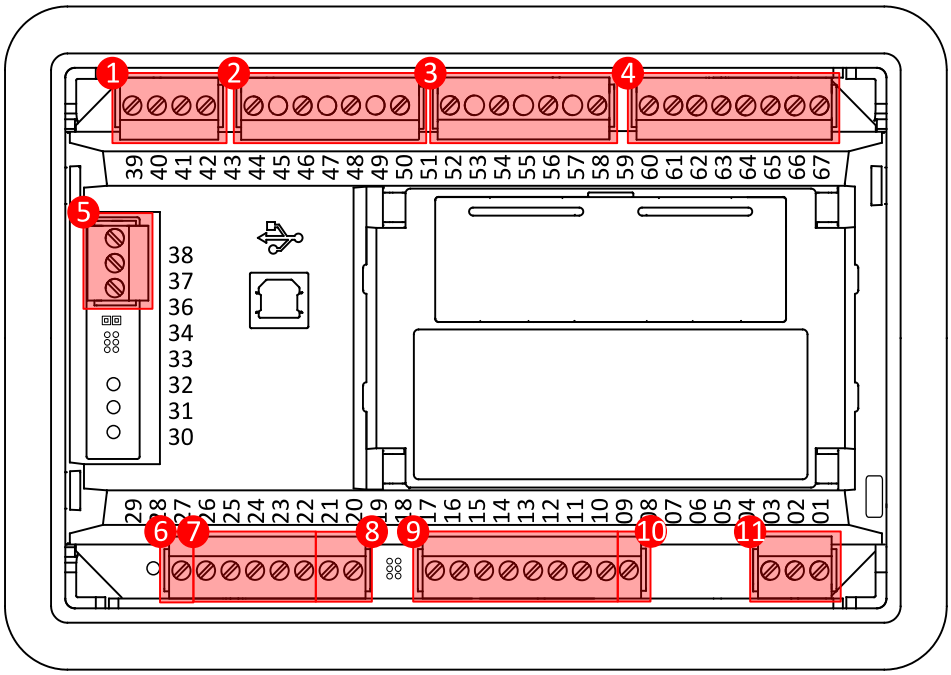


Image 4.1 Terminal diagram for InteliLite 4 AMF9

⑤ CAN1		⑦ ANALOG INPUTS		⑨ BINARY OUTPUTS		⑩ E-STOP	
T36	L	T22	A COM	T10	BOUT1	T09	E-STOP
T37	COM	T23	A01	T11	BOUT2		
T38	H	T24	A02	T12	BOUT3	⑪ POWER SUPPLY, D+	
		T25	A03	T13	BOUT4	T01	BATT -
⑥ +5 V		T26		T14	BOUT5	T02	D+
T27	+5 V	⑧ RPM		T15	BOUT6	T03	BATT +
		T20	RPM GND	T16	BOUT7		
		T21	RPM IN	T17	BOUT8		

4.4 Recommended wiring



1	Current inputs	39-42	**Current measurement wiring (page 30)**
2	Generator voltage inputs	44, 46, 48, 50	**Voltage measurement AMF wiring (page 34)** **Voltage measurement MRS wiring (page 42)**
3	Mains voltage inputs	52, 54, 56, 58	**Voltage measurement AMF wiring (page 34)**
4	Binary inputs	60-67	**Binary inputs (page 51)**
5	CAN bus	H, COM, L	**CAN bus and RS485 wiring (page 55)**
6	+5 V	27	
7	Analog inputs	22-26	**Analog inputs (page 53)**
8	RPM	20,21	**Magnetic pick-up (page 50)**
9	Binary outputs	08-15	**Binary Outputs (page 52)**
10	E-Stop	09	**E-Stop (page 53)**
11	Power supply	"+", D, "-"	**Power supply (page 28)**

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).*

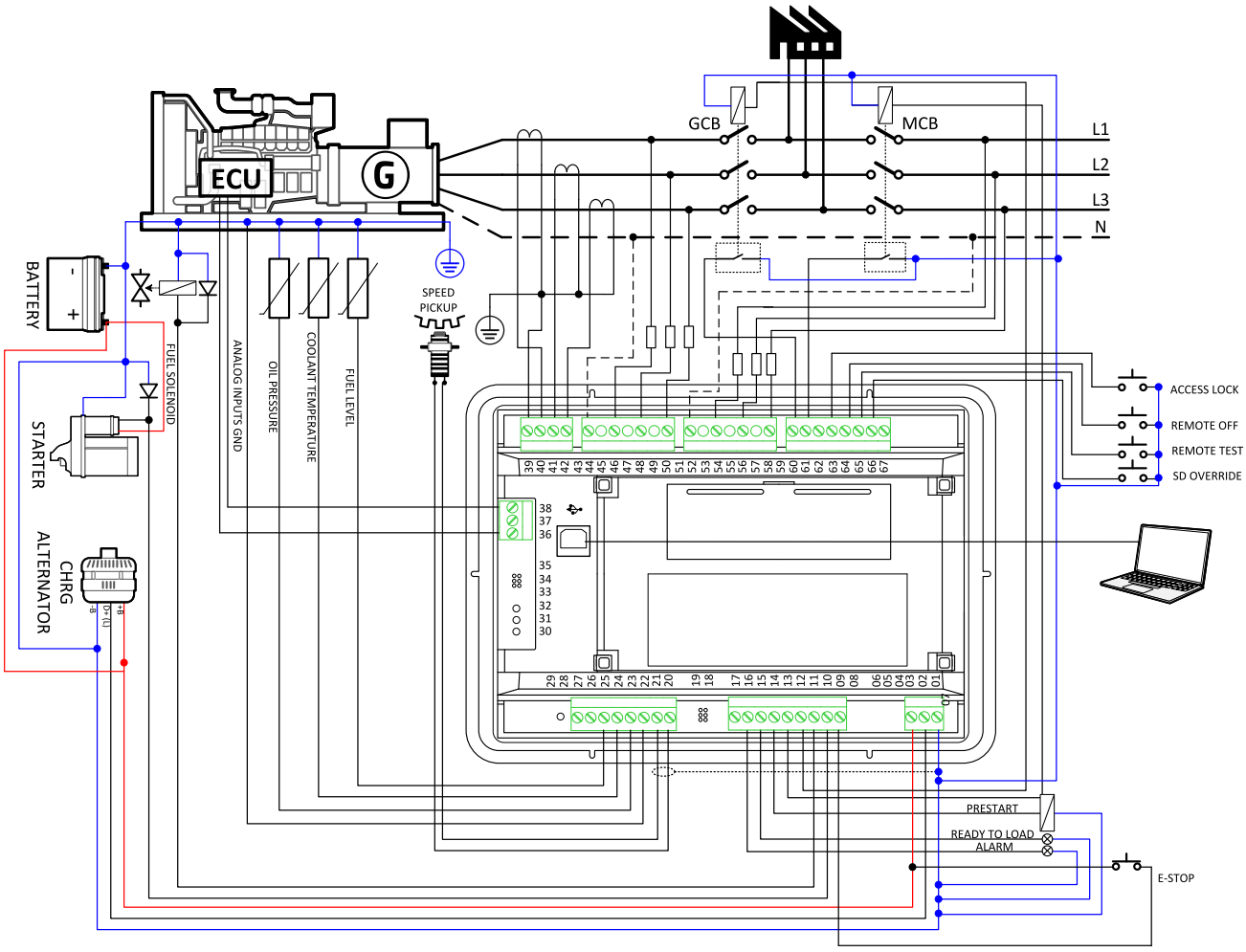
4.4.1 General

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.

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

4.4.2 Example of AMF Wiring



4.4.3 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.

4.4.4 Power supply

To ensure proper function:

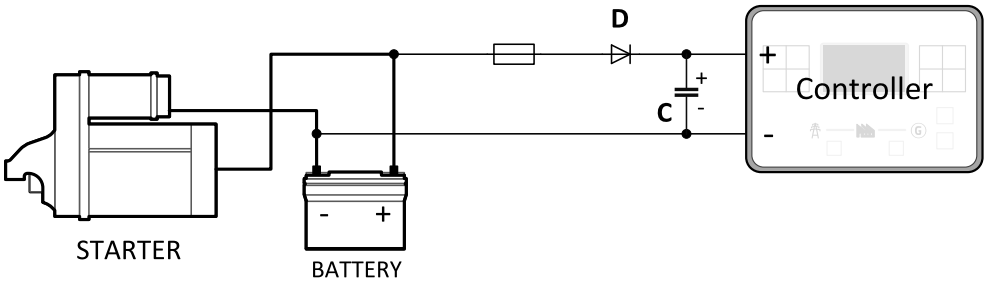
- Use power supply cable min. 1.5 mm^2

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

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

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

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



Note: *Recommended fusing is 4 A fuse.*

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

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

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

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

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

Power supply fusing

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

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

4.4.5 Measurement wiring

Use 1.5 mm^2 cables for voltage connection and 2.5 mm^2 for current transformers connection. Adjust **Connection type (page 213)**, **Nominal Voltage Ph-N (page 215)**, **Nominal Voltage Ph-Ph (page 215)**, **Nominal Current (page 211)**, **Gen VT Ratio (page 218)**, **Mains VT Ratio (page 218)** and **Gen CT Ratio Prim (page 212)** 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.

CT Location

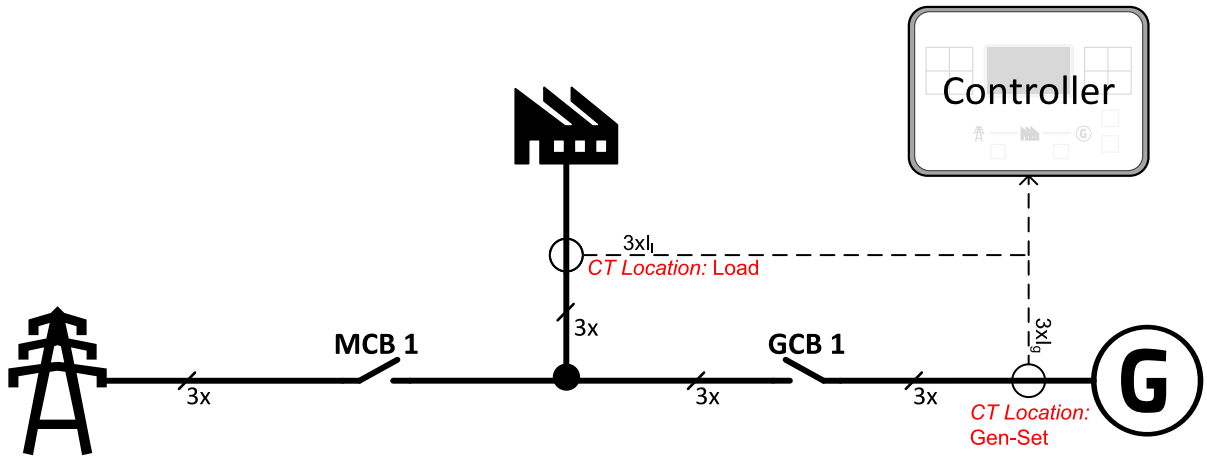


Image 4.2 CT Location

There are three options of CT location.

- Load
- Gen-set
- None

Note: *The current measurement protections are active only when the Gen-set is running.*
If the CT Location is set to Load the ***Short Circuit BOC (page 264)*** *protection is enabled only when GCB is closed.*

Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type (page 213)** [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

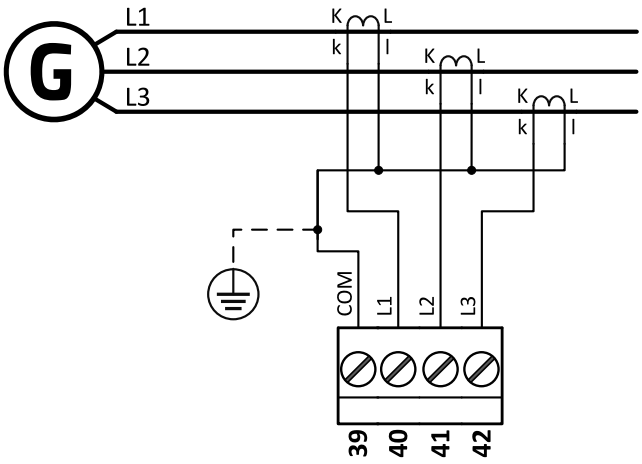


Image 4.3 3 phase application

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

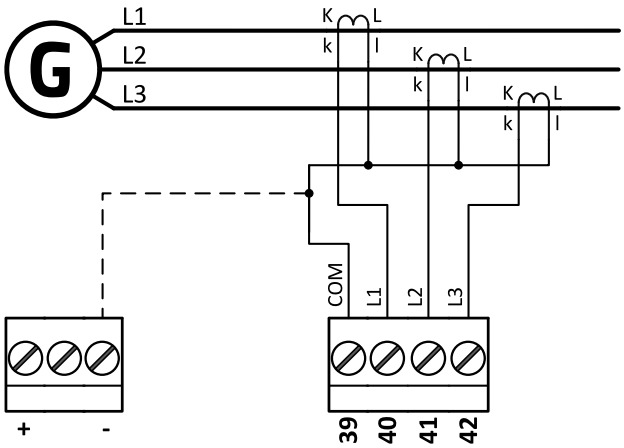


Image 4.4 3 phase application

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

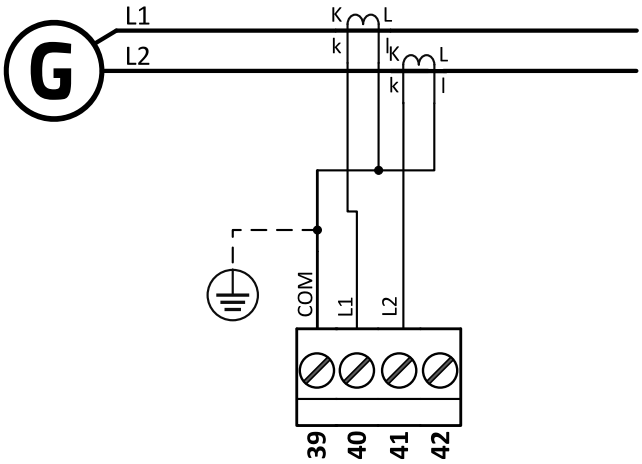


Image 4.5 SplPhL1L2 application

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

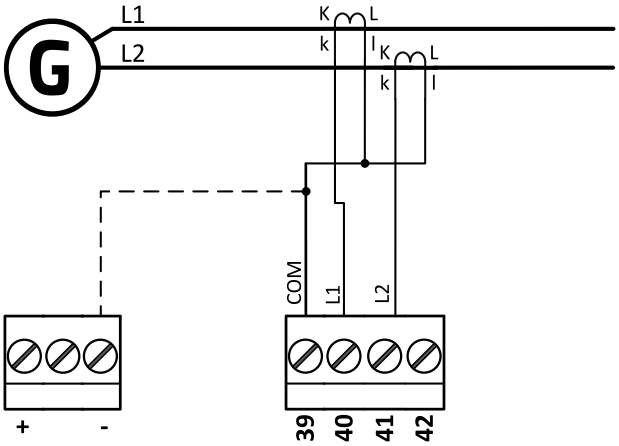


Image 4.6 SplPhL1L2 application

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

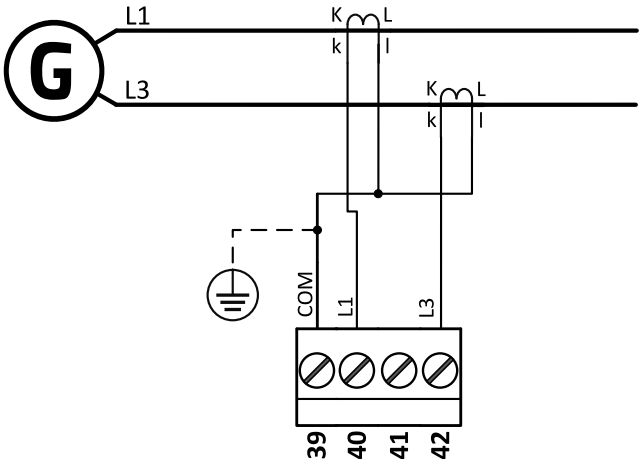


Image 4.7 SplPhL1L3 application

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

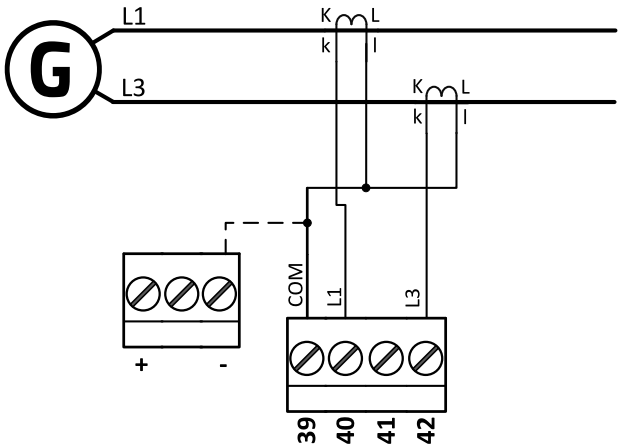


Image 4.8 SplPhL1L3 application

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

Mono phase application

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

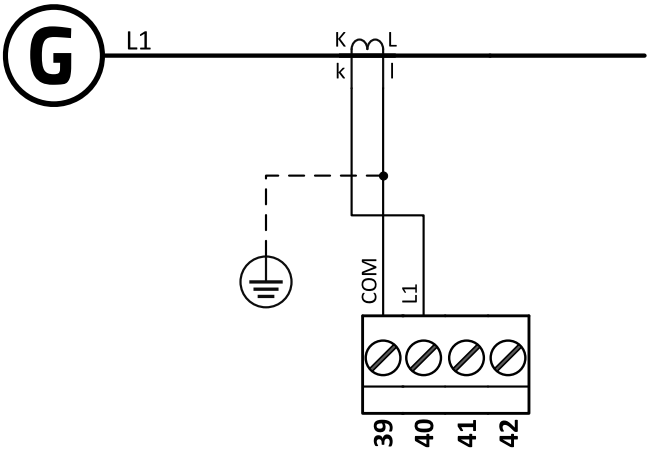


Image 4.9 Mono phase application

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

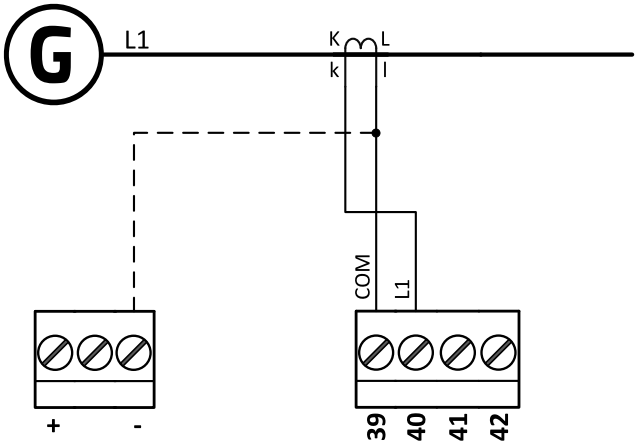


Image 4.10 Mono phase application

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

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

Voltage measurement AMF wiring

There are 6 voltage measurement Connection Type (setpoint **Connection type (page 213)** [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph] options, each 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 213)** 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

Connection Type: 3 Phase 4 Wires

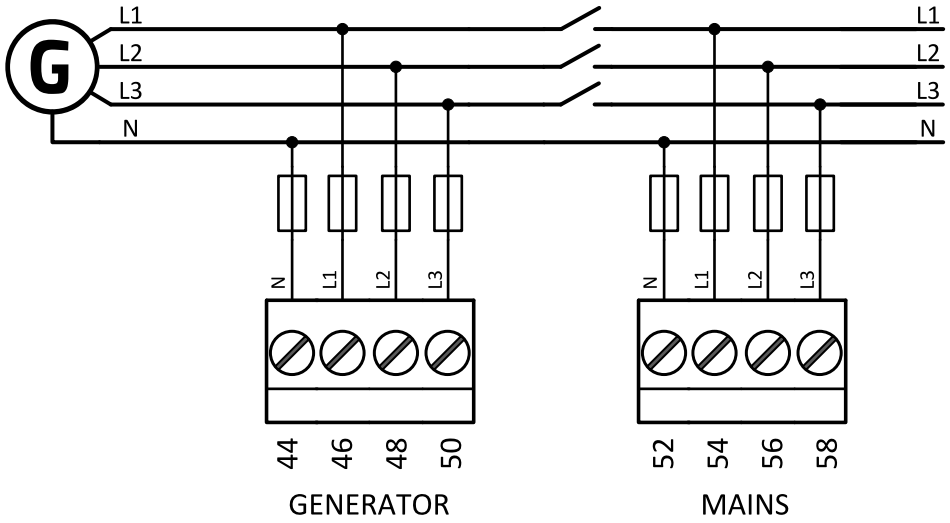


Image 4.11 3 phase application with neutral

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

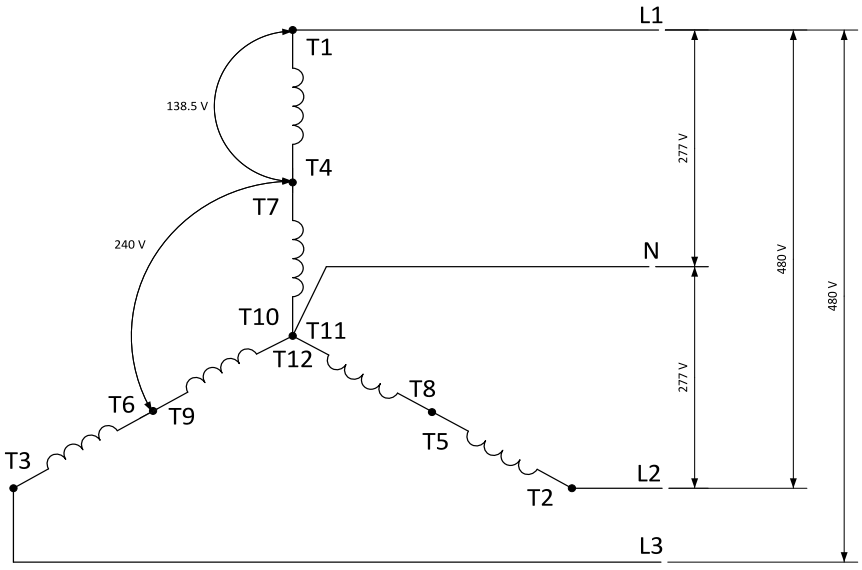


Image 4.12 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

Note: *Connection type 277/480V 3-PHASE,* ***Nominal Voltage 3Ph High Y (page 216)****.*

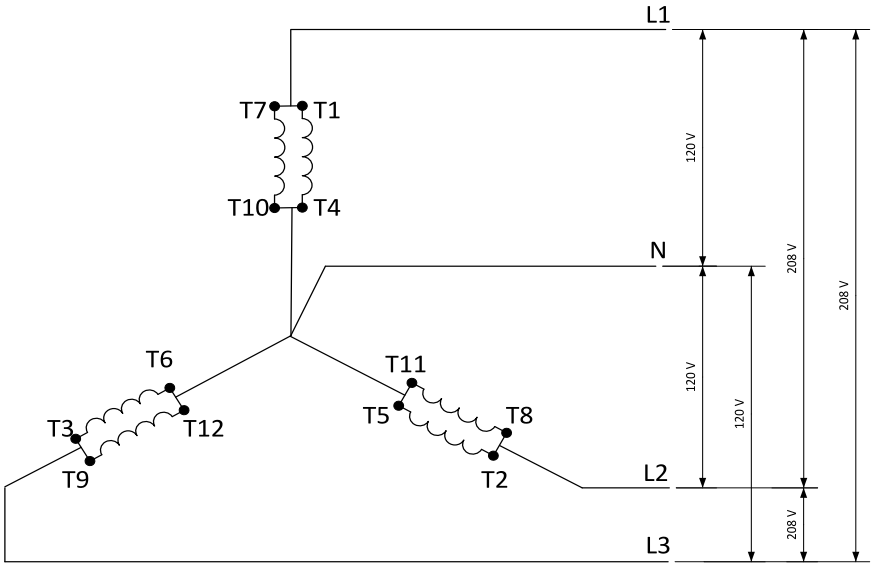


Image 4.13 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

Note: *Connection type 120/208V 3-PHASE,* ***Nominal Voltage 3Ph Low Y (page 216)****.*

Connection Type: High Leg D

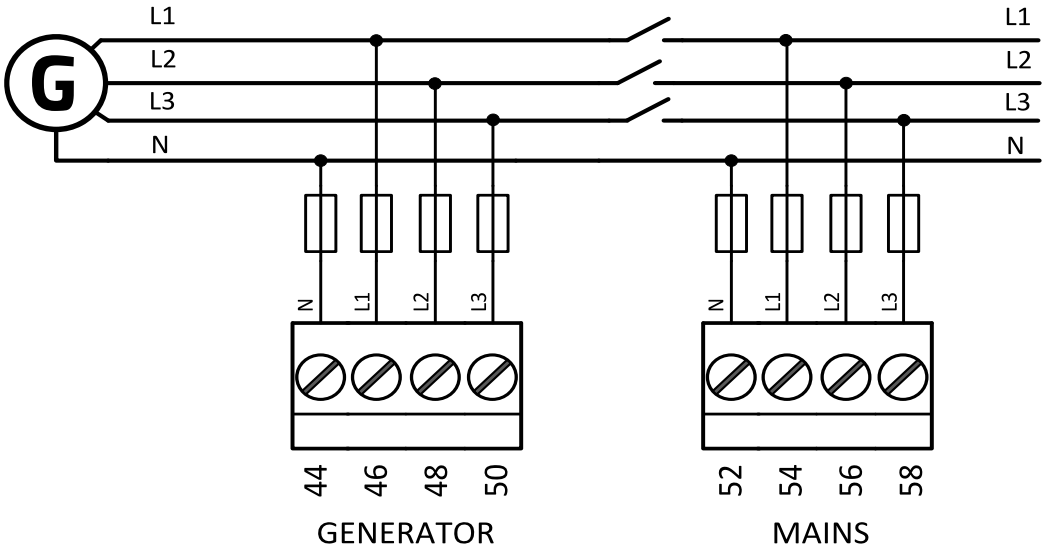


Image 4.14 High Leg Delta application

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

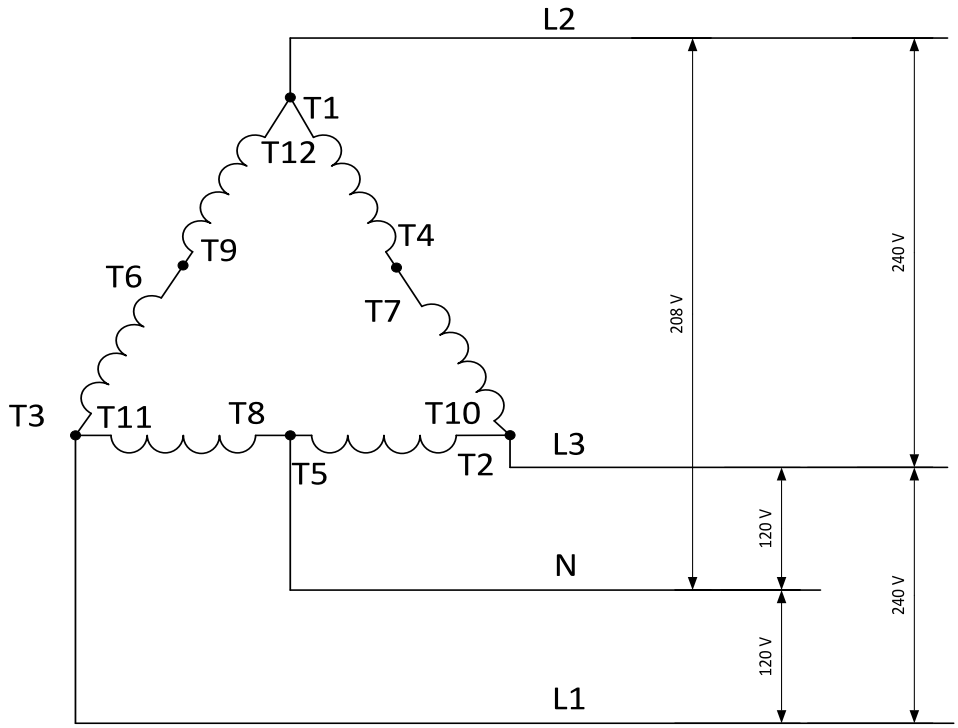


Image 4.15 Typical High Leg D generator wiring

Note: *Connection type 120/240V 3-PHASE,* ***Nominal Voltage High Leg D (page 217)****.*

Connection Type: 3 Phase 3 Wires

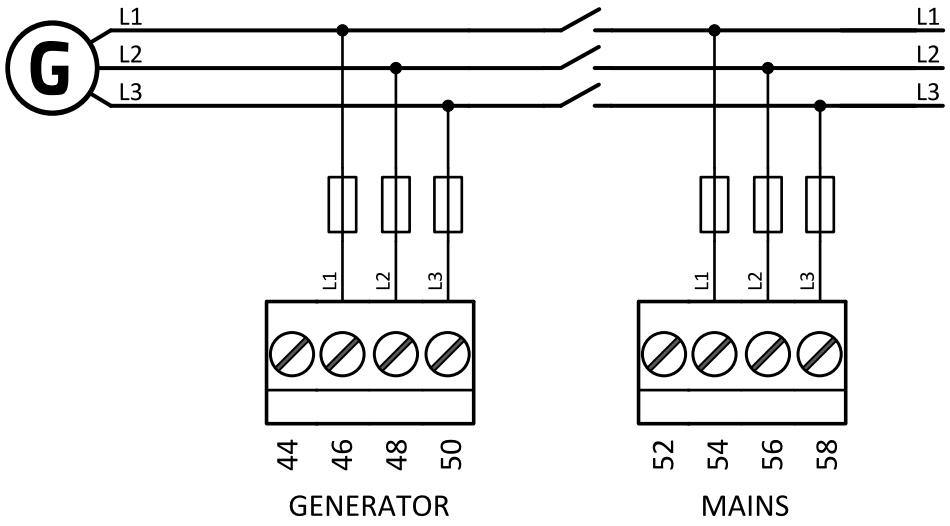


Image 4.16 3 phase application without neutral

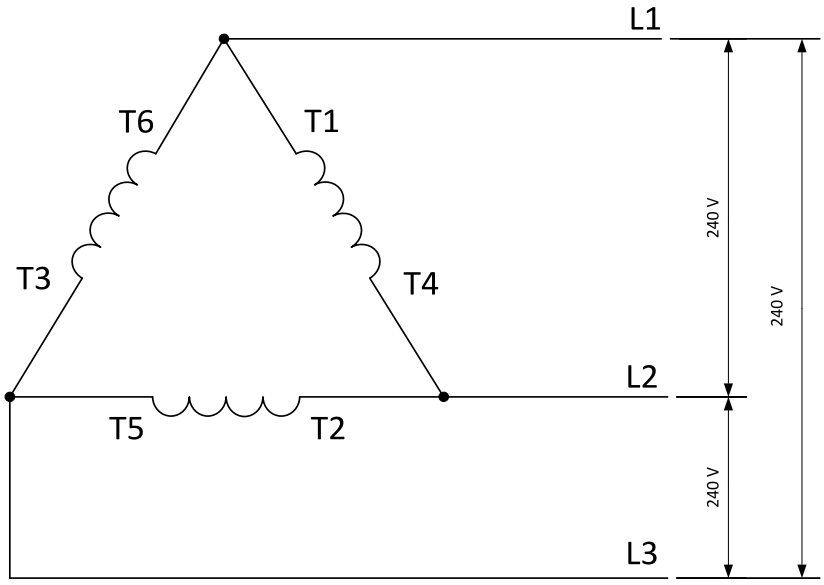


Image 4.17 Typical 3 Phase 3 Wires generator wiring

Connection Type: SplPhL1L2

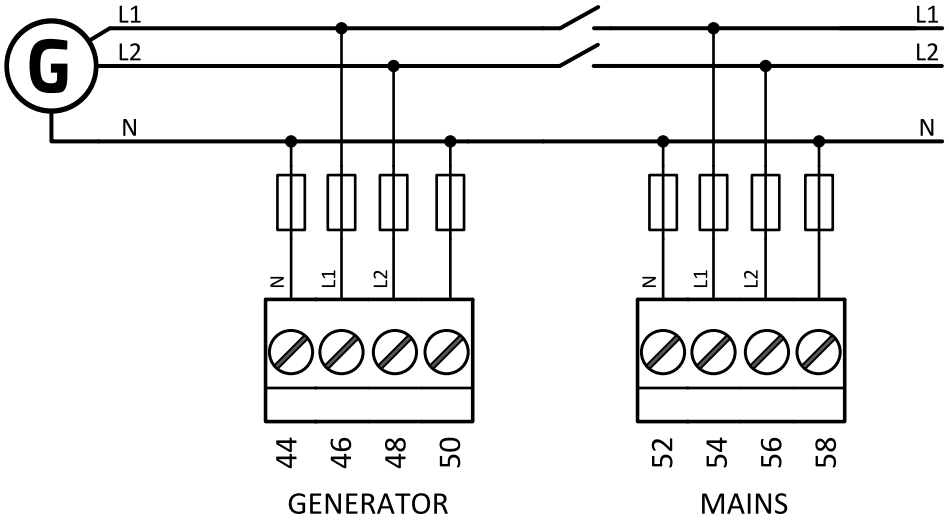


Image 4.18 Split phase L1L2 application

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

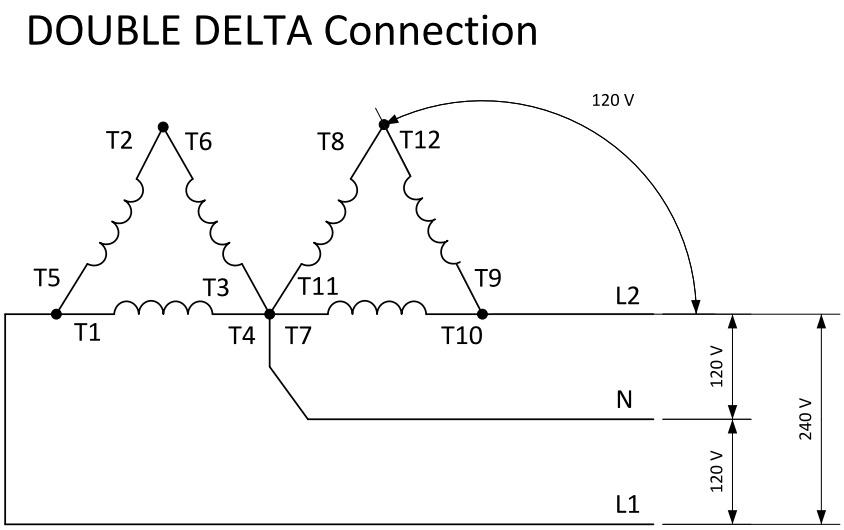


Image 4.19 Typical Split Phase generator wiring

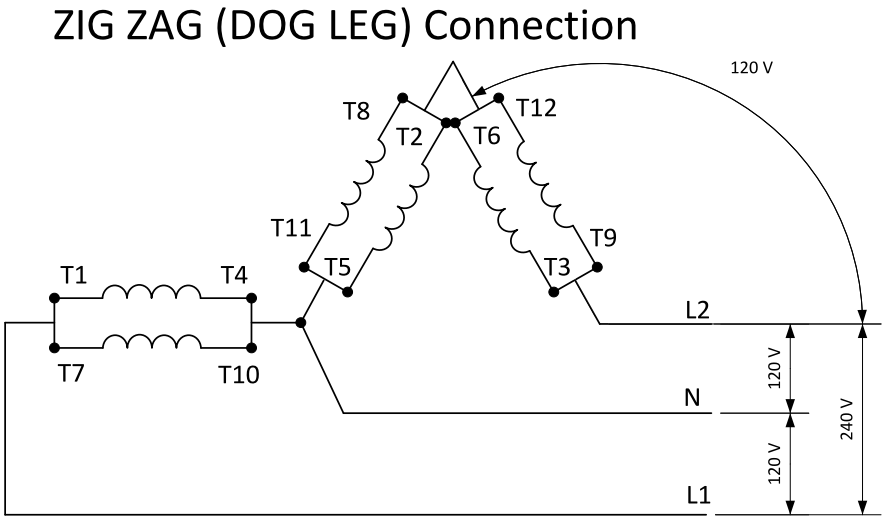


Image 4.20 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* ***Nominal Voltage SplitPhase (page 217)****.*

Connection Type: SplPhL1L3

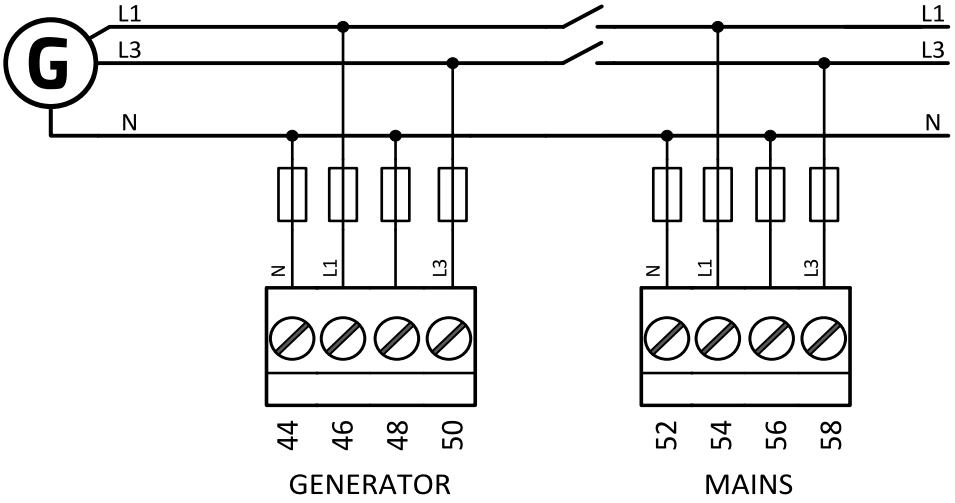


Image 4.21 Split phase L1L3 application

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

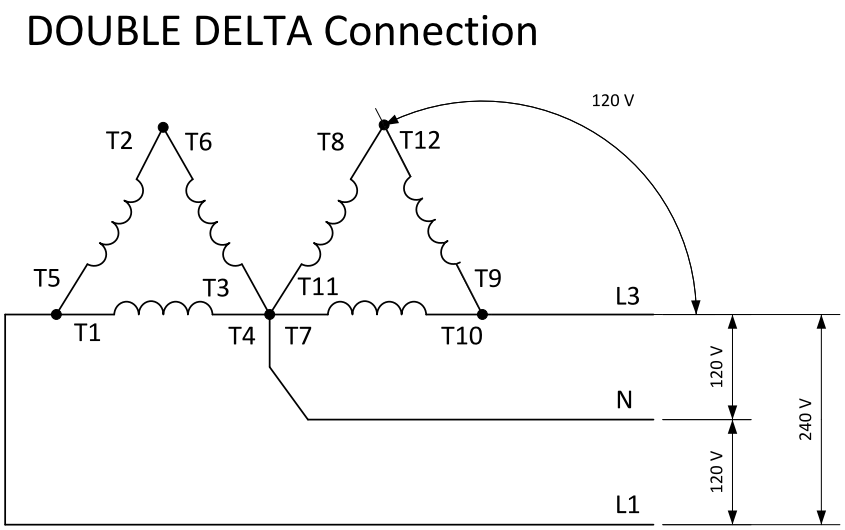


Image 4.22 Typical Split Phase generator wiring

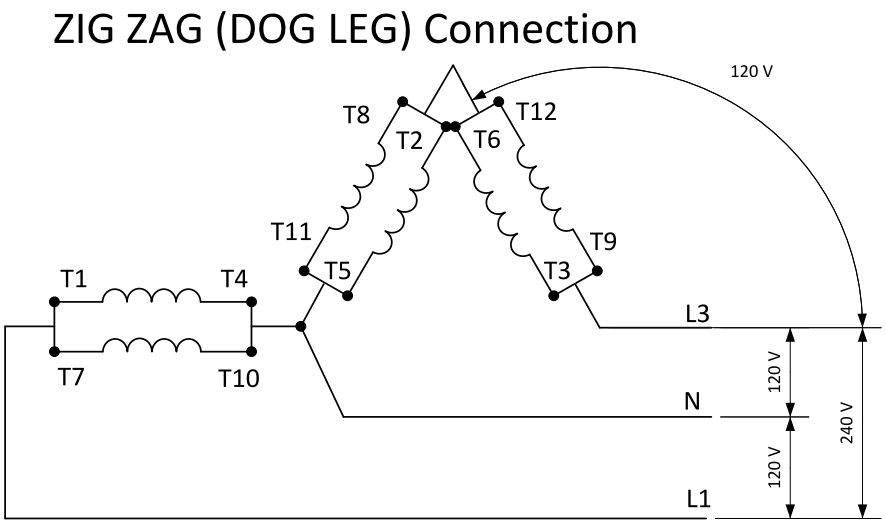


Image 4.23 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* ***Nominal Voltage SplitPhase (page 217)****.*

Connection Type: Mono Phase

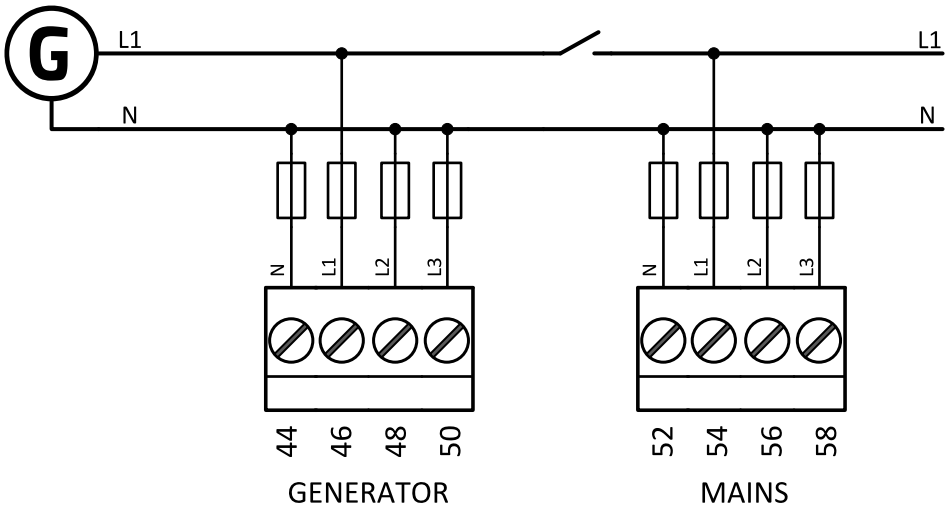


Image 4.24 Mono phase application

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

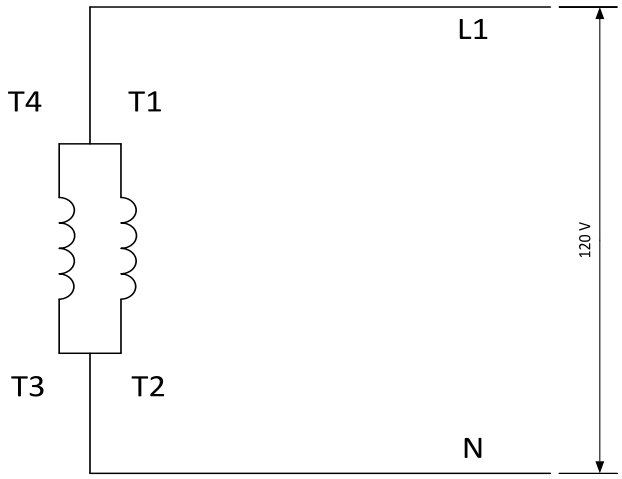


Image 4.25 Typical Mono Phase generator wiring

Voltage measurement MRS wiring

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 213)** [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph] options, each 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 213)** setting:

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

Connection Type: 3 Phase 4 Wires

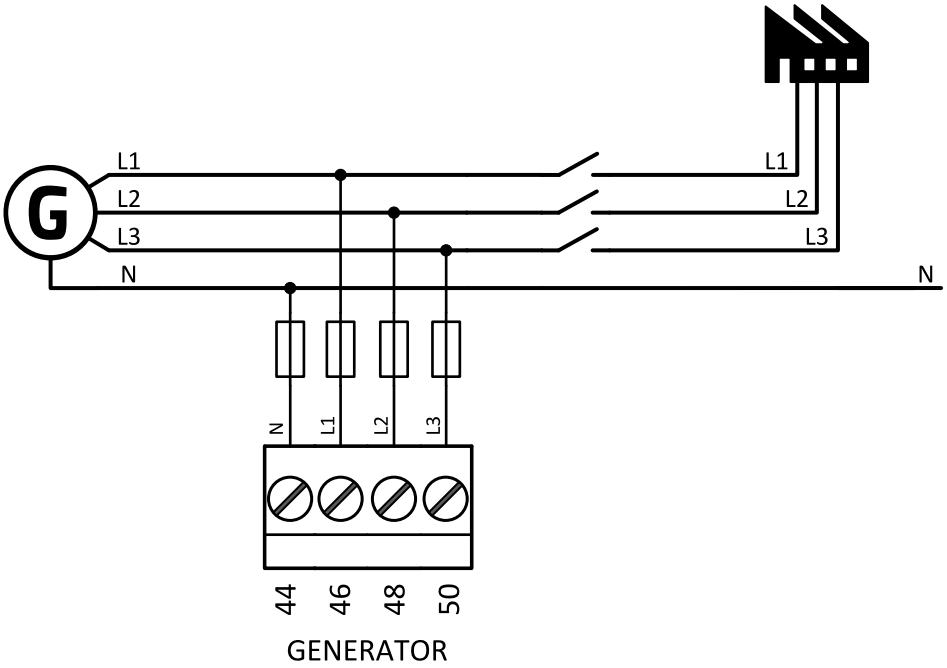


Image 4.26 3 phase application with neutral

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

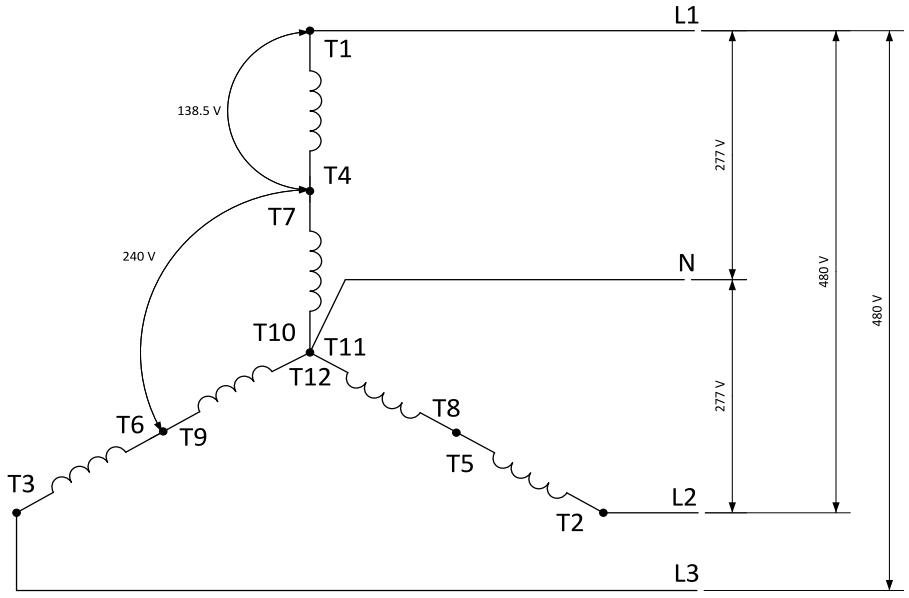


Image 4.27 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

Note: *Connection type 277/480V 3-PHASE,* ***Nominal Voltage 3Ph High Y (page 216)****.*

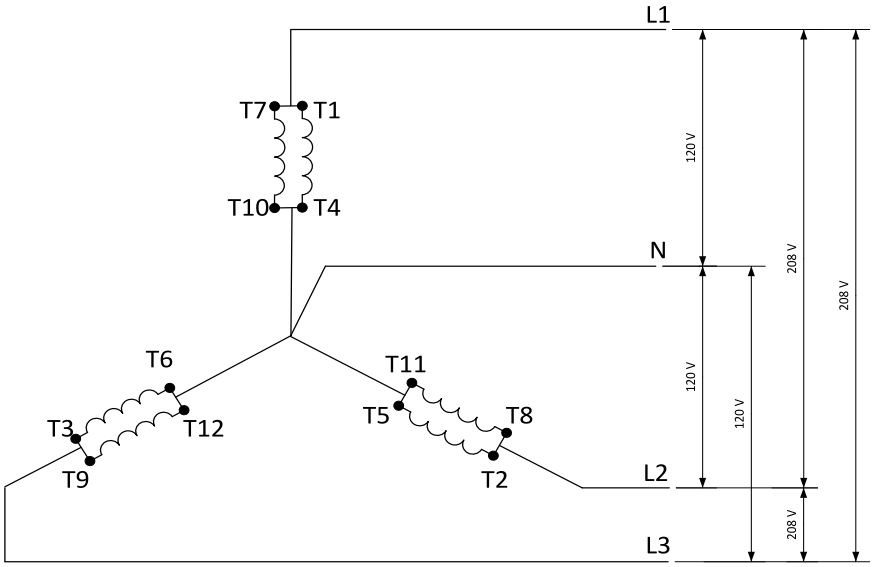


Image 4.28 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

Note: *Connection type 120/208V 3-PHASE,* ***Nominal Voltage 3Ph Low Y (page 216)****.*

Connection Type: 3 Phase 3 Wires

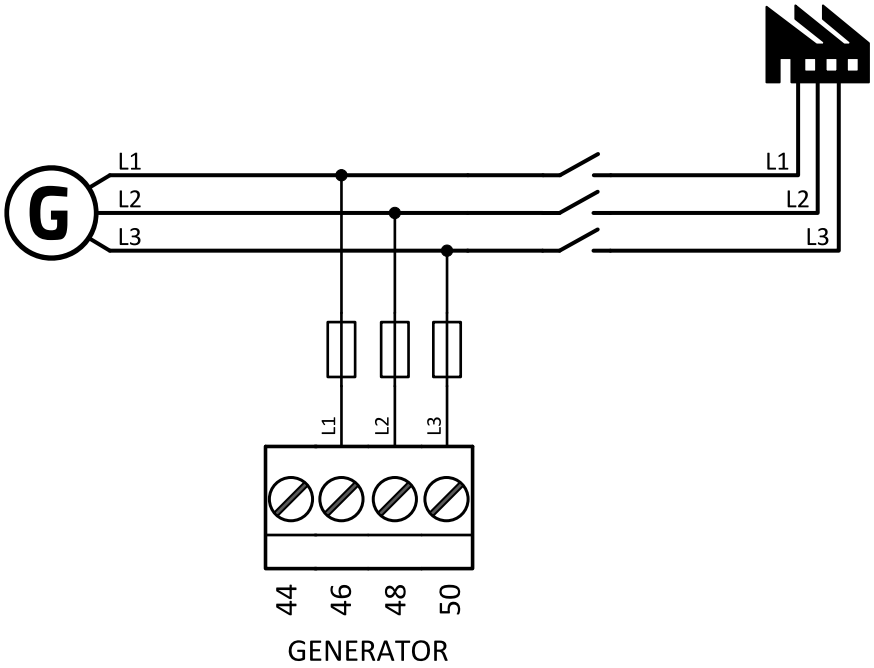


Image 4.29 3 phase application without neutral

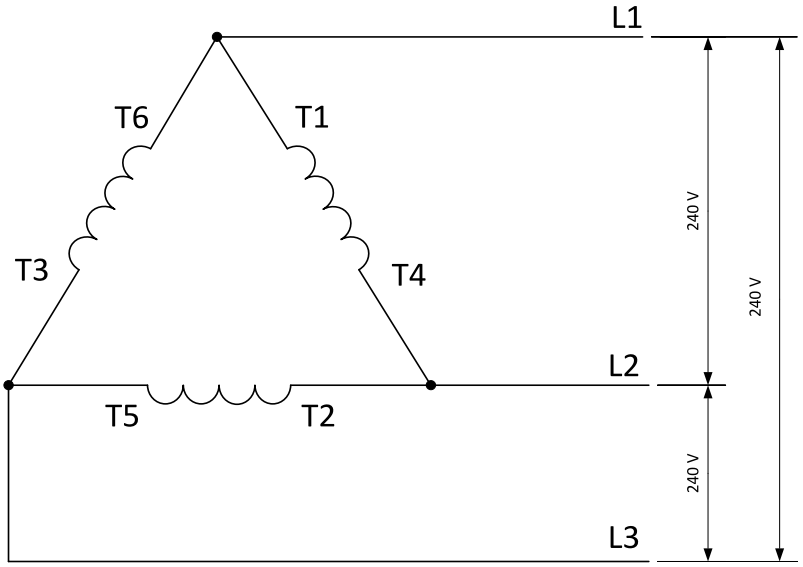


Image 4.30 Typical 3 Phase 3 Wires generator wiring

Connection Type: High Leg D

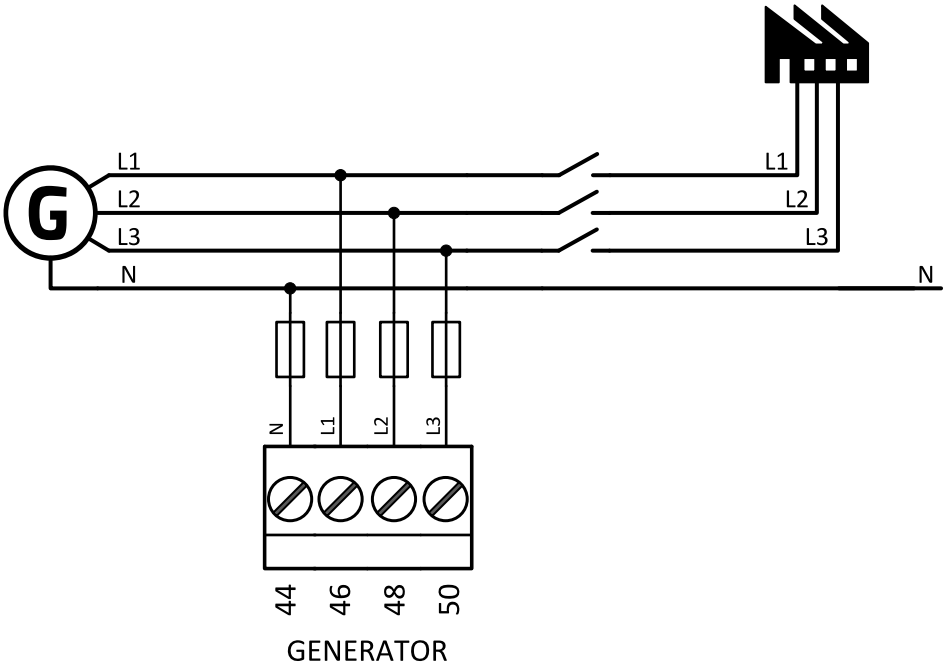


Image 4.31 High Leg Delta application

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

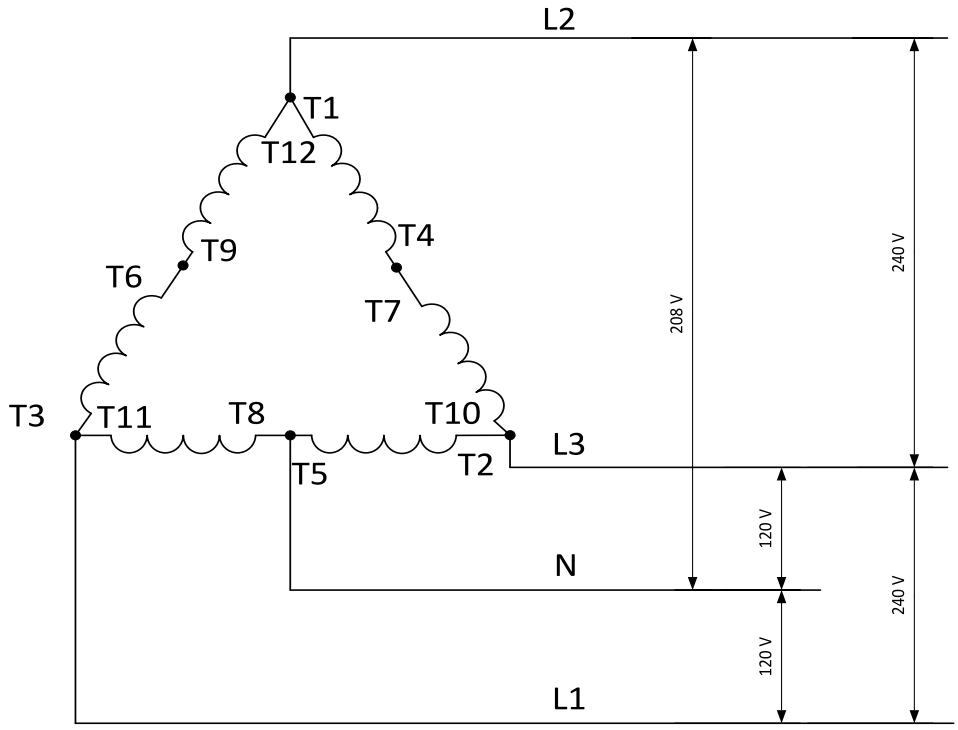


Image 4.32 Typical High Leg D generator wiring

Note: *Connection type 120/240V 3-PHASE,* ***Nominal Voltage High Leg D (page 217)****.*

Connection Type: SplPhL1L2

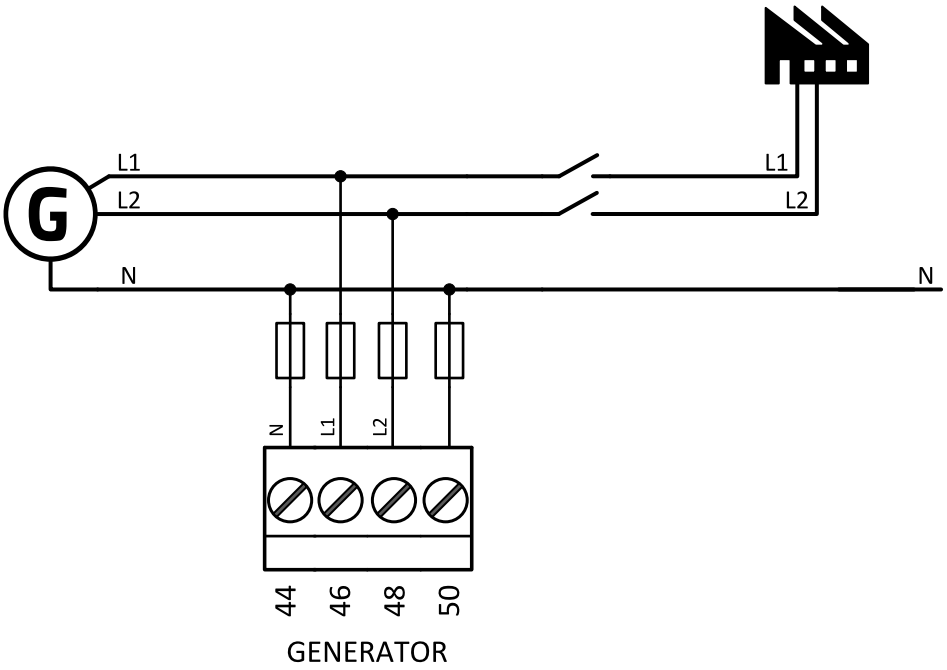


Image 4.33 Split phase L1L2 application

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

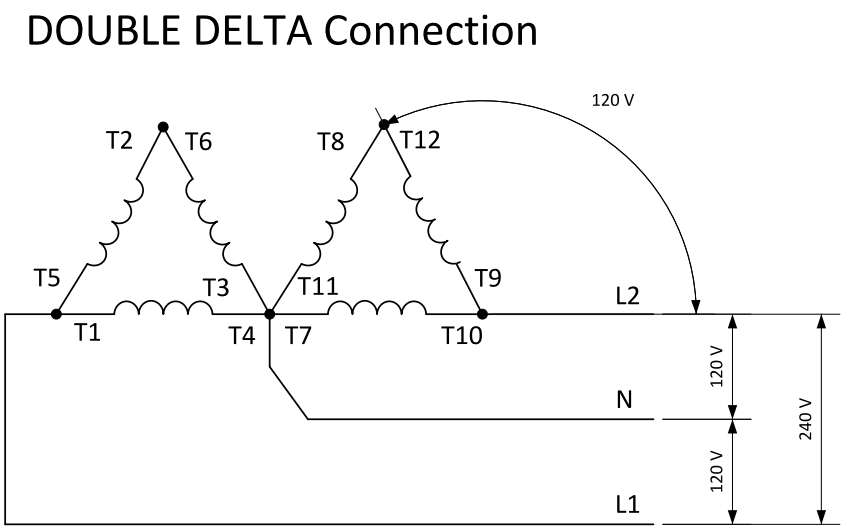


Image 4.34 Typical Split Phase generator wiring

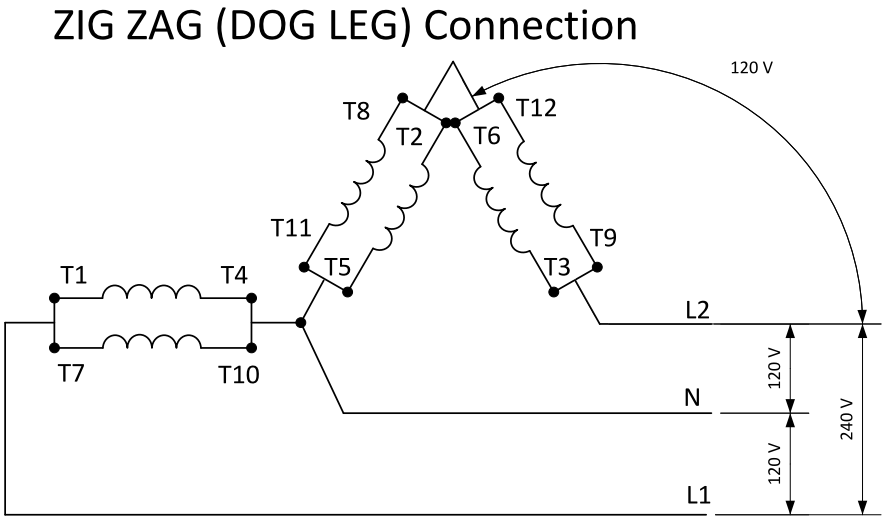


Image 4.35 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* ***Nominal Voltage SplitPhase (page 217)****.*

Connection Type: SplPhL1L3

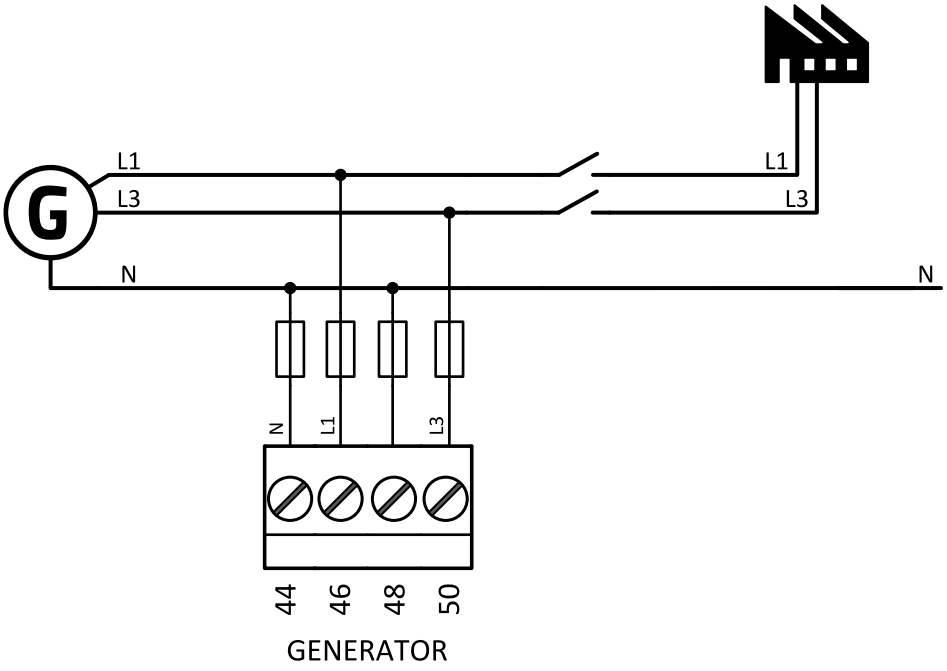


Image 4.36 Split phase L1L3 application

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

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

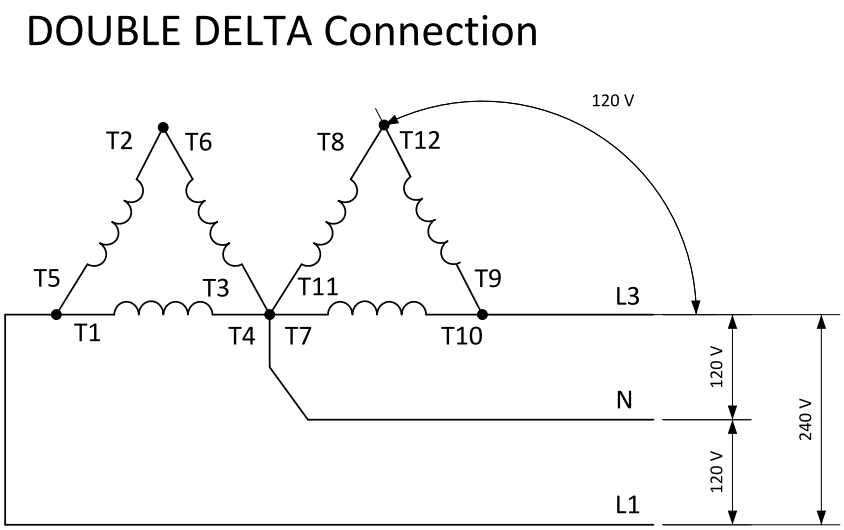


Image 4.37 Typical Split Phase generator wiring

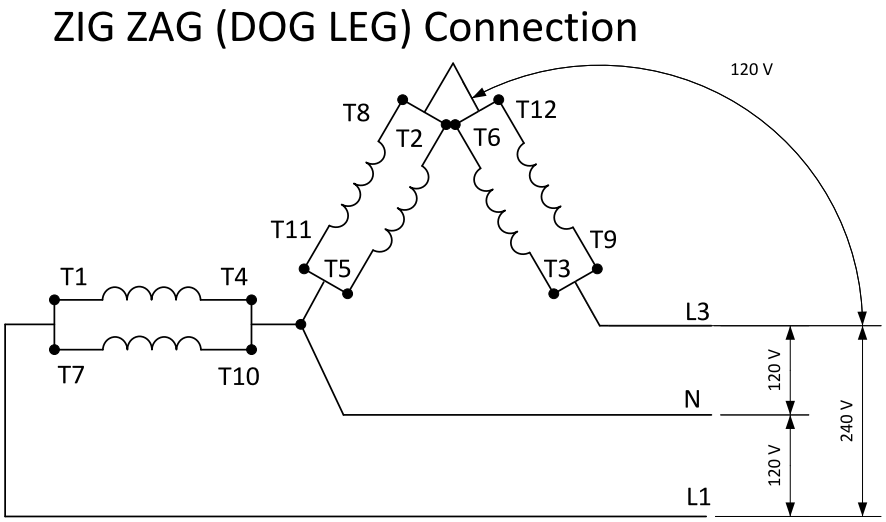


Image 4.38 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* ***Nominal Voltage SplitPhase (page 217)****.*

Connection Type: Mono Phase

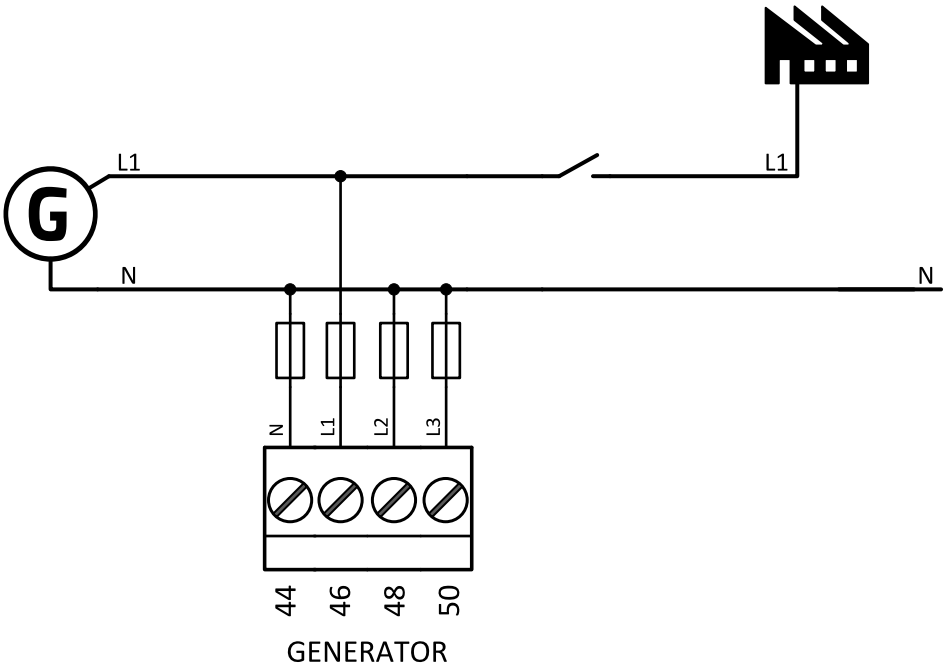


Image 4.39 Mono phase application

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

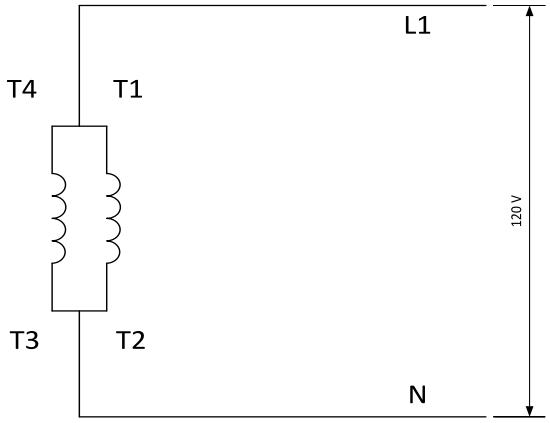


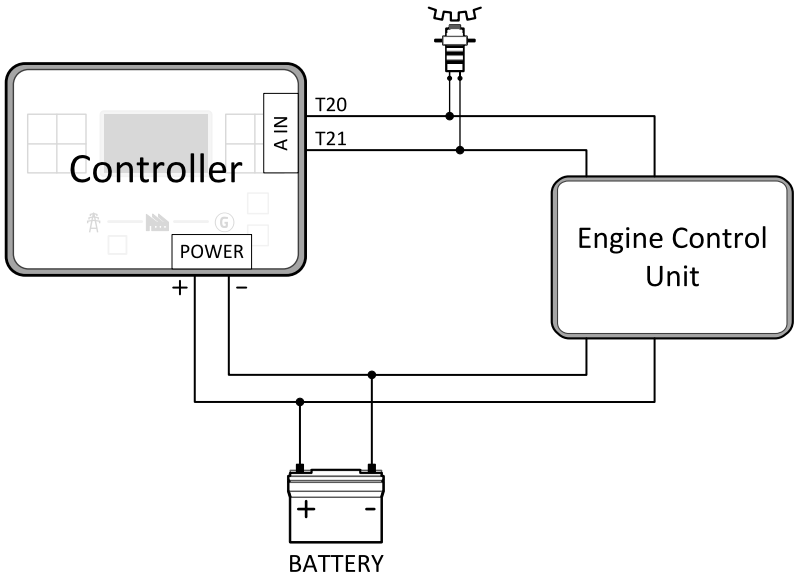
Image 4.40 Typical Mono Phase generator wiring

4.4.6 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 219)** according to the number of teeth on the flywheel.

For the details about the pick-up input parameters **see Technical data on page 201**.

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.*

4.4.7 Binary inputs

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

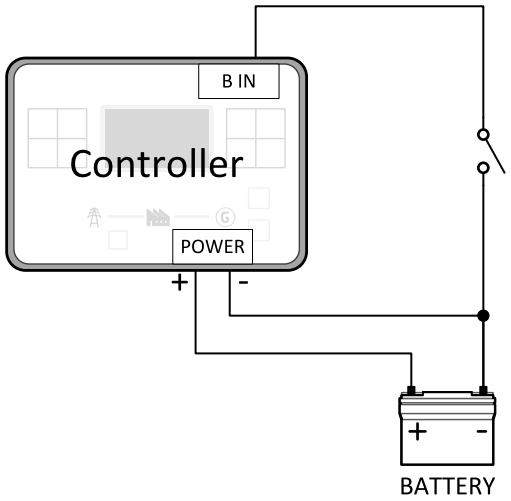


Image 4.41 Wiring binary inputs

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

4.4.8 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!

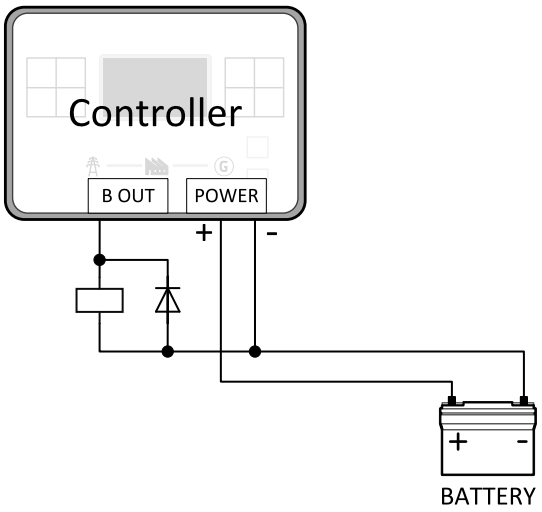
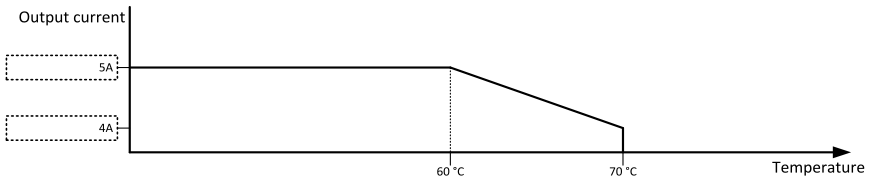


Image 4.42 Binary outputs wiring

Note: *Every single low current 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.

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



4.4.9 E-Stop

E-Stop has dedicated terminal T09. 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 163**.

Note: *This function has the same behavior as binary input* ***EMERGENCY STOP (PAGE 483)****.*

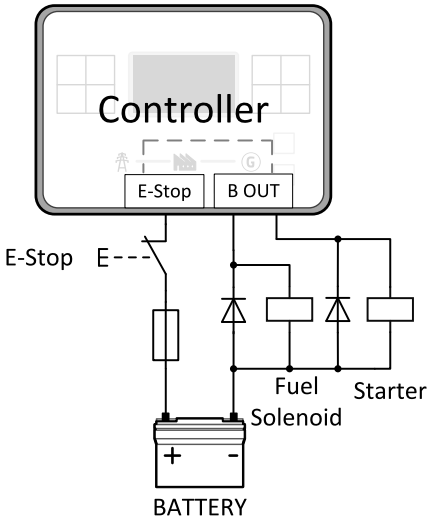


Image 4.43 E-Stop wiring

Note: *Recommended fusing is 10 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 T09 must be always wired. Terminal can be connected to battery+ or to terminal T03 (BATT+)*

IMPORTANT: Suppression diodes are not indicated, but required.

4.4.10 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.

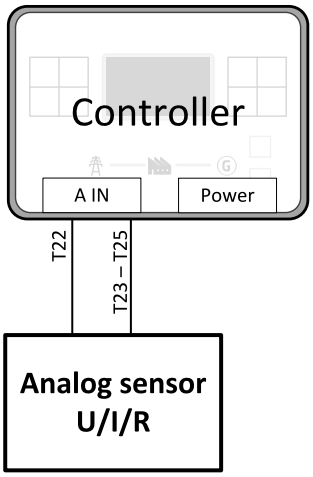


Image 4.44 Wiring of analog sensor

- 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.

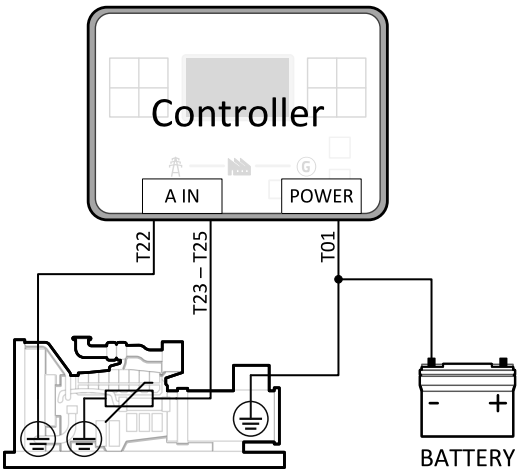


Image 4.45 Grounded sensors

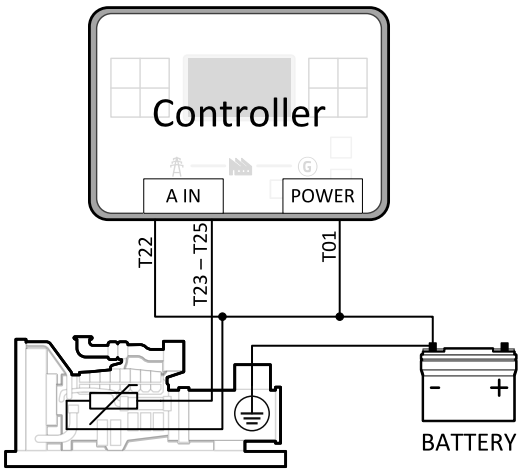


Image 4.46 Isolated sensors

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).

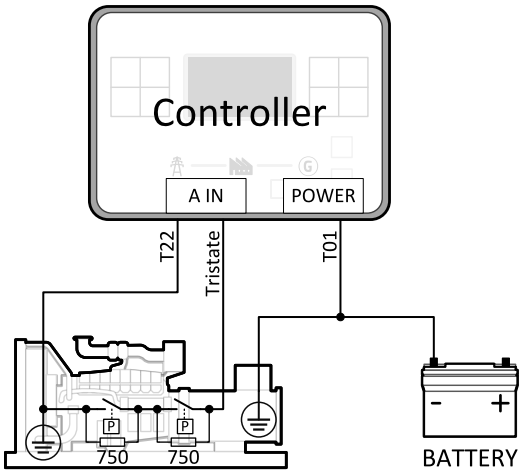


Image 4.47 Analog inputs as tristate

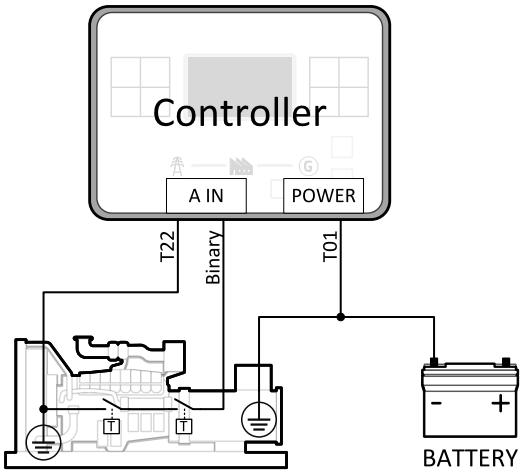


Image 4.48 Analog inputs as binary

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.*

Analog Voltage sensor

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

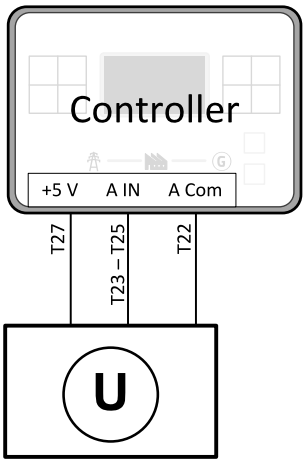


Image 4.49 Analog Voltage sensor

Note: *Maximal current of 5V output is 45 mA.*

4.4.11 CAN bus and RS485 wiring

CAN bus wiring

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

- The maximum length of the CAN bus depends on the communication speed. For a speed of 250 kbps, which is used on the CAN1 bus (extension modules, ECU), 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.*

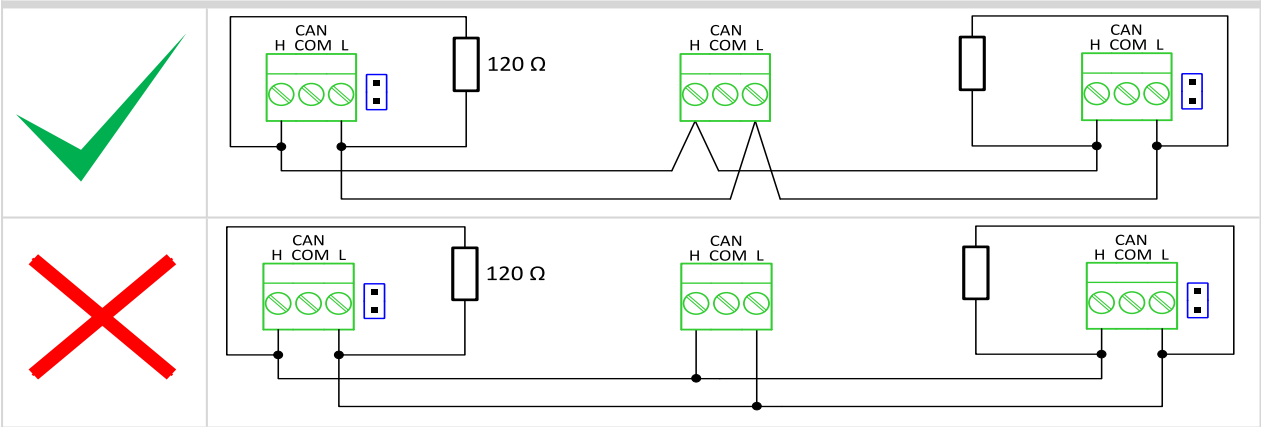


Image 4.50 CAN bus topology

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

- For shorter distances (connection within one building)

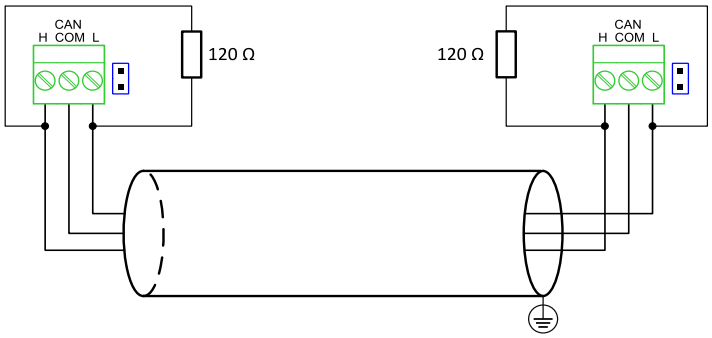


Image 4.51 CAN bus wiring for shorter distances

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.)

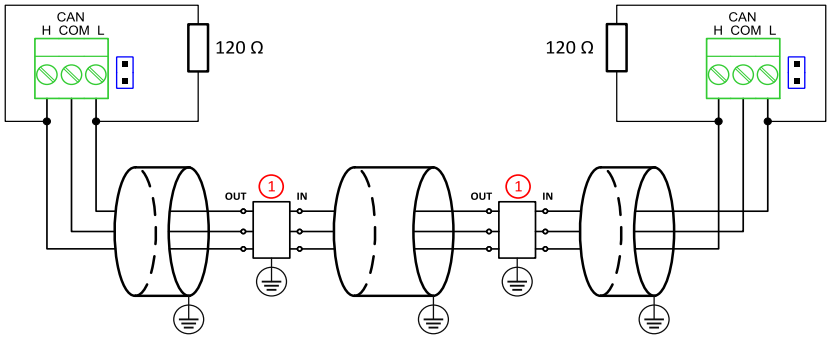


Image 4.52 CAN bus wiring for longer distances

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)

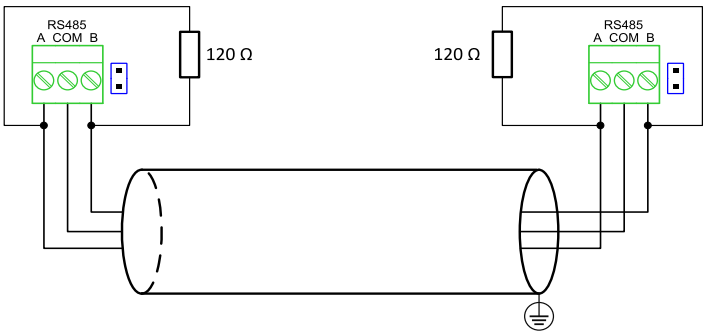


Image 4.53 RS485 wiring for shorter distances

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

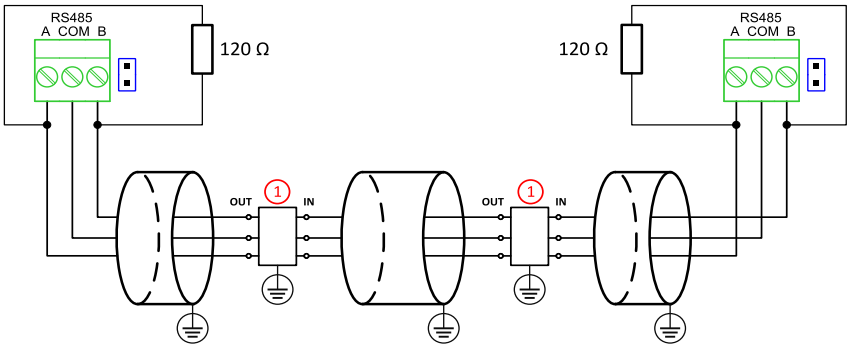


Image 4.54 RS485 wiring for longer distances

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

4.4.12 USB

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

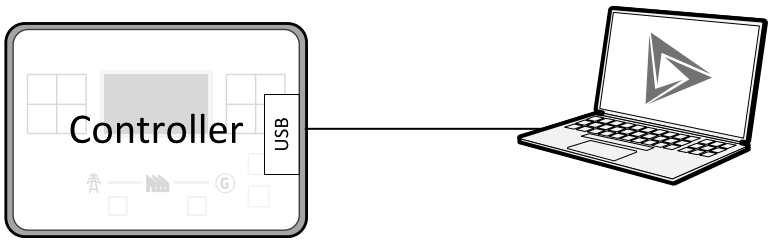


Image 4.55 USB connection

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.**

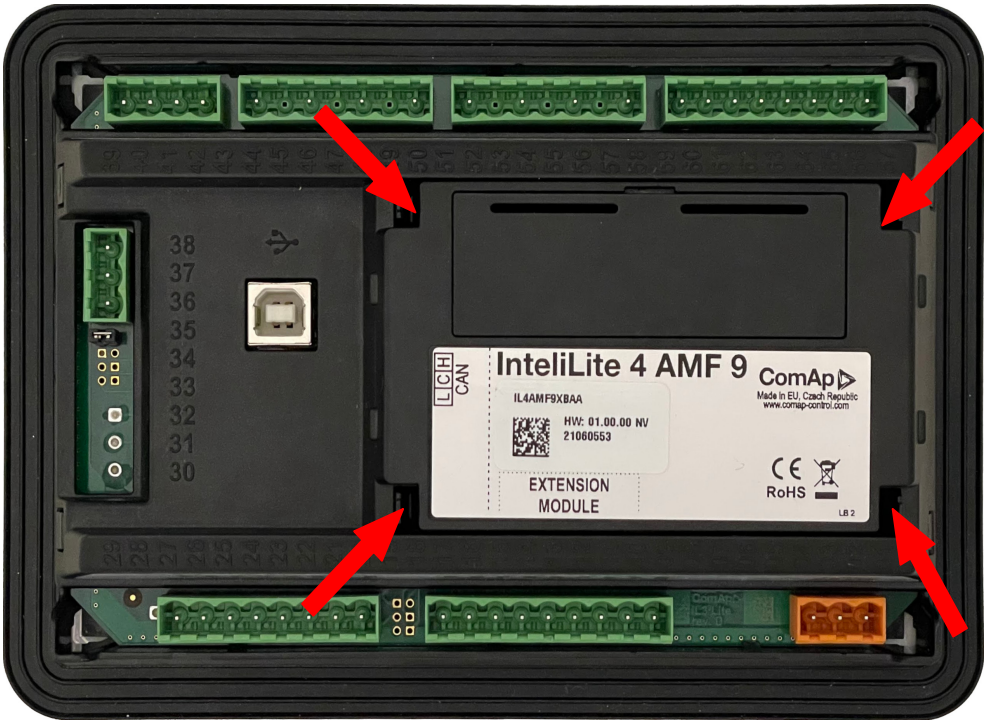
back to Recommended wiring

4.5 Plug-in module installation

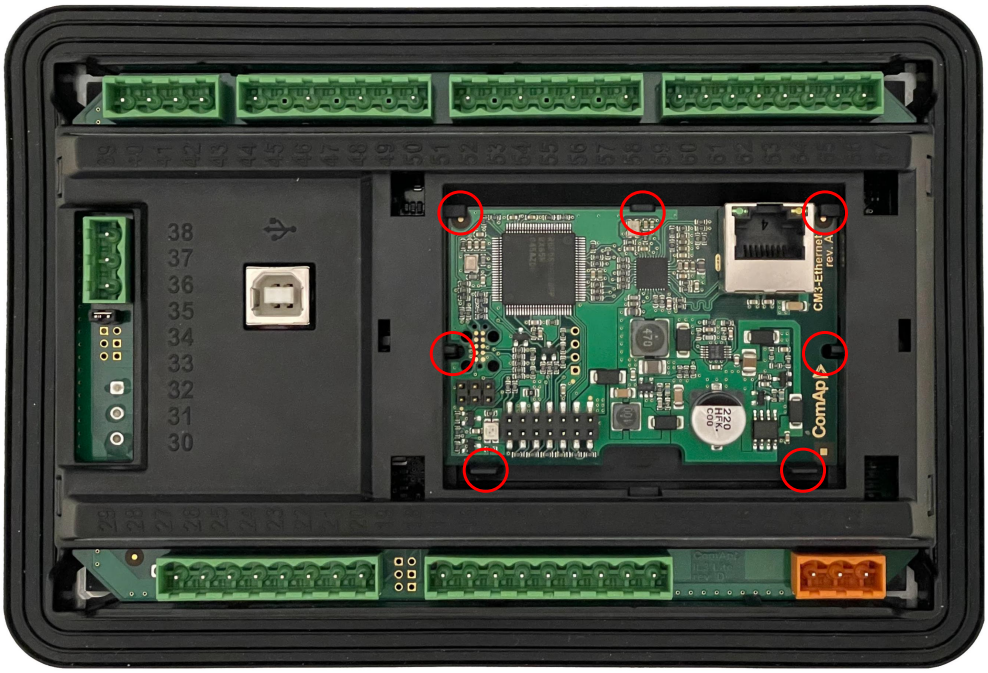
4.5.1 Installation

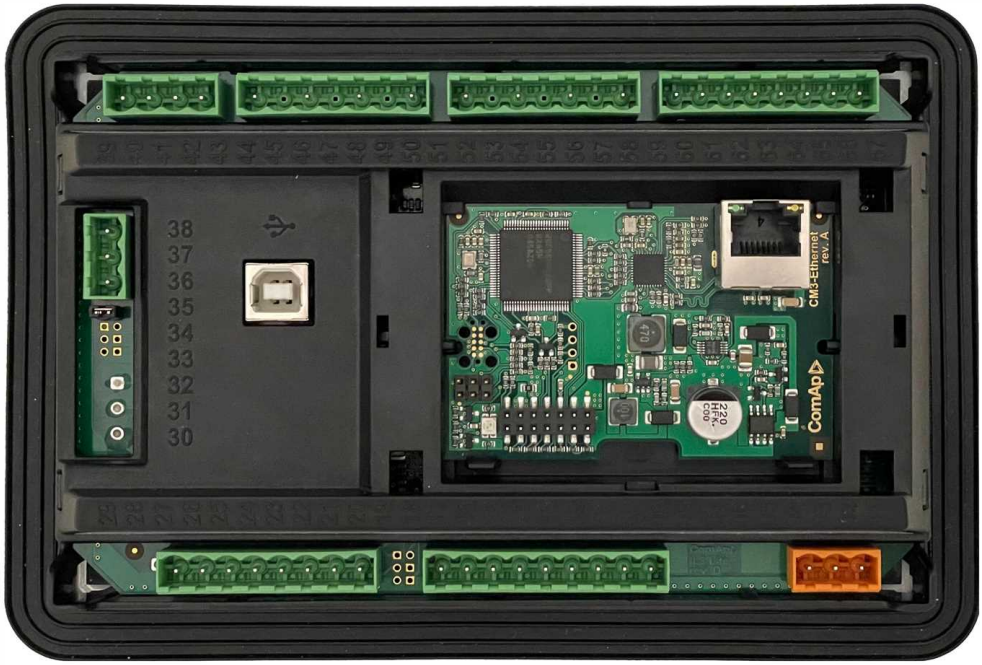
> **IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**

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.



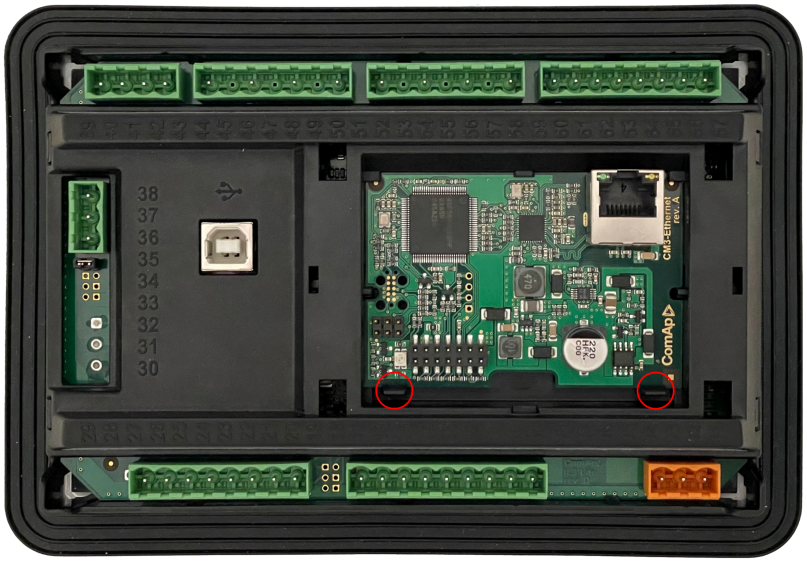


After locking the plug-in module into holders, place back the back cover (small cover for connectors has to be removed from back cover). Finally insert the small cover for connectors. Small covers are unique for each plug-in module.

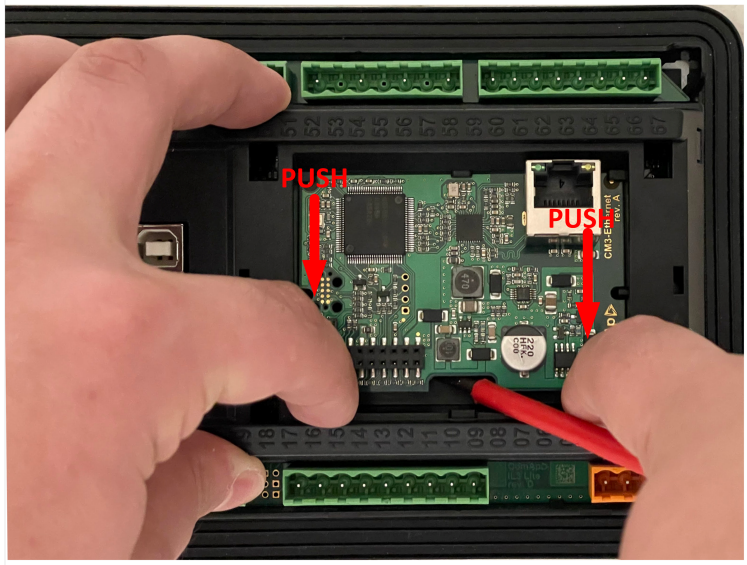
4.5.2 Removing of the plug-in module

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

Every plug-in module is held by two plastic holders which are in the picture marked with red circles.



The easiest way how to remove the plug-in module is to use flat screwdriver and fingers. Put the end of the screwdriver under the plug-in module and index fingers on the plastic holders. Now push with your fingers in the direction as it is shown in the picture and with the screwdriver gently push from below. The plug-in module should pop out of the holders and can be easily removed.



4.6 Maintenance

4.6.1 Backup battery replacement

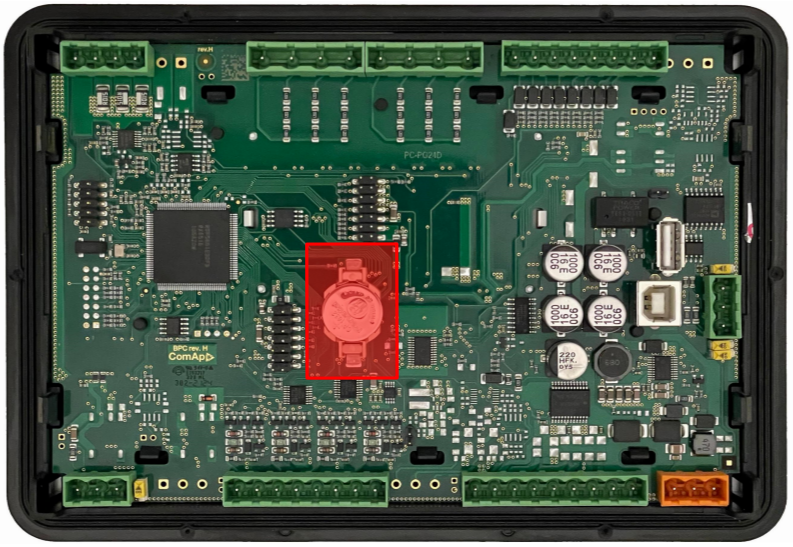
This battery serves to maintain the run of RTC (real time clock) so that controller does not lose information about time and date when disconnected from power supply.

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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5.5 Functions 101
5.6 User management and data access control 166

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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 487)**
BIN2	Mains circuit breaker feedback	**MCB FEEDBACK (PAGE 490)**
BIN3	Remote control Lock	**Not Used**
BIN4	Access Lock	**ACCESS LOCK (PAGE 473)**
BIN5	Switch controller to OFF mode	**REMOTE OFF (PAGE 494)**
BIN6	Switch controller to TEST mode	**REMOTE TEST (PAGE 496)**
BIN7	Suppression of alarms	**SD OVERRIDE (PAGE 496)**
BIN8	Free slot	**Not Used**

5.1.2 Binary outputs

Number	Description	Function
BOUT1	Starter motor control	**STARTER (PAGE 539)**
BOUT2	Fuel solenoid valve	**FUEL SOLENOID (PAGE 516)**
BOUT3	Indication of breaker state	**GCB CLOSE/OPEN (PAGE 518)**
BOUT4	Indication of breaker state	**MCB CLOSE/OPEN (PAGE 529)**
BOUT5	Activation of any devices before start	**PRESTART (PAGE 534)**
BOUT6	Gen-set can be connected to load	**READY TO LOAD (PAGE 537)**
BOUT7	Indication of unconfirmed alarm	**ALARM (PAGE 507)**
BOUT8	Free slot	**NOT USED (PAGE 534)**

5.1.3 Analog inputs

Number	Configured sensor	Function
AIN1	VDO 10 Bar	**OIL PRESSURE (PAGE 547)**
AIN2	VDO40-120°C	**COOLANT TEMP (PAGE 547)**
AIN3	VDOLevel %	**FUEL LEVEL (PAGE 547)**

5.2 Controller configuration and PC tools connection

5.2.1 USB 64
5.2.2 RS232/RS485 65
5.2.3 Ethernet 66

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

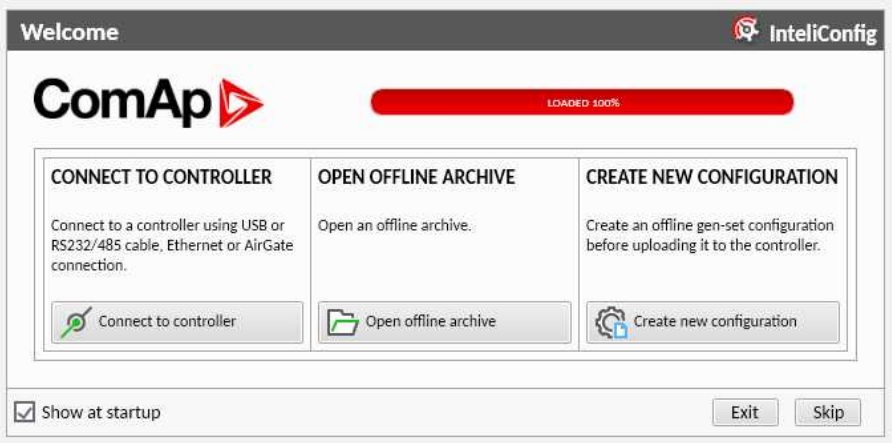


Image 5.1 First screen of InteliConfig – select connect to controller



Image 5.2 Second screen of InteliConfig – select detected controllers

Connection using WinScope 1000

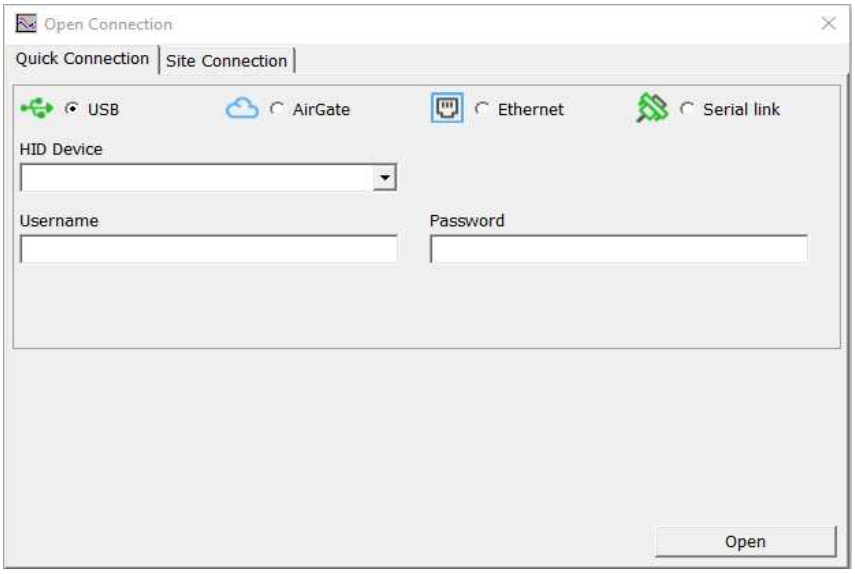


Image 5.3 WinScope 1000 screen – select USB connection

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 359)** = Direct
- **Controller Address (page 228)** must be set

Connection using InteliConfig

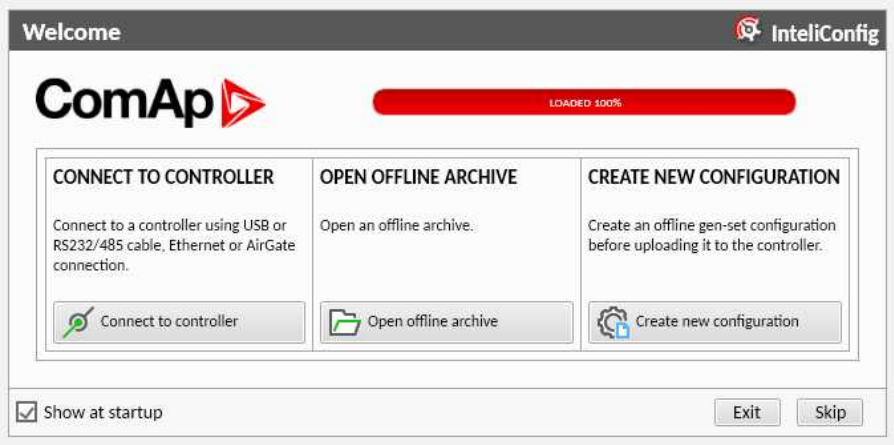


Image 5.4 First screen of InteliConfig – select connect to controller

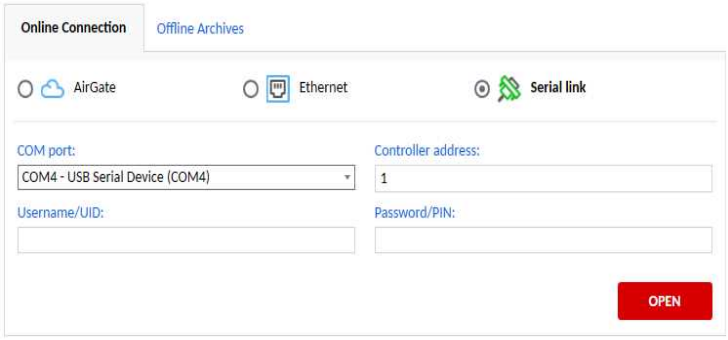


Image 5.5 Second screen of InteliConfig – select Serial link

Connection using WinScope 1000

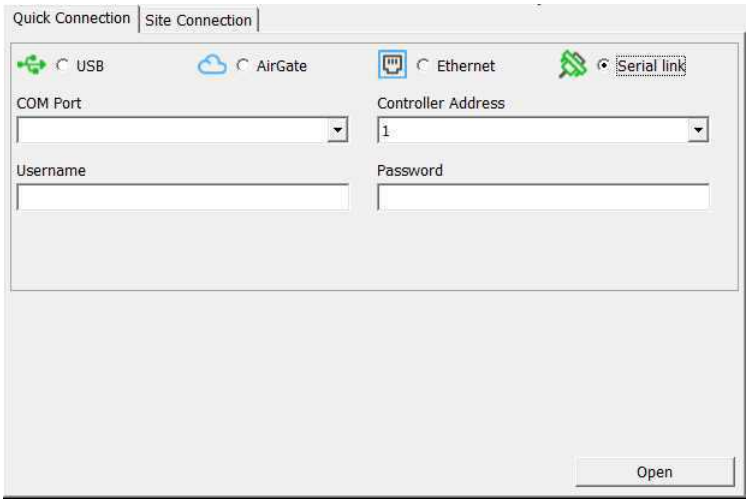


Image 5.6 WinScope 1000 screen – select serial link

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.

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 228)** must be set to the same value as in the PC tool
- **IP Address Mode (page 384)** can be set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED
- **IP Address (page 385)** is either set automatically or it can be adjusted to a specific requested value
- **Subnet Mask (page 385)** is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 386)** can be set here when it is used

Connection using InteliConfig

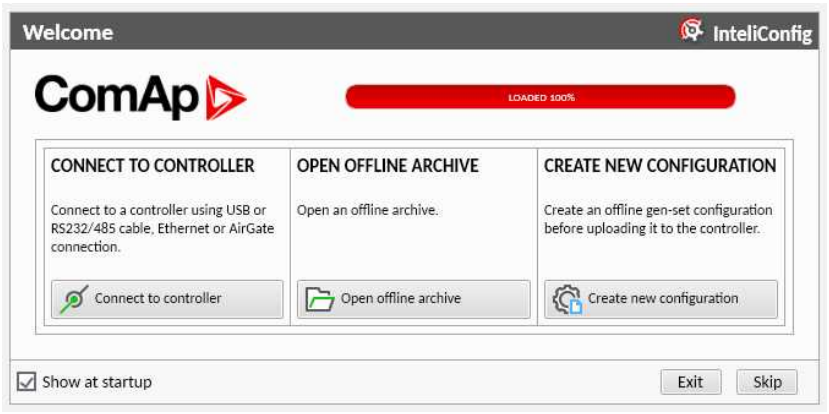


Image 5.7 First screen of InteliConfig – select connect to controller

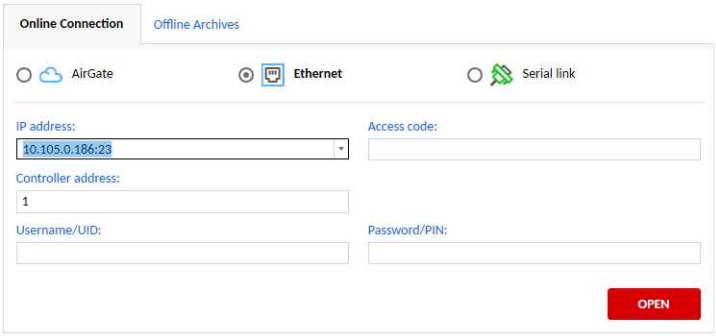


Image 5.8 Second screen of InteliConfig – select Internet / Ethernet

Connection using WinScope 1000

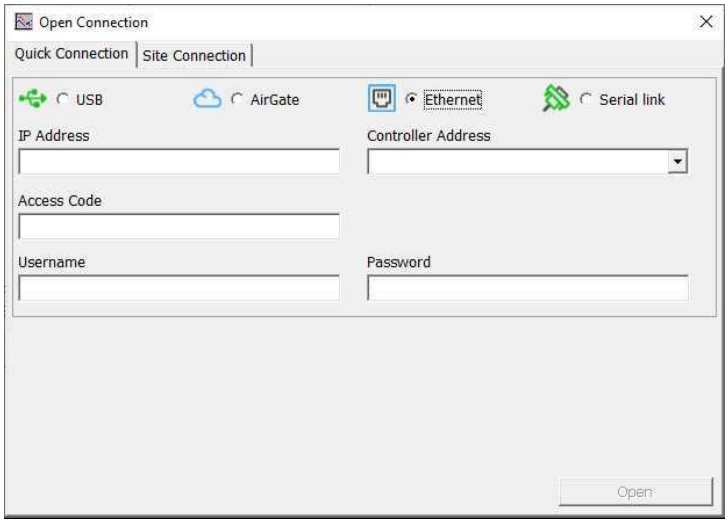


Image 5.9 WinScope 1000 screen – select Ethernet

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 228)** has to be set to the same value as in the PC tool
- **IP Address Mode (page 384)** must set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED
- **IP Address (page 385)** is either set automatically or it can be adjusted to a specific requested value
- **Subnet Mask (page 385)** is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 386)** can be set here when it is used
- **AirGate Connection (page 388)** must be set to Enabled
- **AirGate Address (page 389)** 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.

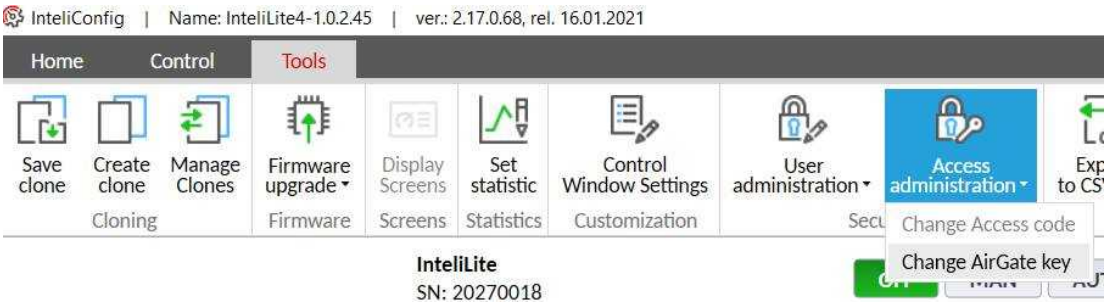
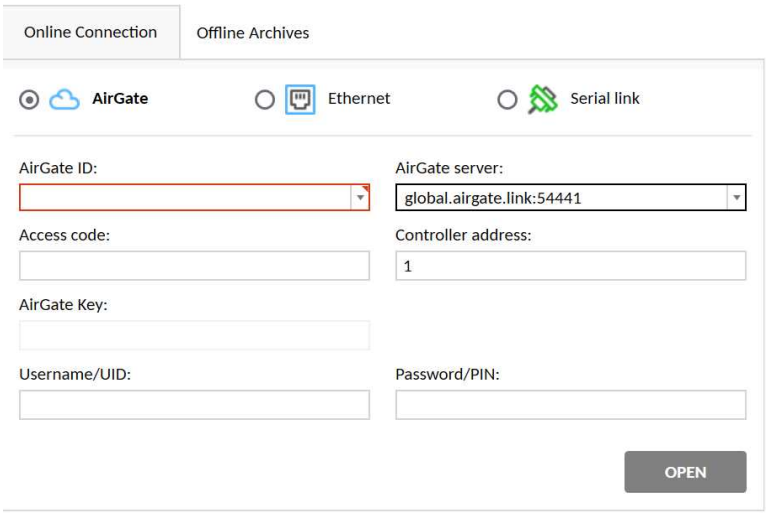


Image 5.10 Changing AirGate key

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 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 two different AirGate ID.*

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 ID (page 463)**
- AirGate Server → **AirGate Address (page 389)**
- **Controller Address (page 228)**
- 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.



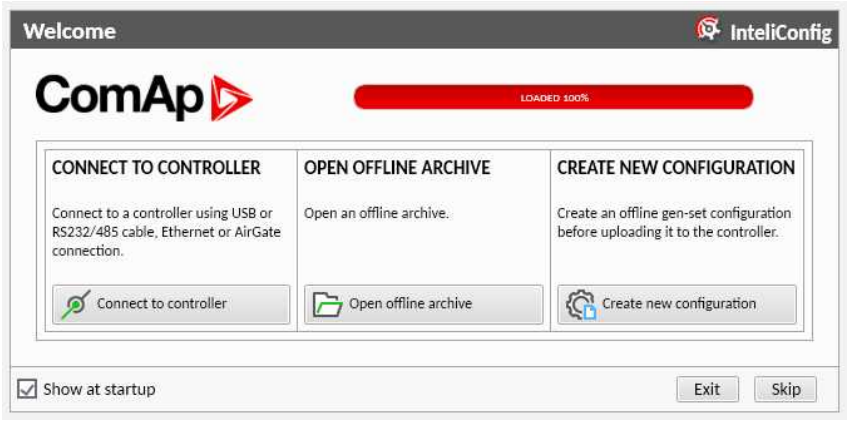


Image 5.11 First screen of InteliConfig – select connect to controller

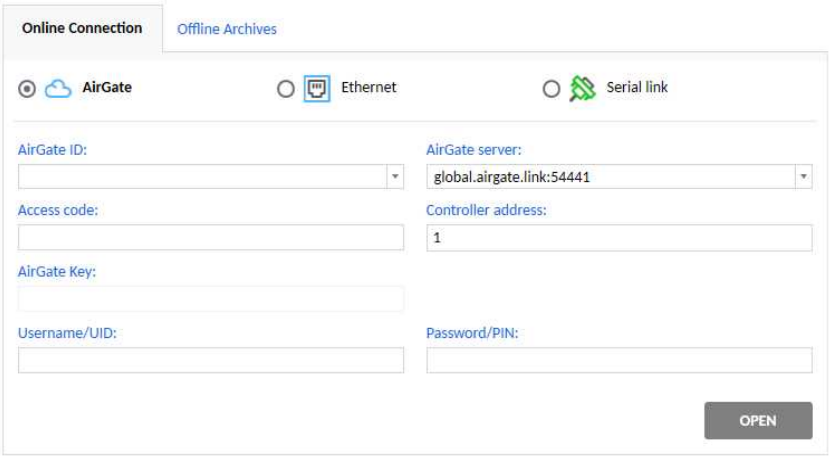


Image 5.12 Second screen of InteliConfig – AirGate

Connection using WinScope 1000

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

- **AirGate ID (page 463)**
- AirGate Server → **AirGate Address (page 389)**
- **Controller Address (page 228)**
- 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.



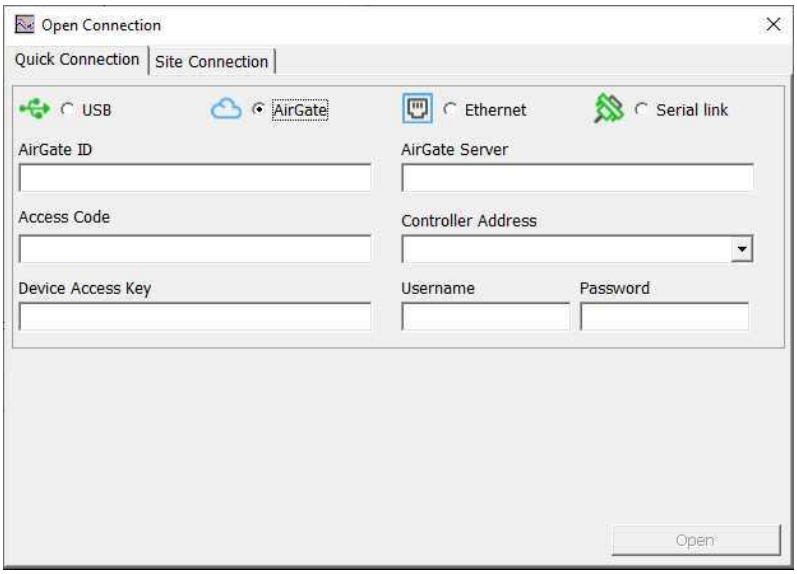


Image 5.13 WinScope 1000 screen – select AirGate

5.3 Operator Guide

5.3.1 Front panel elements 73
5.3.2 Display screens and pages structure 75
5.3.3 Browsing alarms 88
5.3.4 Login 89
5.3.5 Production mode 92
5.3.6 Information screen 93
5.3.7 Language selection 95
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5.3.1 Front panel elements

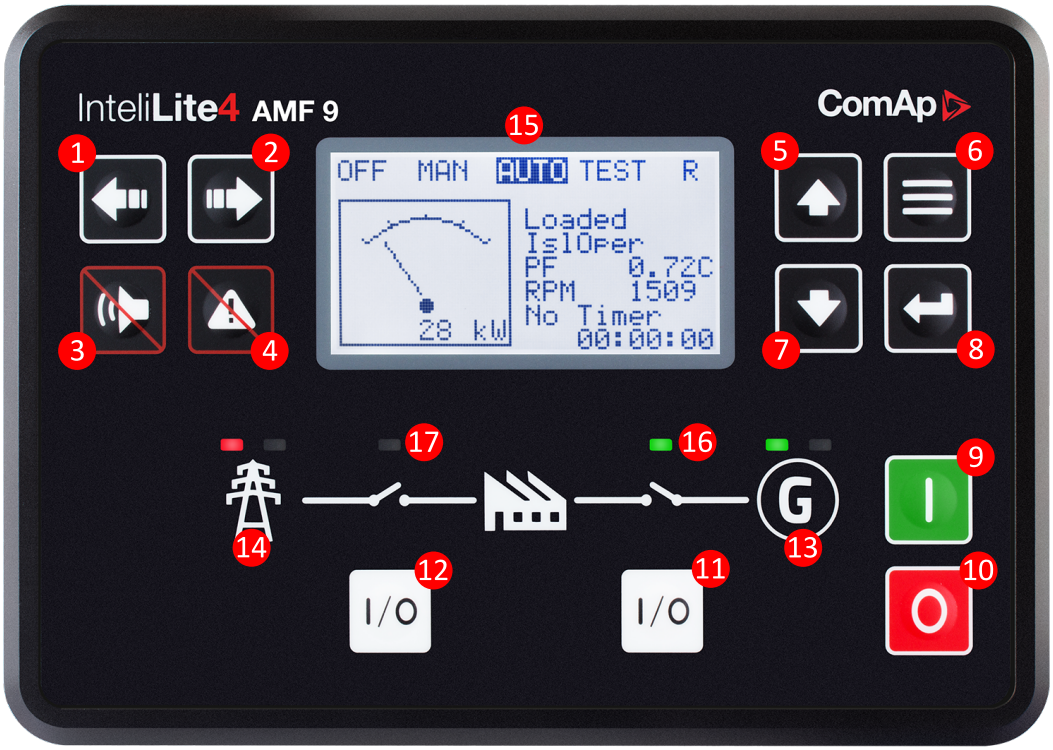


Image 5.14 Operator interface of InteliLite 4 AMF 9

Control buttons		
Position	**Picture**	**Description**
1		**LEFT** button. Use this button to move left or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed.

		***Note:** This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.*
2		**RIGHT** button. Use this button to move right or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed. ***Note:** This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.*
3		**HORN RESET** button. Use this button to deactivate the horn output without acknowledging the alarms.
4		**FAULT RESET** button. Use this button to acknowledge alarms and deactivate the horn output. Inactive alarms will disappear immediately and status of active alarms will be changed to "confirmed" so they will disappear as soon as their reasons dismiss.
5		**UP** button. Use this button to move up or increase value.
6		**PAGE** button. Use this button to switch over display pages.
7		**DOWN** button. Use this button to move down or decrease value.
8		**ENTER** button. Use this button to finish editing a setpoint or moving right in the history page.
9		**START** button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.
10		**STOP** button. Works in MAN mode only. Press this button to initiate the stop sequence of the Gen-set. Repeated pressing of button will cancel current phase of stop sequence (like cooling) and next phase will continue.
11		**GCB** button. Works in MAN mode only. Press this button to open or close the GCB.
12		**MCB** button. Works in MAN mode only. Press this button to open or close the MCB.
Indicators and others		
Position	**Description**	
13	**GENERATOR** status indicator. There are two states – Gen-set OK (indicator is green) and Gen-set failure (indicator is red). Green LED is on if the generator voltage and frequency is present and within limits. Red LED starts flashing when Gen-set failure occurs. After FAULT RESET button is pressed, Red LED goes to steady light (if an alarm	

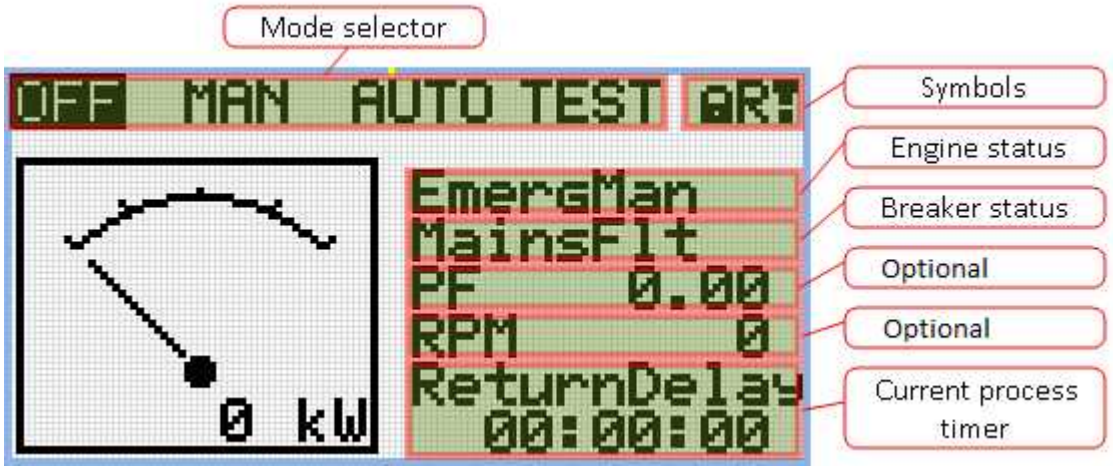
	is still active) or is off (if no alarm is active).
14	**MAINS** status indicator. There are two states – Mains OK (indicator is green) and Mains failure (indicator is red). Green LED is on, if mains is present and within limits. Red LED starts blinking when the mains failure is detected and after the Gen-set has started and connected to the load it lights permanently until the mains failure disappears.
15	Graphic B/W display, 132 × 64 px.
16	**GCB Status**. Green LED is on if GCB is closed. It is driven by GCB CLOSE/OPEN output or by GCB feedback signal.
17	**MCB Status**. Green LED is on if MCB is closed. It is driven by MCB CLOSE/OPEN output or by MCB feedback signal.

5.3.2 Display screens and pages structure

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

- The page Measurement consists of screens which display measured values such as voltages, current, oil pressure etc.; computed values such as Gen-set power, statistic data and the alarm list on the last screen.
- The page setpoints contains all setpoints organized to groups and also a special group for entering a password.
- The page History log shows the history log with the most recent record displayed first.

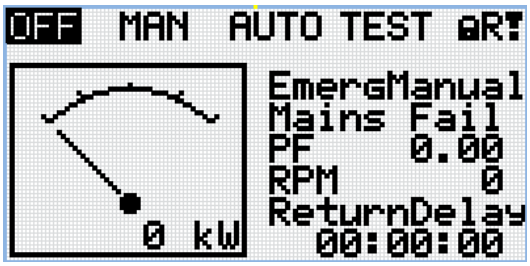
Main Screen

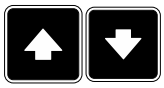


Symbols

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

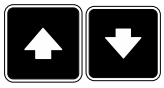
Measurement Screens



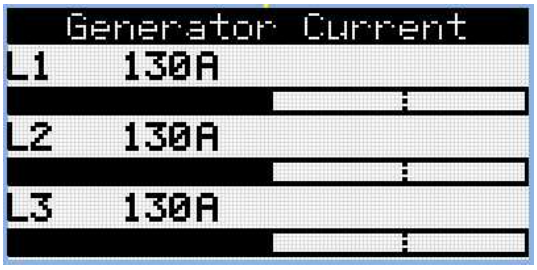


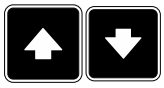
Note: *Use the Up and Down buttons to move between measurement pages.*



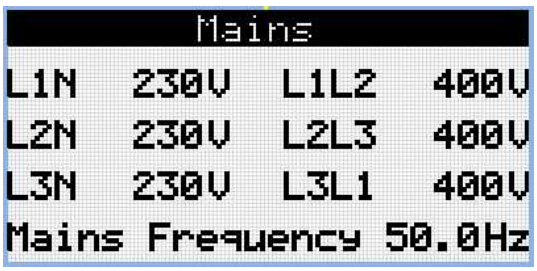


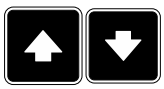
Note: *Use the Up and Down buttons to move between measurement pages.*



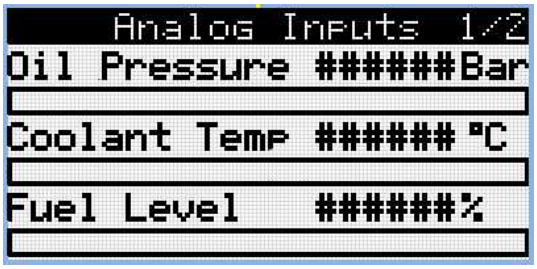


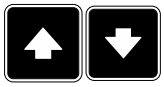
Note: *Use the Up and Down buttons to move between measurement pages.*



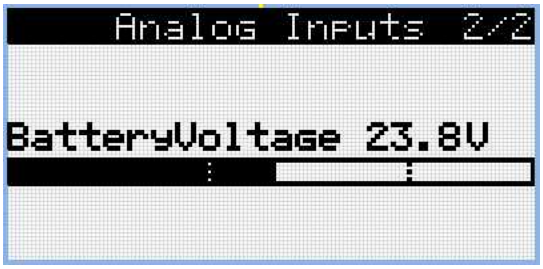


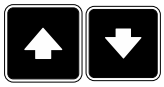
Note: *Use the Up and Down buttons to move between measurement pages.*





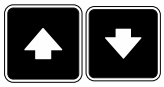
Note: *Use the Up and Down buttons to move between measurement pages.*





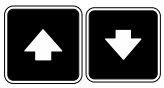
Note: *Use the Up and Down buttons to move between measurement pages.*



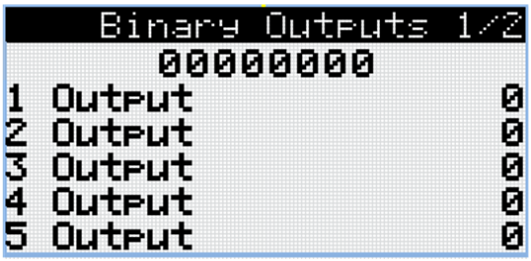


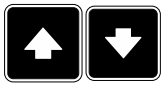
Note: *Use the Up and Down buttons to move between measurement pages.*



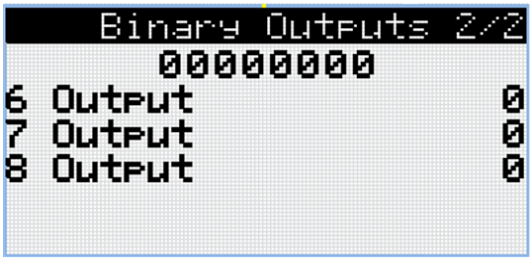


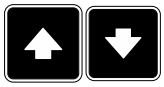
Note: *Use the Up and Down buttons to move between measurement pages.*



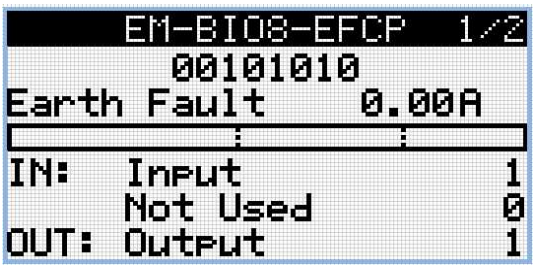


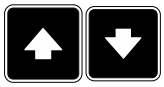
Note: *Use the Up and Down buttons to move between measurement pages.*





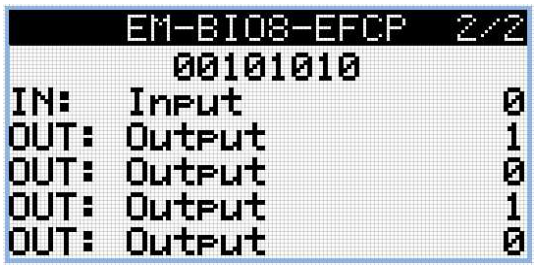
Note: *Use the Up and Down buttons to move between measurement pages.*

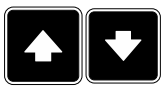




Note: *Use the Up and Down buttons to move between measurement pages.*

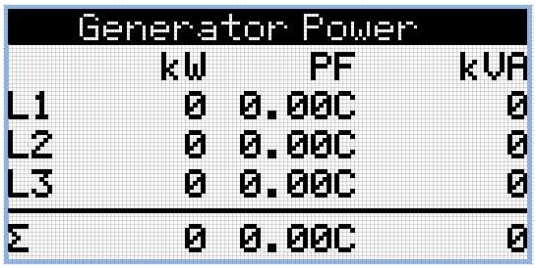
Note: *Available only with plug-in module.*

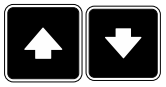




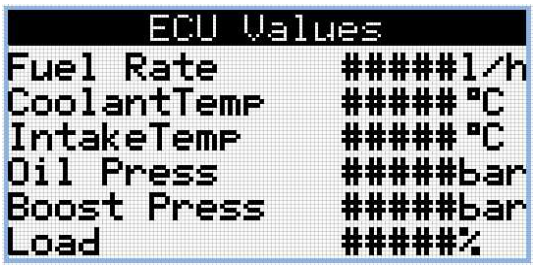
Note: *Use the Up and Down buttons to move between measurement pages.*

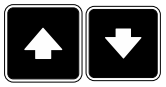
Note: *Available only with plug-in module.*



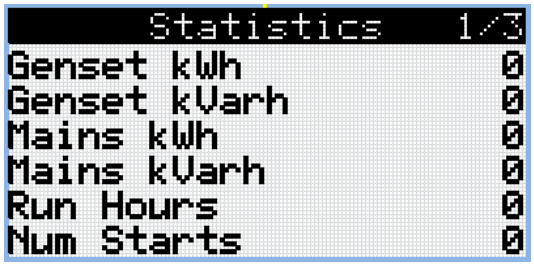


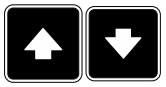
Note: *Use the Up and Down buttons to move between measurement pages.*



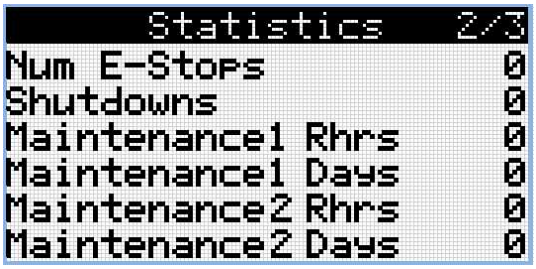


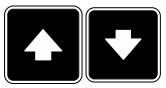
Note: *Use the Up and Down buttons to move between measurement pages.*



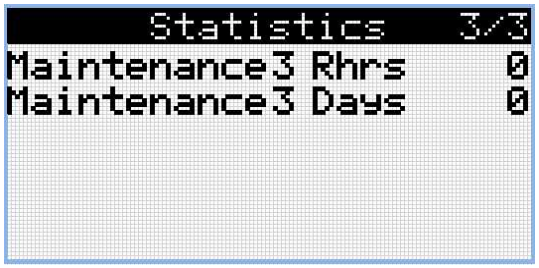


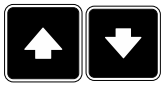
Note: *Use the Up and Down buttons to move between measurement pages.*



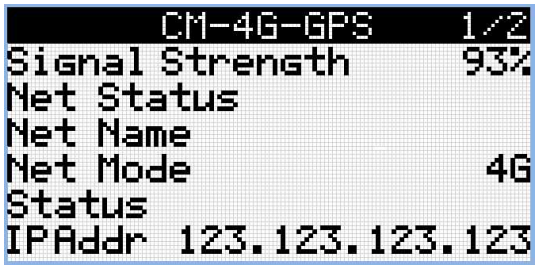


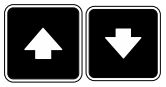
Note: *Use the Up and Down buttons to move between measurement pages.*





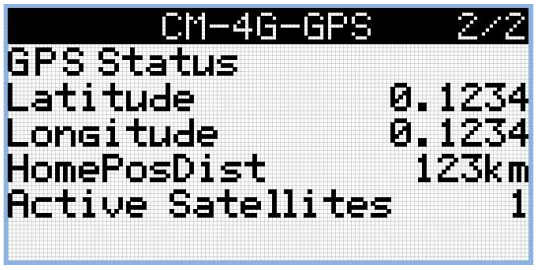
Note: *Use the Up and Down buttons to move between measurement pages.*

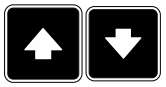




Note: *Use the Up and Down buttons to move between measurement pages.*

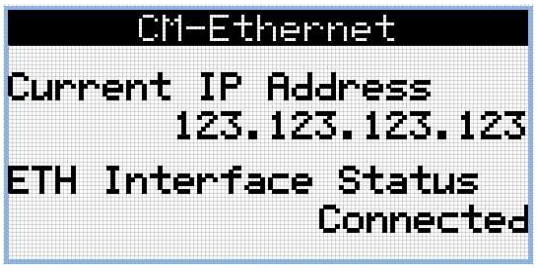
Note: *Available only with plug-in module.*

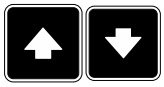




Note: *Use the Up and Down buttons to move between measurement pages.*

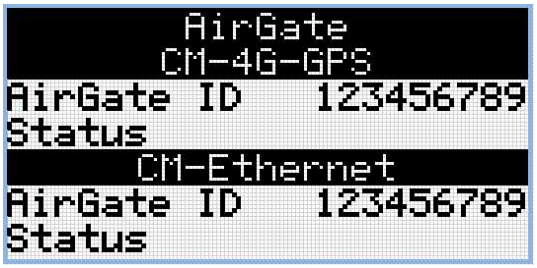
Note: *Available only with plug-in module.*

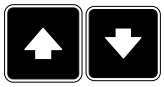




Note: *Use the Up and Down buttons to move between measurement pages.*

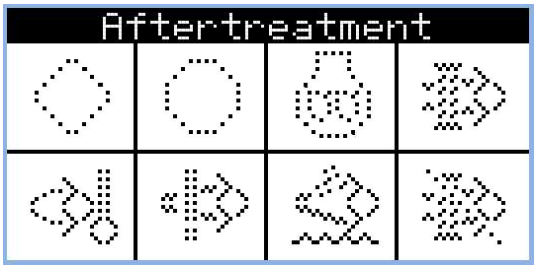
Note: *Available only with plug-in module.*

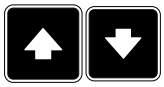




Note: *Use the Up and Down buttons to move between measurement pages.*

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

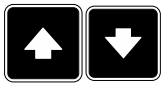




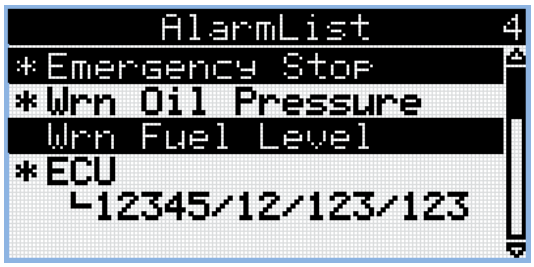
Note: *Use the Up and Down buttons to move between measurement pages.*

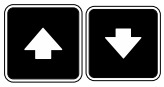
Note: *Available only with ECU supported by TIER4F*





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



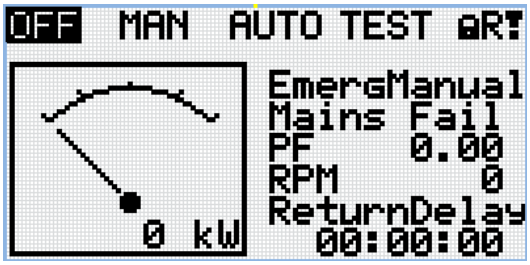


Note: *Use the Up and Down buttons to move between measurement pages.*

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

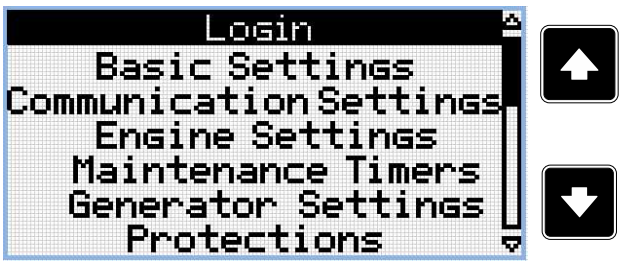
Note: *There can be some additional screens and also some screens can be hidden. Screen's visibility depends on actual configuration (usage of extension or communication modules, ECU etc.).*

Setpoint Screens



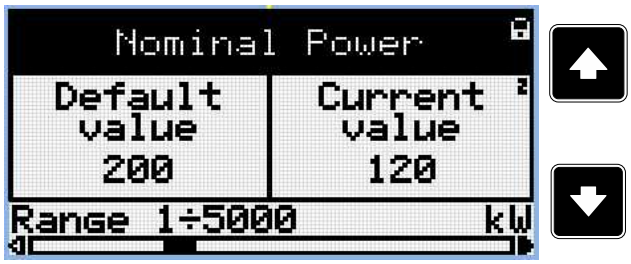


Note: *From all measurement pages you can easily go to the setpoint group page by pressing the Page button.*



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

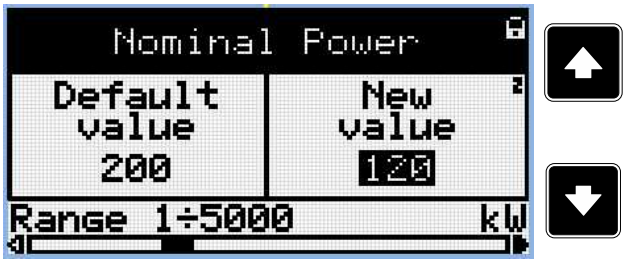
Note: *Use the Enter button to enter selected setpoint group.*



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

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

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

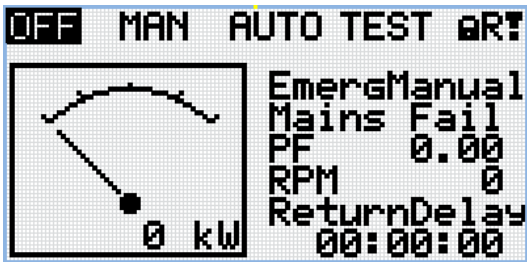


Note: *Use Up and Down button to set required value of selected setpoint.*

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

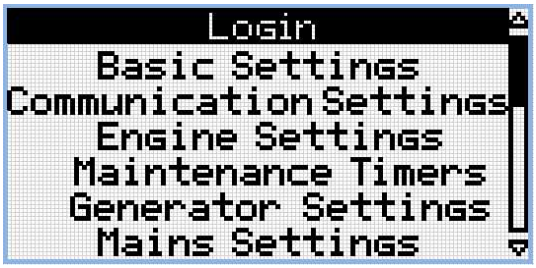
Note: *Use the Page button to discard changes, to set setpoint to previous value and to return to the list of setpoints of selected group.*

History Log



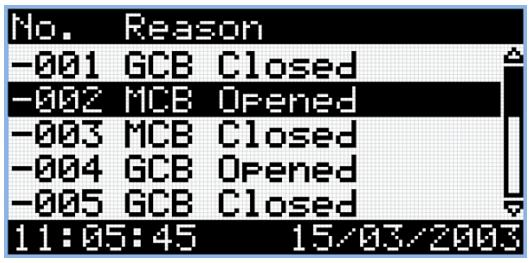


Note: *From all measurement pages you can easily go to the setpoint group page by pressing the Page button.*





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



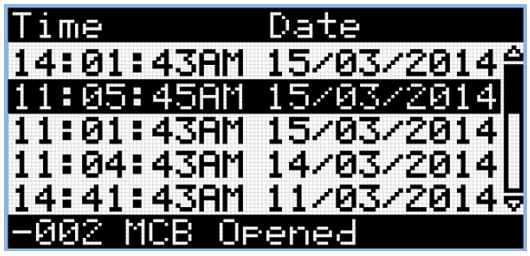




Note: *Use the Up and the Down button to select required alarm reason.*



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



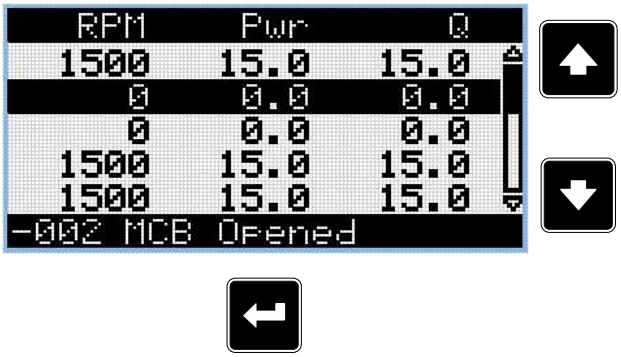




Note: *Use the Up and the Down button to select required alarm reason.*

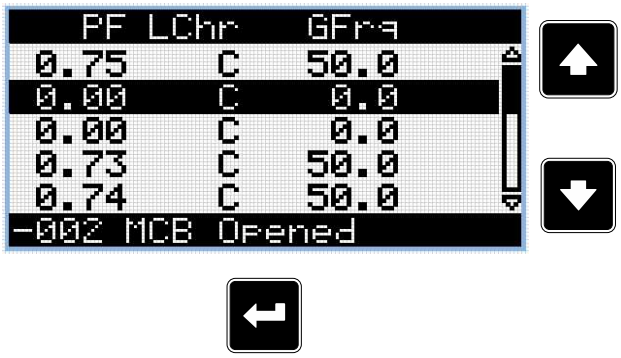


Note: *Use the Enter button to move to the next page of history log.*



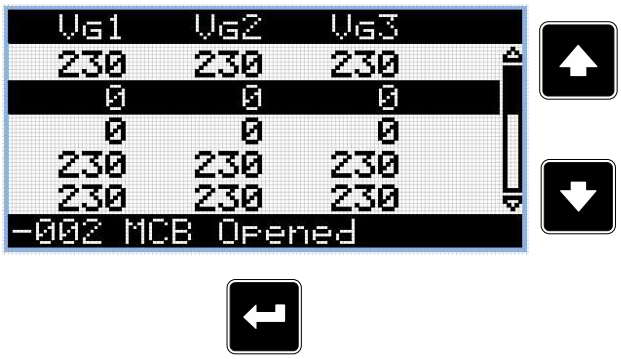
Note: *Use the Up and the Down button to select required alarm reason.*

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



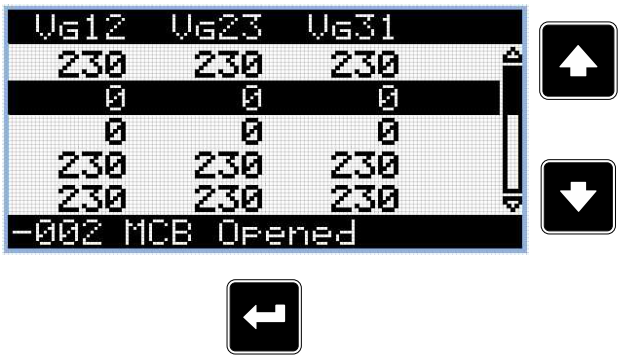
Note: *Use the Up and the Down button to select required alarm reason.*

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



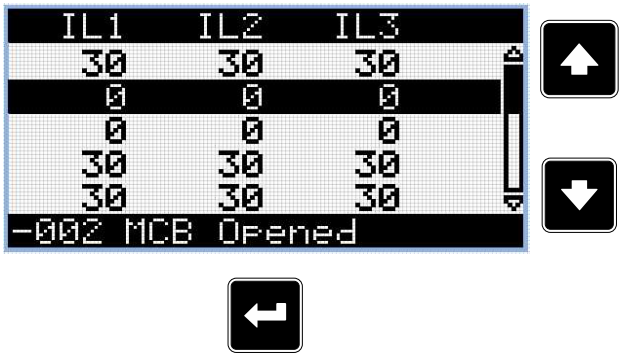
Note: *Use the Up and the Down button to select required alarm reason.*

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



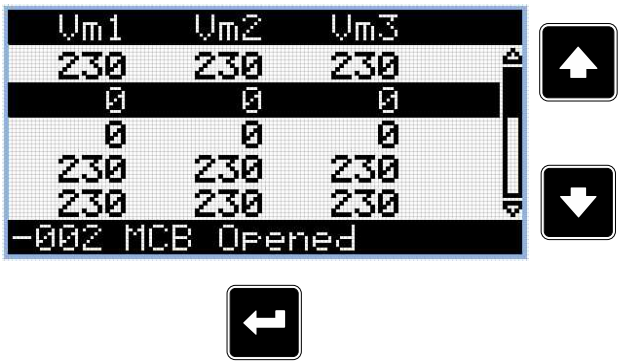
Note: *Use the Up and the Down button to select required alarm reason.*

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



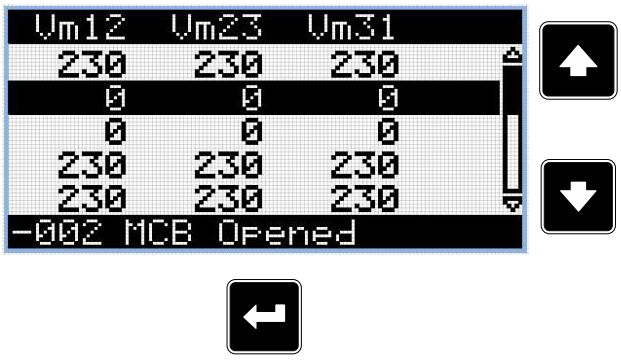
Note: *Use the Up and the Down button to select required alarm reason.*

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



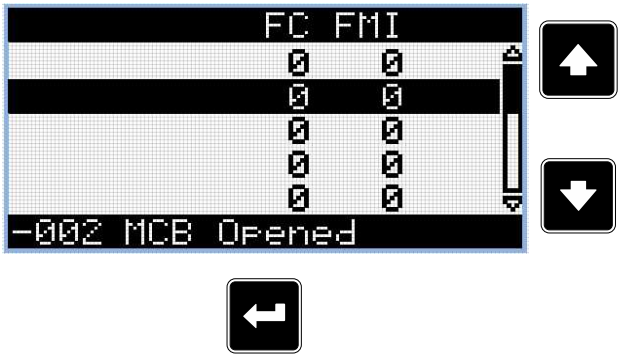
Note: *Use the Up and the Down button to select required alarm reason.*

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



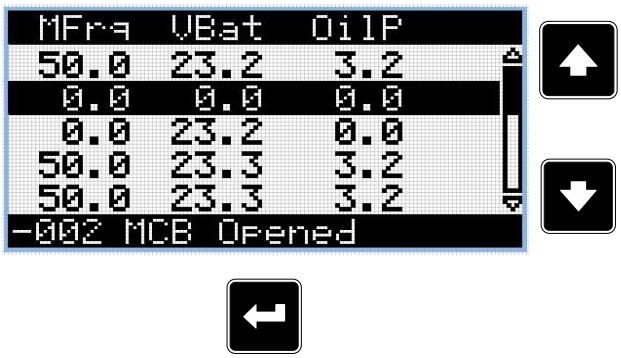
Note: *Use the Up and the Down button to select required alarm reason.*

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



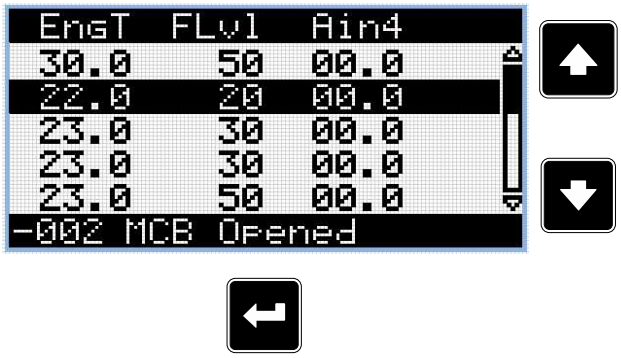
Note: *Use the Up and the Down button to select required alarm reason.*

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



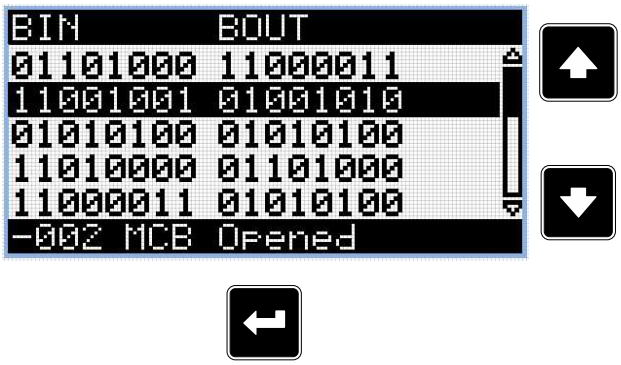
Note: *Use the Up and the Down button to select required alarm reason.*

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



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

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



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

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



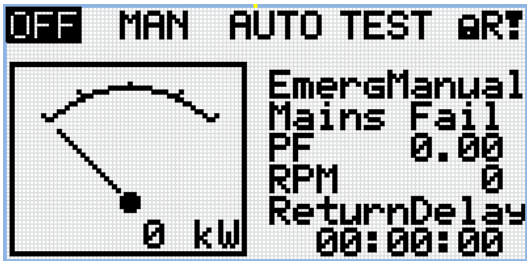
Note: *Use the Up and the Down button to select required alarm reason.*

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

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

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

5.3.3 Browsing alarms





Note: *Use the Up button to move to alarm list from main measurement screen.*



- Active alarms are displayed as white text on black background. It means the alarm is still active, i.e. the appropriate alarm conditions are still present.
- Inactive alarms are displayed as black text on white background. It means the alarm is not active, i.e. the appropriate alarm conditions are gone.
- Unconfirmed alarms are displayed with an asterisk. This means the alarm is still not acknowledged (confirmed).
- ECU alarms: SPN/FMI/OC/SC
  - SPN – Suspect parameter number
  - FMI – type of protection
  - OC – number of errors
  - SC – source of error

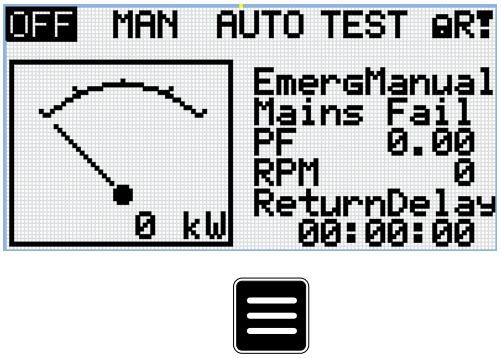


User access management alarms

The controller comes to the customer with Production mode turned on, the default administrator password installed and with no prefilled email address for password reset. For security purposes, the following user access management alarms will appear. Detailed description of situation when the alarms are active is provided below:

- **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 or go to Production Mode display screen and select disable.
- **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.
- **Wrn Password reset e-mail address 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 Login



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



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

Note: *Use the Enter button to enter setpoint group Login.*

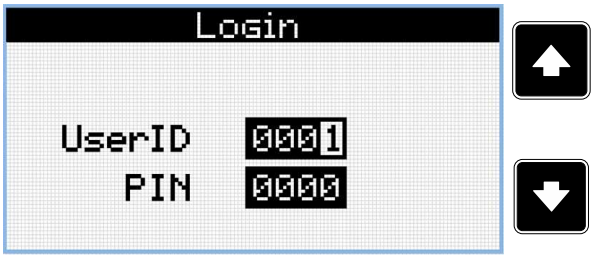


Note: *Use the Up and the Down Button to select Login.*

Note: *Use the Enter button to enter Login.*



UserID Edit



Note: *Use the Up and the Down Button to change the digit.*

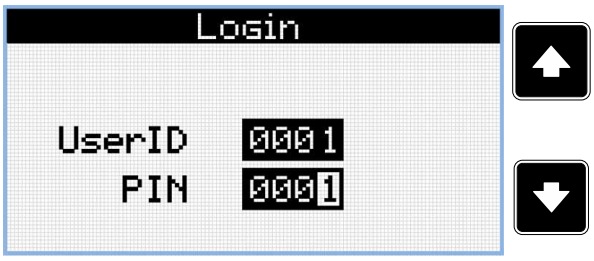
Note: *Use the Left and the Right buttons to move between digits.*



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

PIN Edit





Note: *Use the Up and the Down Button to change the digit.*

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

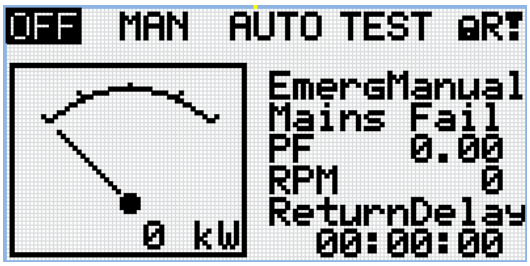


Note: *Use the Enter button to confirm the PIN and Login or the Page button to cancel entering the Login.*



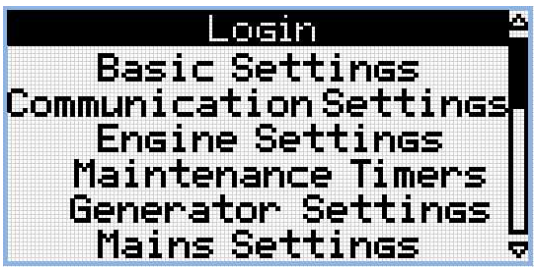
Note: *In case that invalid UserID or PIN are entered, the controller shows Wrong Credentials screen. Use the Enter button to enter Login again or the Page Button to go back to menu.*

5.3.5 Production mode





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





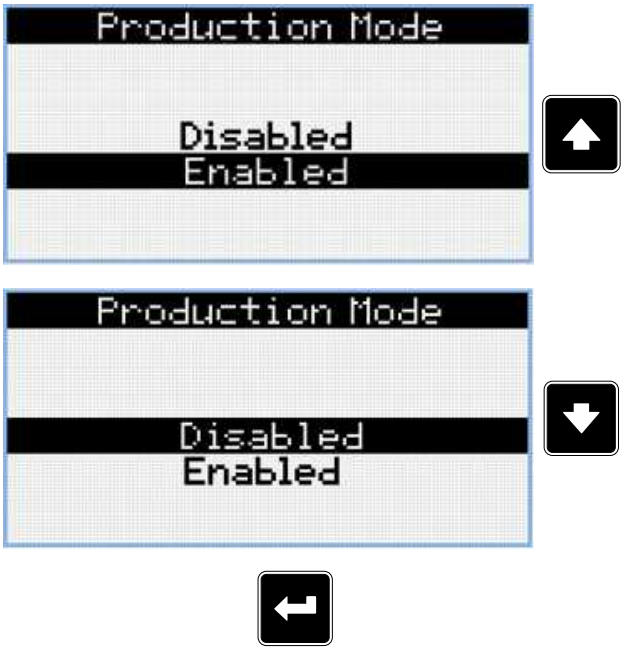
Note: *Use the Enter button to enter setpoint group Login.*



Note: *Use the Up and the Down Button to select Production Mode*



Note: *Use the Enter button to enter the Production Mode.*



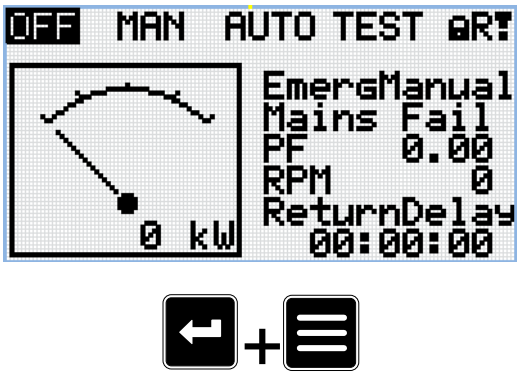
Note: *Use the Up and the Down Button to change to disabled*

Note: *Use the Enter button to disable the Production Mode.*



Note: *Once Disabled is confirmed by Enter button the option Enabled is no longer on the screen and therefore it is not possible to enable Production mode by HMI display screen. Use InteliConfig to enable the Production mode.*

5.3.6 Information screen

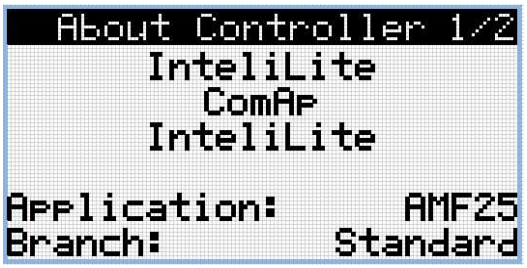


Note: *On Main measurement screen press the Enter and the Page button together. The Enter button has to be pressed first.*



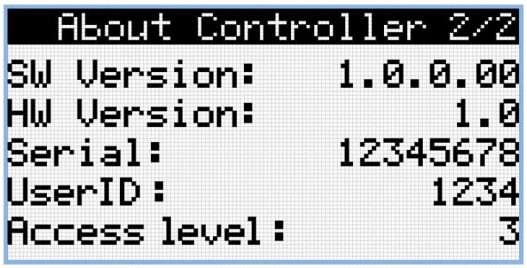


Note: *Use the Page button to move to the next page.*





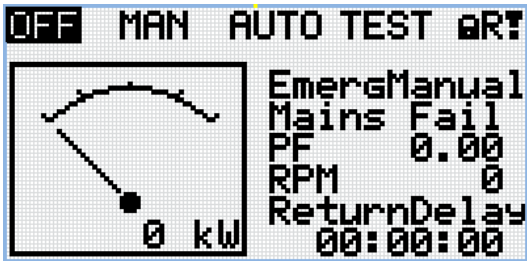
Note: *Use the Page button to move to the next page.*





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

5.3.7 Language selection



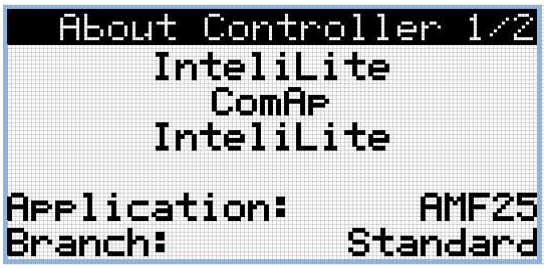


Note: *On Main measurement screen press the Enter and the Page button together. The Enter button has to be pressed first.*



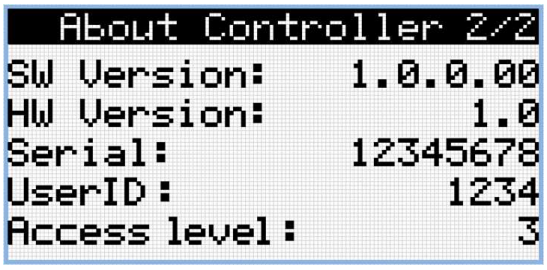


Note: *Use the Page button to move to the next page.*





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





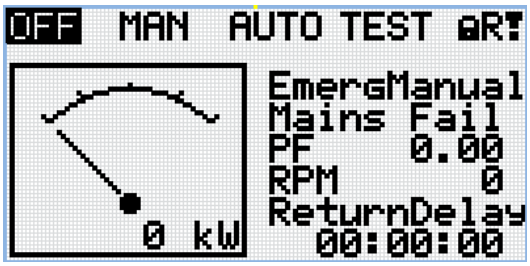
Note: *Use the Page button to move to the next page.*

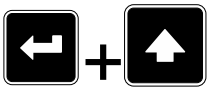


Note: *Use the Up and the Down button to select required language.*

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

5.3.8 Display contrast adjustment

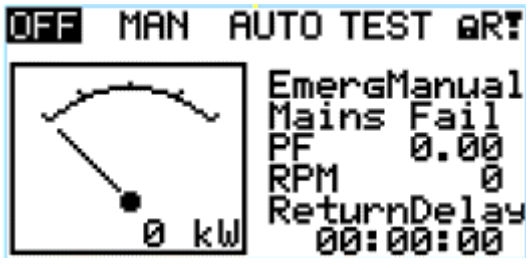


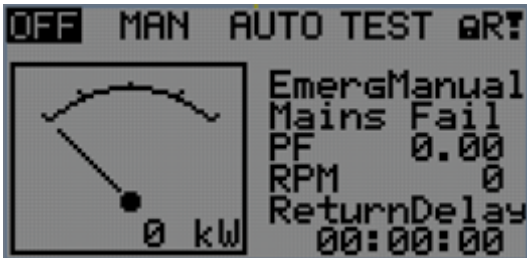


Note: *On any measurement screen press the Enter and the Up button together for higher contrast.*



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





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

5.4 Remote Display

This chapter describes Remote display firmware IL4-RD, which is designed as a remote signalling and control software for InteliLite 4 family controllers. It is an optional software which is possible to upload into the controller rather than the controller's standard firmware.

5.4.1 General description

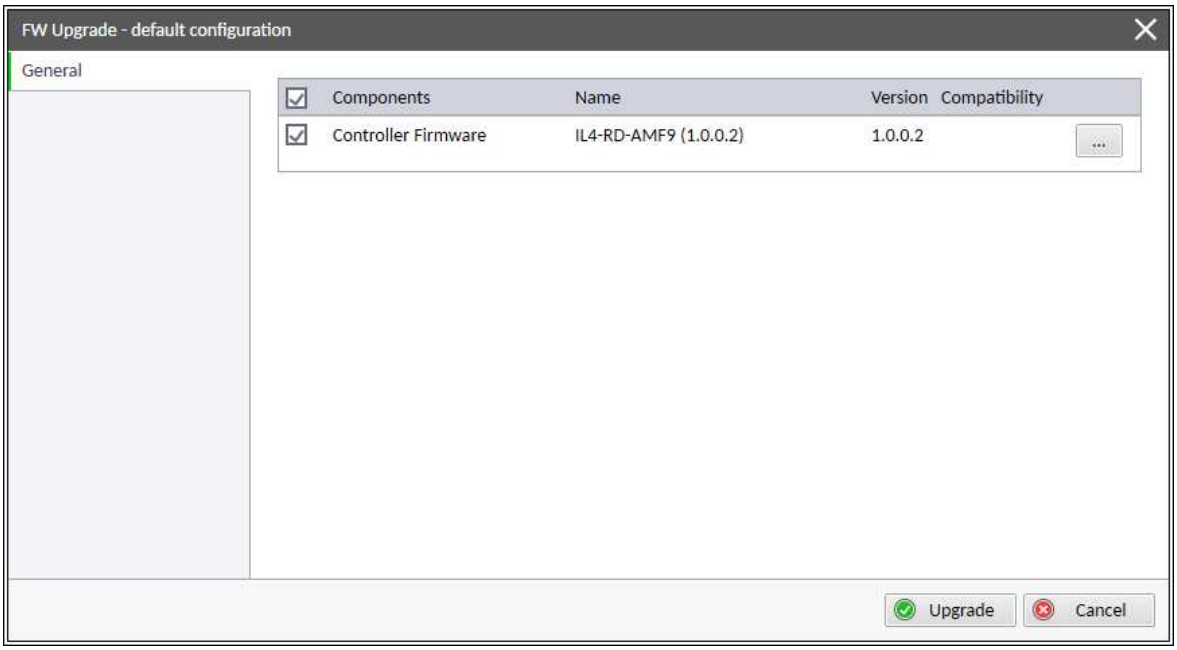
Remote display software works as "remote display and control" for the Master InteliLite 4 family controller. Gen-set can be controlled using the Remote display and the Master controller simultaneously and independently. All Remote display screens (Measurement screens, Setpoint screens and History Log) display the same data as the Master controller. The front panel buttons on both controllers work the same way. All remote display LEDs show the same state as corresponding LEDs on Master controller.

Note: *Some settings are not shared between display and control unit (setpoint* ***Backlight Timeout (page 223)****, Controller language and Controller user mode).*

5.4.2 IL4-RD Firmware installation

The IL4-RD Remote display firmware is installed in the same way as any other InteliLite 4 firmware using the InteliConfig PC tool. Reverting the Remote display controller back to regular Gen-set controller is carried out the same way.

Note: *InteliConfig shows the most compatible and the most recent firmware as default option. Thus, it is necessary use "More options" (…) button to pick IL4-RD firmware for uploading to controller. (See details on picture below.)*



Note: *IL4-RD consists of firmware only, there is no archive included.*

Note: *When IL4-RD firmware is uploaded to controller there is only possible connect InteliConfig using USB connection. InteliConfig serves only for firmware update when connected to Remote display. There is no Master controller SCADA displayed, no possibility to adjust setpoints, display Values etc.*

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

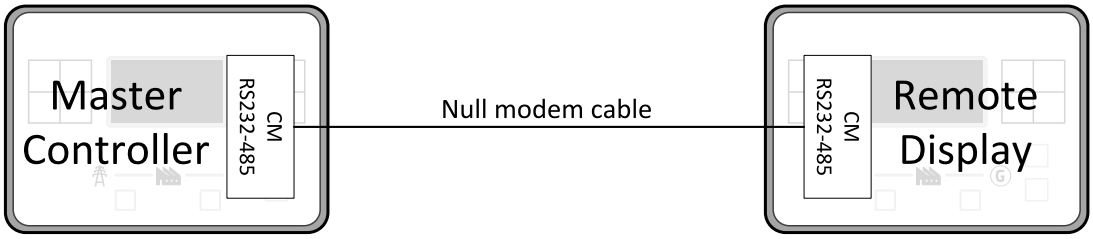
5.4.3 Wiring

IL4-RD can be connected to any InteliLite 4 family controller via an onboard RS485 communication port or via the external RS232/RS485communication ports on CM-RS232-485 communication module . It is possible to connect up to two Remote displays to one Master controller, but each one needs to be using different communication interface.. Connecting two or more remote displays to one communication line (e.g. RS485) is not possible. Using one Remote display it is possible to monitor only one Master controller at the time.

Note: *IL4 AMF8 and AMF9 do not have an onboard RS485 comm port.*

5.4.4 Interconnection variants

RS232

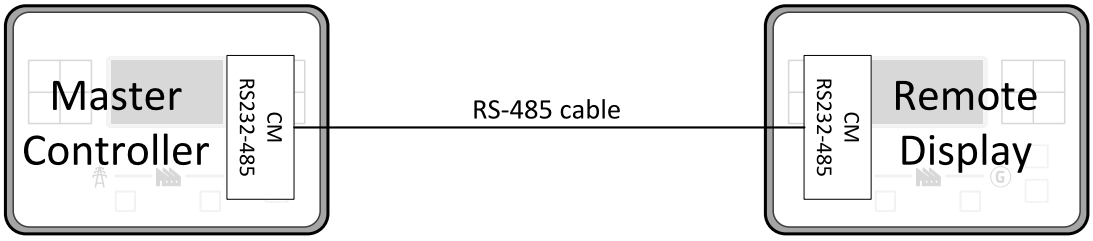


It is necessary to use CM-RS232-485 communication module on both the Master controller and the Remote display. COM 1 communication channel is used with these settings:

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

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

RS485



Any combination of internal RS485 port or external one on CM-RS232-485 communication module can be used for the Master and Remote Displays.

COM 2 communication channel is used with these settings:

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

The maximal distance between Master controller and Remote display is 1200 m for RS485 connection. It is recommended to use shielded twisted-pair cables that comply with the EIA RS-485 standard to reduce interference and to achieve maximal distance.

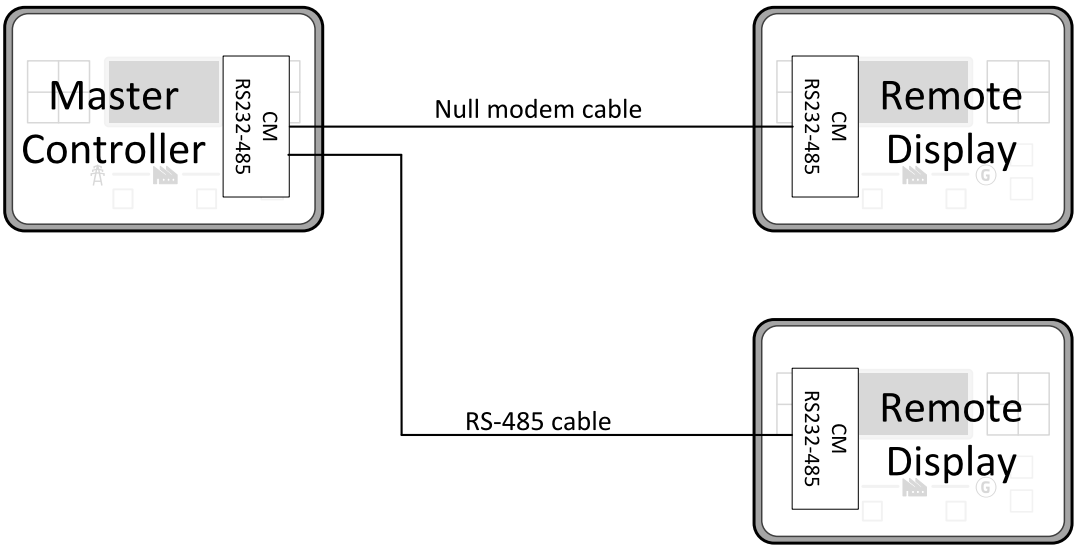
RS232 + RS485

Master Controller with Two Remote Displays

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

Note: *Onboard RS485 and CM-232-485 communication module can be used to achieve both remote displays being connected via RS485 for IL4 MRS16 and IL4 AMF25.*

Note: *IL4 AMF8, IL4 AMF9 and IL4 AMF20 as master controller can only have up to two remote displays at the same time and will need to use RS232 combined with RS485.*



5.4.5 Connection process

After powering up, the Remote Display automatically tries to connect to the last known Master controller (if such configuration exists in Remote display). Otherwise the Remote display searches for any Master controller connected. It starts to search on COM 2 (RS485) using Master controller address 1 – 32 and continues with COM 1 (RS232). The Remote Display tries two communication speeds 57600 bps and 115200 bps.

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

When an incompatible configuration type is found in a detected controller, the message "Unknown cfg format COM x Addr yy" is displayed on screen for 5 seconds. Detecting continues with the next address in the range.

If detecting finishes with no compatible Master controller found, the message "No connection" is displayed on screen for 5 seconds. The detecting process starts from the beginning and continues until compatible a Master controller is found.

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

5.4.6 Connection troubleshooting

There are a few reasons why the Remote display may not connect to the Master controller:

- An unsupported type of Master controller connected.
- Unsupported firmware in Master controller.
- Configuration table error in Master controller.
- Wrong settings of setpoint COM x Mode in master controller.
- Wrong settings of setpoint COM x Communication Speed in master controller.
- Wrong connection, wiring, or communication failure.

5.4.7 Function description

Remote display software works as "remote display and control" for the Master InteliLite 4 family controller. Gen-set can be controlled using the Remote display and the Master controller simultaneously and independently. All Remote display screens (Information screens, Measurement screens, Setpoint screens and History Log) display the same data as the Master controller. The front panel buttons on both controllers work the same way. All remote display LEDs show the same state as corresponding LEDs on Master controller. User can switch screens, enter or set password, adjust setpoints, change language, change Configuration Level, change display contrast and view history records.

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

> **Example:** When AMF controller HW type is used as a Master controller and MRS controller HW type is used for Remote display there is no possibility to control MCB in MAN mode as there is no MCB button on the MRS controller. Even though all these not recommended combinations may work, all of the limitations above must be considered.

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

When the serial line between the Master controller and Remote display is disconnected, or communication cannot be established, Remote display shows its own Init screen with the message "Trying to connect" and all LEDs are off.

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

It is possible to switch to Remote display's own Init screen to check IL4-RD FW version and serial number of used controller and communication status by pressing and holding the Page button for more than 3 seconds.

5.4.8 Firmware compatibility

Remote Display

IL4-RD FW is able to be uploaded into the following controllers:

- InteliLite 4 AMF25
- InteliLite 4 AMF20
- InteliLite 4 AMF9

- InteliLite 4 AMF8
- InteliLite 4 MRS16

Note: *All controllers from IL4 family can act as Remote Display of master controller and will always be compatible with each other.*

Note: *If IL4 MRS16 is used as a Remote Display in AMF application, the user won't be able to see information about mains status and there will be no option to control MCB.*

5.5 Functions

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back to Controller setup

5.5.1 Operating Modes

Selecting the operating mode is done with the Left and the Right buttons on the front panel or by changing the **Controller Mode (page 220)** 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 494)**
- **Remote TEST (page 496)**
- **Remote MAN (page 493)**
- **Remote AUTO (page 493)**

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.

AMF Operating Modes

OFF mode – AMF

No starting of the Gen-set is possible .Controller stays in Not ready status and cannot be started in any way. The MCB is closed permanently (**MCB Opens On (page 288)** = GENRUN) or is open / closed depending on whether the mains is present or not (**MCB Opens On (page 288)** = MAINSFAIL). No AMF function will be performed. The buttons MCB, GCB, Start and Stop including the appropriate binary inputs for external buttons are not active.

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

MAN mode – AMF

The engine can be started and stopped manually using the Start and Stop buttons (or the external buttons wired to the appropriate binary inputs) in MAN mode. When the engine is running, GCB can be closed. Also MCB can be closed and opened manually using the MCB button, regardless of whether the mains is present or not. No auto start is performed.

Note: *The controller provides interlock between GCB and MCB, it means it is never possible to close both CB together.*

AUTO mode – AMF

The controller does not respond to the buttons Start, Stop, MCB ON/OFF and GCB ON/OFF. Engine start/stop request is evaluated from Mains failure/return.

Note: *When the AMF function will start the engine than the engine will be running at least for the time which is defined in* ***Mains Return Delay (page 274)*** *setpoint, even if the mains would return in the meantime.*

TEST mode – AMF only

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 **Transfer Delay (page 290)** the GCB will be closed and the Gen-set will supply the load. After the mains have recovered, the delay **Mains Return Delay (page 274)** will count down. If the time elapses and the mains is still OK, the controller will transfer the load back to the mains after **Transfer Delay (page 290)** and the Gen-set will run unloaded again until the mode is changed.

Remote test on load

When binary input is active, the controller automatically transfers load from the mains to the Gen-set. See LBI **REM TEST ON LOAD (PAGE 492)**.

MRS Operating Modes

OFF mode – MRS

No start of the Gen-set is possible. Controller stays in Not ready status and cannot be started in any way. The buttons GCB I/O, Start I and Stop O including the appropriate binary inputs for the external buttons are not active.

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

MAN mode – MRS

The engine can be started and stopped manually using the Start I and Stop O buttons (or the external buttons wired to the appropriate binary inputs) in MAN mode. When the engine is running, GCB can be closed.

AUTO mode – MRS

The controller does not respond to the buttons Start I, Stop O and GCB ON/OFF I/O .Engine start/stop request is given by binary input **Remote Start/Stop (page 495)**.

5.5.2 Start-stop sequence

State	Condition of the transition	Action	Next state
Ready	Start request	**PRESTART (PAGE 534)** on **Prestart Time (page 230)** counter started	Prestart
	RPM > 2 or Oil pressure > **Starting Oil Pressure (page 231)** or Generator voltage > 10V or D+ voltage is higher than **D+ Threshold (page 246)**		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		Ready

	Mode selected		
Prestart	Prestart time elapsed	**FUEL SOLENOID (PAGE 516)** on, **STARTER (PAGE 539)** or **Maximum Cranking Time (page 229)** counter started	Cranking
Cranking	RPM > Starting RPM	**STARTER (PAGE 539)** or **PRESTART (PAGE 534)** off	Starting
	D+ input activated or oil pressure detected or Generator voltage > 25% Nominal voltage	**STARTER (PAGE 539)** or **PRESTART (PAGE 534)** off	Cranking
	Maximum Cranking Time (page 229), 1st attempt	**STARTER (PAGE 539)** or **FUEL SOLENOID (PAGE 516)** off, **STOP SOLENOID (PAGE 540)** on, **Cranking Fail Pause (page 229)** timer started	Crank pause
	Maximum Cranking Time (page 229) elapsed, last attempt	**STARTER (PAGE 539)** or **PRESTART (PAGE 534)** off	Shutdown (Start fail)
	all cranking attempts elapsed	**FUEL SOLENOID (PAGE 516)** off, **STOP SOLENOID (PAGE 540)** on	Shutdown (Start fail)
Crank pause	**Cranking Fail Pause (page 229)** elapsed	**STARTER (PAGE 539)** or **FUEL SOLENOID (PAGE 516)** on, **STOP SOLENOID (PAGE 540)** off, **Maximum Cranking Time (page 229)** counter started	Cranking
Starting	**Idle Time (page 238)** elapsed	**Minimal Stabilization Time (page 240)** and **Maximal Stabilization Time (page 241)** counter started	Running
	any shutdown condition	**FUEL SOLENOID (PAGE 516)** off, **STOP SOLENOID (PAGE 540)** on	Shutdown
Running	Stop request	**READY TO LOAD (PAGE 537)** off,**Cooling Time (page 243)** counter started	Cooling
	RPM = 0 or any other shutdown condition	**READY TO LOAD (PAGE 537)** off, **FUEL SOLENOID (PAGE 516)** off	Shutdown
	GCB CLOSE/OPEN (PAGE 518) closed		Loaded
Loaded	**GCB CLOSE/OPEN (PAGE 518)** opened		Running
	RPM = 0 or any other shutdown condition	**FUEL SOLENOID (PAGE 516)** off, **STOP SOLENOID (PAGE 540)** on, **READY TO LOAD (PAGE 537)** off,	Shutdown
Cooling	**Cooling Time (page 243)**	**FUEL SOLENOID (PAGE 516)** off,	Stop

	elapsed	**STOP SOLENOID (PAGE 540)** on	
	RPM = 0 or any other shutdown condition	**FUEL SOLENOID (PAGE 516)** off, **STOP SOLENOID (PAGE 540)** on	Shutdown
	Start request	**READY TO LOAD (PAGE 537)** 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 243)** elapsed.		Stop (Stop fail)

Note: *If all generator parameters are OK and **Minimal Stabilization Time (page 240)** 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.*

5.5.3 Engine start

Diesel engine

The setpoint **Fuel Solenoid (page 228)** 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 534)** and **GLOW PLUGS (PAGE 522)** outputs are energized for a time period established by the setpoints **Prestart Time (page 230)** and **Glow Plugs Time (page 231)**.
- After **Prestart Time (page 230)** and **Glow Plugs Time (page 231)**, the output **FUEL SOLENOID (PAGE 516)** is energized after **Fuel Solenoid Lead (page 238)** the motor starter is activated by energizing the output **STARTER (PAGE 539)**.
- 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 230)**, or
  - One of the **Additional running engine indications (page 118)** signals is active.
- The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 230)**, after which it is considered started and the Idle period will follow.
- The maximum duration that the output **STARTER (PAGE 539)** is energized is determined by the setpoint **Maximum Cranking Time (page 229)**. If the engine does not start within this period, the output **STARTER (PAGE 539)** is de-energized and a pause with a length determined by **Cranking Fail Pause (page 229)** will follow. **PRESTART (PAGE 534)** and **GLOW PLUGS (PAGE 522)** 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 229)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 525)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 238)**.
- After the idle period has finished, the output **IDLE/NOMINAL (PAGE 525)** is activated and the start-up sequence is finished. The **Stabilization (page 109)** phase follows.

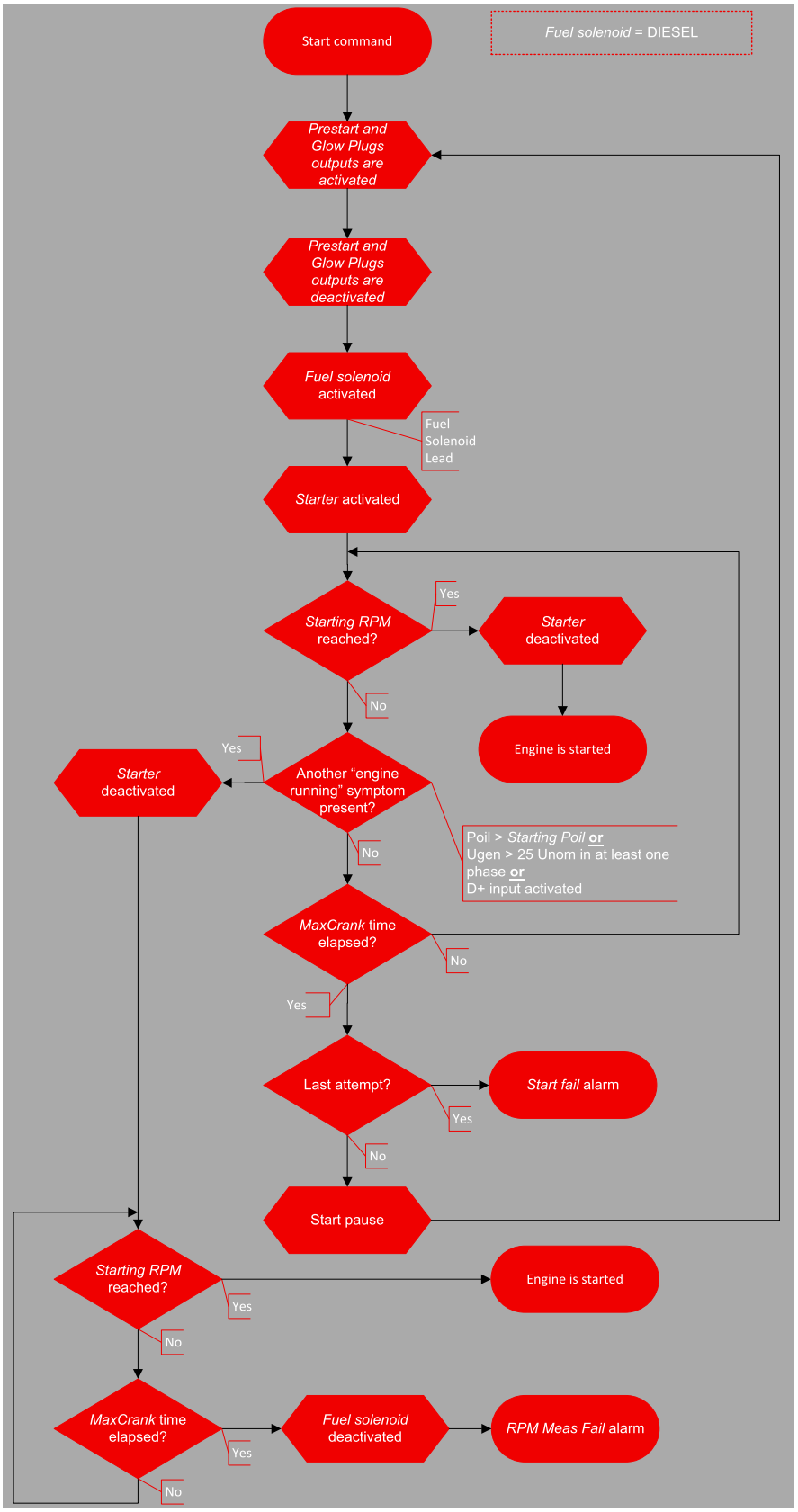


Image 5.15 Flowchart of start of diesel engine

GAS engine

The setpoint **Fuel Solenoid (page 228)** 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 534)** and **GLOW PLUGS (PAGE 522)** outputs are energized for a time period established by the setpoints **Prestart Time (page 230)** and **Glow Plugs Time (page 231)** begins.
- When the engine speed exceeds 30 RPM, the outputs **FUEL SOLENOID (PAGE 516)** and **IGNITION (PAGE 525)** are energized.
- When the engine speed exceeds value of **Starting RPM (page 230)**, the engine starter is de-energized. The engine is considered as started and the Idle period will follow.

IMPORTANT: Additional running engine indications (page 118) signals are not evaluated during the start of a gas engine. The Pickup must be used in any case!

- The maximum duration that the output **STARTER (PAGE 539)** is energized is determined by the setpoint **Maximum Cranking Time (page 229)**. If the engine does not start within this period, outputs **STARTER (PAGE 539)** and **FUEL SOLENOID (PAGE 516)** are de-energized and a pause with length determined by **Cranking Fail Pause (page 229)** will follow. **PRESTART (PAGE 534)**, **GLOW PLUGS (PAGE 522)** and **IGNITION (PAGE 525)** 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 229)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 525)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 238)**.
- After the idle period has finished, the output **DESCRIPTION (PAGE 525)** is activated and the start-up sequence is finished. The **Stabilization (page 109)** phase follows.

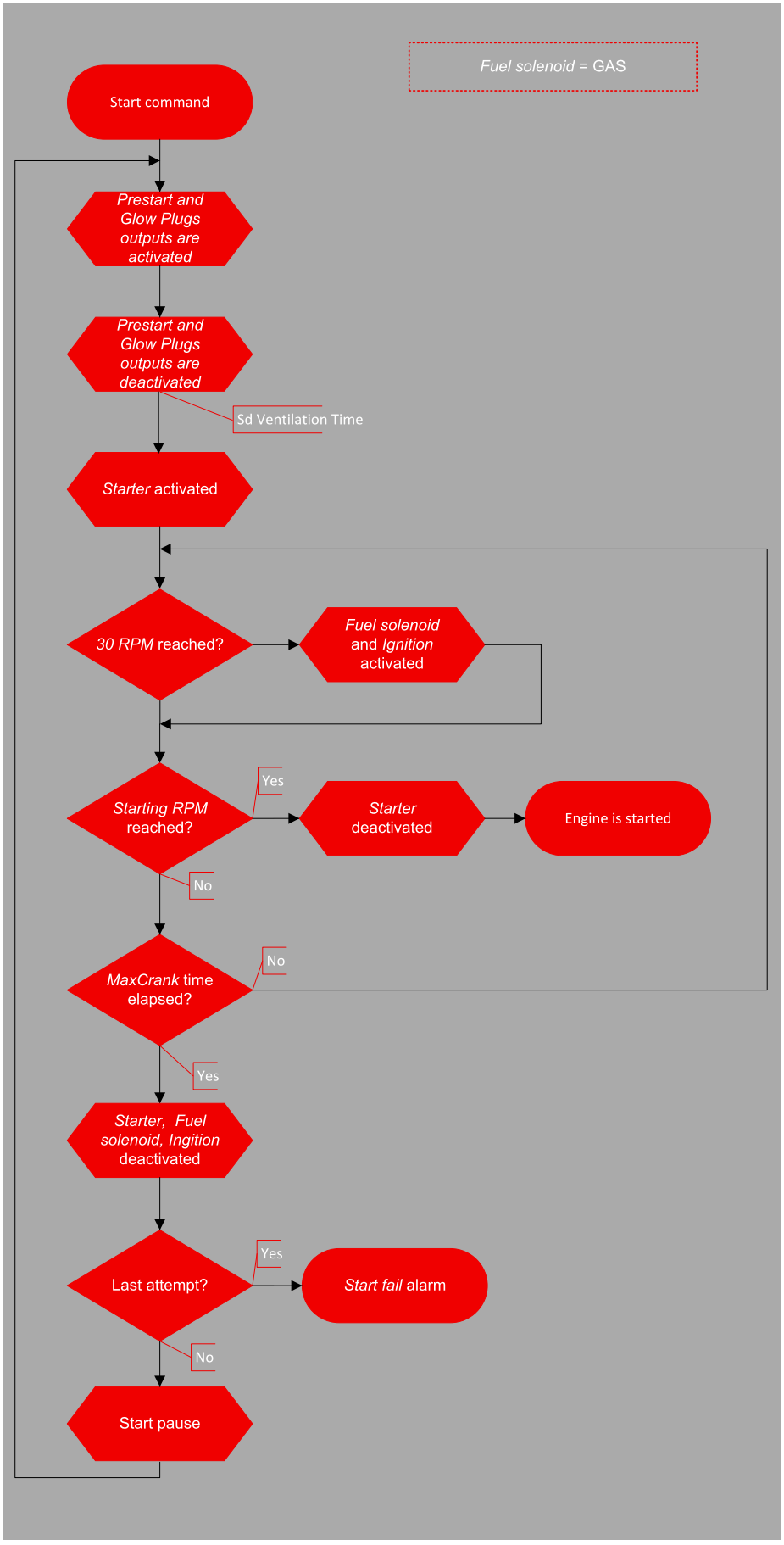


Image 5.16 Flowchart of start of gas engine

5.5.4 Stabilization

When the **Engine start (page 105)** sequence is finished, the Gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

- **Minimal Stabilization Time (page 240)** 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 241)** 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 240)** has elapsed.

In the event that the generator voltage or frequency are not within limits of the **Maximal Stabilization Time (page 241)** 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 263)****.*

Note: *The value of the* ***Minimal Stabilization Time (page 240)*** *setpoint has to be lower than the value of* ***Maximal Stabilization Time (page 241)*** *setpoint.*

5.5.5 Connecting to load

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

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

- The Gen-set is running and the **Minimal Stabilization Time (page 240)** timer has elapsed.
- The Gen-set voltage and frequency are within limits.

5.5.6 MRS operation

The "MRS function" represents manual or remote start of gen-set. It is ideal for prime power applications.

The MRS procedure

When the start command is detected, the following steps are performed:

- The Gen-set is started.
- GCB is closed and the Gen-set begins to supply the load (in AUTO mode, otherwise GCB button must be pressed)

When the stop command is detected, the following steps are performed:

- GCB is opened and the Gen-set stops supplying the load.
- After GCB is opened, the Gen-set cools down and a stops.

5.5.7 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 473) or MAINS FAIL BLOCK (PAGE 488).

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

AMF sequence

State	Condition of the transition	Action	Next state
Mains operation	Mains failed or **MCB FEEDBACK (PAGE 490)** dropout, **MCB Opens On (page 288)** = Mains Fail	**MCB CLOSE/OPEN (PAGE 529)**off, **Emergency Start Delay (page 274)** timer started	Mains failure
	Mains failed or **MCB FEEDBACK (PAGE 490)** dropout, **MCB Opens On (page 288)** = Gen Run	**Emergency Start Delay (page 274)** timer started	Mains failure
Mains failure	Mains voltage and frequency OK, **MCB Opens On (page 288)** = Mains Fail	After elapsing **MCB Close Delay (page 275) MCB CLOSE/OPEN (PAGE 529)** on	Mains operation
	Mains voltage and frequency OK, **MCB Opens On (page 288)** = Gen Run	None	Mains operation
	Emergency Start Delay (page 274) elapsed, **MCB Opens On (page 288)** = Mains Fail	Engine start sequence performed, then **GCB CLOSE/OPEN (PAGE 518)** on	Island operation
	Emergency Start Delay (page 274) elapsed, **MCB Opens On (page 288)** = Gen Run	Engine start sequence performed, then **MCB CLOSE/OPEN (PAGE 529)** off, time delay **Transfer Delay (page 290)** performed and **GCB CLOSE/OPEN (PAGE 518)** on	Island operation
Island operation	Mains voltage and frequency OK	**Mains Return Delay (page 274)** timer started	Mains return
Mains return	Mains failed		Island operation
	Mains Return Delay (page 274) elapsed	**GCB CLOSE/OPEN (PAGE 518)** off, then after **Transfer Delay (page 290) MCB CLOSE/OPEN (PAGE 529)** on and then engine stop sequence performed	Mains operation

Note: *Mains failed means mains over/under -voltage, over/under -frequency, voltage asymmetry is issued (preset delay must elapse).*

Note: *If during start-up sequence mains returns, then MCB is reclosed with delay **MCB Close Delay (page 275)**(if opened, depending on **MCB Opens On (page 288)** setpoint) and start-up sequence is interrupted.*

Note: *If mains fails during stop procedure (cooling) again, stop sequence is interrupted, MCB opened and GCB re-closed with **Transfer Delay (page 290)**.*

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 279)** and **Mains Overvoltage (page 277)** for a time period longer than **Mains Undervoltage Delay (page 281)** or **Mains Overvoltage Delay (page 281)**.
- The mains voltage unbalance is out of limit given by setpoint **Mains Voltage Unbalance (page 281)** for a time period longer than **Mains Voltage Unbalance Delay (page 282)**.
- The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 284)** and **Mains Overfrequency (page 282)** for a time period longer than **Mains < > Frequency Delay (page 286)**.
- The MCB close command was not successful and the alarm **Wrn MCB Fail (page 580)** 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 279)** and **Mains Overvoltage (page 277)**.
- The mains voltage unbalance is within the limits given by the setpoint **Mains Voltage Unbalance (page 281)**.
- The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 284)** and **Mains Overfrequency (page 282)**.
- The alarm **Wrn MCB Fail (page 580)** is not active (if the **MCB FEEDBACK (PAGE 490)** matches the expected position given by the **MCB CLOSE/OPEN (PAGE 529)**). This condition is not required if MCB is open (**MCB FEEDBACK (PAGE 490)** 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 288)** is set to Mains Failure, the MCB is opened
- The timer for automatic start of the Gen-set **Emergency Start Delay (page 274)** 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 473) or MAINS FAIL BLOCK (PAGE 488).*

- If the setpoint **MCB Opens On (page 288)** is set to Gen Run, the MCB is opened once the generator voltage is within limits (after **Minimal Stabilization Time (page 240)** 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 **Transfer Delay (page 290)** 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 274)** begins to count down.
- Maximum time between closing of MCB and opening GCB is given by the setpoint **Transfer Delay (page 290)**. After GCB is opened, the Gen-set cools down and stops.

IMPORTANT: Controller has this behavior only in AUTO mode!

5.5.8 Dual Operation

Dual operation – AMF

Dual operation - AMF consists of 2 Gen-sets and 1 mains. Principle of dual operation is in switching the Gen-sets in supplying of load when there is a mains failure or LBI **REMOTE START/STOP (PAGE 495)** is activated on Master controller. Each controller measures mains and its gen-set. Interlock between all breakers (GCB1, GCB2 and MCB) is required. If there is failure of one Gen-set, the second Gen-set will take the load.

MCB control from both controllers is not required. Slave controller in Dual Operation does not control MCB (MCB Close/Open is in open position). However it is recommended to be prepared to also control MCB from slave controller – in case of failure of Dual Operation, both controllers switch to normal AMF operation.

IMPORTANT: Dual operation works only in AUTO mode.

IMPORTANT: Dual operation is in fail also during process of adjustment of setpoints. In this moment slave still tries to control MCB.

IMPORTANT: Setpoint MCB Opens On (page 288) has to be set-up to Mains Fail option.

IMPORTANT: LBI MAINS FAIL BLOCK (PAGE 488) can cause fail of dual operation system. In case of different states of mains on master and slave controllers, alarm AHI Dual Operation Different Mains (page 576) is activated and gen-sets are switched to normal operation.

Note: *LBI **AMF START BLOCK (PAGE 473)** is evaluated on both controllers. When this LBI is activated, gen-set can't start in dual operation. Second gen-set (without active **AMF START BLOCK (PAGE 473)**) will start. Gen-sets are not swapping the load until this LBI is active. Behaviour is the same like with alarm of 2nd level.*

Note: *MCB Fail protection is not used in Slave controller during Dual Operation. MCB is controlled only via Master. Slave controller has MCB Close/Open in open position all the time during Dual Operation.*

Start/stop events

Event	Dual AMF
Mains Fail	Evaluated by Master only
LBI **REMOTE START/STOP (PAGE 495)**	Evaluated by Master only

Dual operation – MRS

Dual operation MRS consists of 2 Gen-sets. The principle of dual operation is in switching the Gen-sets in supplying of load when **REMOTE START/STOP (PAGE 495)** is activated on Master controller (on slave controller this LBI has no function in Dual Operation). Each controller measures its Gen-set. Interlock between all breakers (GCB1 and GCB2) is required. If there is failure of one Gen-set, the second Gen-set will take the load.

IMPORTANT: Dual operation works only in AUTO mode.

IMPORTANT: Dual operation is in fail also during process of adjustment of setpoints.

IMPORTANT: It is not possible to use Auto Run option in Exercise timers with dual operation.

Start/stop events

Event	Dual MRS
LBI REMOTE START/STOP (PAGE 495)	Evaluated by Master only

Communication

Communication can be established via communication module CM-RS232-485. Communication line is selected via setpoints **COM1 Mode (page 359)** or **COM2 Mode (page 361)**. There are options for DualMaster and DualSlave. These options adjust, which communication line is selected and which role the controller has in Dual Operation.

> **IMPORTANT: For correct communication it is necessary to have one Master and one Slave controller on the same communication line.**

> **IMPORTANT: There are no shared setpoints. It is necessary to have the same settings of AMF setpoints and engine timers in both controllers.**

In case of communication failure between controllers, alarm **AHI Dual Operation Fail (page 575)** is activated. This alarm is activated on both controllers. Both controllers are switched to normal operation.

Adjustment of COM Modes

COM Mode in controller 1	COM Mode in controller 2	Behavior
Master	Slave	OK – normal dual operation function
Slave	Master	OK – normal dual operation function
Master	Master	There will be communication fail (it is necessary to have master and slave to establish communication line) – there will be active alarm **AHI Dual Operation Fail (page 575)**. This alarm will be active on both controllers. Both controllers will be switched to normal operation.
Slave	Slave	There will be communication fail (it is necessary to have master and slave to establish communication line) – there will be active alarm **AHI Dual Operation Fail (page 575)**. This alarm will be active on both controllers. Both controllers will be switched to normal operation.
Disabled	Master/Slave	There will be communication fail (it is necessary to have master and slave to establish communication line) – there will be active alarm **AHI Dual Operation Fail (page 575)**. This alarm will be active on master/slave controller. Both controllers will be switched to normal operation.
Master/Slave	Disabled	There will be communication fail (it is necessary to have master and slave to establish communication line) – there will be active alarm **AHI Dual Operation Fail (page 575)**. This alarm will be active on master/slave controller. Both controllers will be switched to normal operation.
Disabled	Disabled	Both controllers are in normal operation.

Switching of Gen-sets

Switching of Gen-sets is based on their **Running Hours (page 448)**. The time that the Gen-set runs is adjusted via setpoint **Running Hours Max Difference (page 288)**. When difference of **Running Hours (page 448)** between Gen-sets is bigger than value adjusted in this setpoint, load is transferred from first Gen-set to second Gen-set. First Gen-set is supplying the load until second Gen-set is in running state. Then the GCB of first Gen-set is opened. From this moment timer **Transfer Delay (page 290)** counts down. When it counts down, GCB of second Gen-set can be closed.

Note: *Value of **Running Hours (page 448)** can be modified by setpoint **Running Hours Base (page 289)**. This setpoint can add or remove additional running hours to value from statistics. This modified value of running hours is used in dual operation function.*

Note: *In case that both Gen-sets have the same running hours, Master controller has higher priority.*

Note: *Switching of Gen-sets can be inhibit by setpoint **Swap Gen-sets (page 289)** or by binary input **DUAL SWAP GEN-SETS (PAGE 479)**.*

Note: *Priority of Gen-set can be changed by binary input **DUAL TOP PRIORITY (PAGE 480)**. In this case running hours values are not used to decide, which Gen-set should start.*

Dual operation adjustment

- Prepare two InteliLite 4 AMF 9 controllers with CM-RS232-485 module.
- Adjust setpoints **COM1 Mode (page 359)** or **COM2 Mode (page 361)** (depending on preferred communication line) to DualMaster on first controller and Dual Slave on second controller
- Copy the identical configurations to both of them
- Use wiring with mechanical/electrical interlock between all breakers (mechanical interlock is preferred)
- Switch both controllers to OFF mode to prevent automatic or remote start
- Interconnect communication terminals on CM-RS232-485 modules
- Adjust setpoint **MCB Opens On (page 288)** to Mains Fail option
- Adjust setpoint **Running Hours Max Difference (page 288)** on Master controller
- Adjust setpoints **Running Hours Base (page 289)** on both controllers if running hours change is needed for dual operation
- Adjust additional function of dual operation – **Master Error Protection (page 290)**, **Slave Error Protection (page 290)** and **Swap Gen-sets (page 289)** setpoints
- Change the mode of both controllers to AUTO
- System is now ready for dual operation function

Note: *Breakers feedbacks are recommended, but not required.*

Alarms related to dual operation:

- **AHI Dual Operation Fail (page 575)**
- **Wrn Dual Operation Master Fail (page 575)**
- **Wrn Dual Operation Slave Fail (page 576)**
- **AHI Dual Operation Different Mains (page 576)**
- **ALI Dual Operation Different FW Version (page 575)**

5.5.9 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 243)**.
- 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 242)**.
- 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 516)** is de-energized and **STOP SOLENOID (PAGE 540)** is energized. The engine will stop within the time period determined by the setpoint **Stop Time (page 243)**. If the engine does not stop within this time, the alarm **Wrn Stop Fail (page 578)** will be issued.

The output **STOP SOLENOID (PAGE 540)** is energized until the engine is stopped, but at least for the duration of **Stop Time (page 243)**. If the **Stop Time (page 243)** has elapsed and the engine has still not stopped, the **STOP SOLENOID (PAGE 540)** is de-energized for 5 s and then energized again for **Stop Time (page 243)**.This is repeated until the engine is stopped.

The output **Ignition (page 525)** 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 118)** signals is active.

5.5.10 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 534)** output is active. **Example:** Usually used for preheating or processes executed prior Gen-set start.
Cranking	Engine is cranking, **STARTER (PAGE 539)** 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.

Loaded	Gen-set is running at nominal speed and **GCB CLOSE/OPEN (PAGE 518)** is active.
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 483)** Gen-set operation. **Example:** Used for bypass the controller and engine manual start. Controller mode, where the LBI **EMERGENCY MAN (PAGE 483)** is activated. All control functions are stopped

Engine started conditions

- Engine speed (RPM) > **Starting RPM (page 230)** or
- Oil pressure > **Starting Oil Pressure (page 231)** or
- Binary input **OIL PRESSURE (PAGE 491)** is in logical 0 or
- D+ terminal active (reached **D+ Threshold (page 246)** of supply voltage) for minimum 1 s or
- Generator voltage > 25 % of **Nominal Voltage Ph-N (page 215)** or **Nominal Voltage Ph-Ph (page 215)** (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 230)****.*

Engine running conditions

- Engine speed (RPM) > **Starting RPM (page 230)** or
- Oil pressure > **Starting Oil Pressure (page 231)** or
- Binary input **OIL PRESSURE (PAGE 491)** is in logical 0 or
- Generator voltage > 25 % of **Nominal Voltage Ph-N (page 215)**

Still engine conditions

- Engine speed (RPM) < **Starting RPM (page 230)** and
- Oil pressure < **Starting Oil Pressure (page 231)** and
- Binary input **OIL PRESSURE (PAGE 491)** 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 578)** 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 231)**, Wrn Stop Fail has delay 1 s
- Binary input **OIL PRESSURE (PAGE 491)** 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 540)** output.

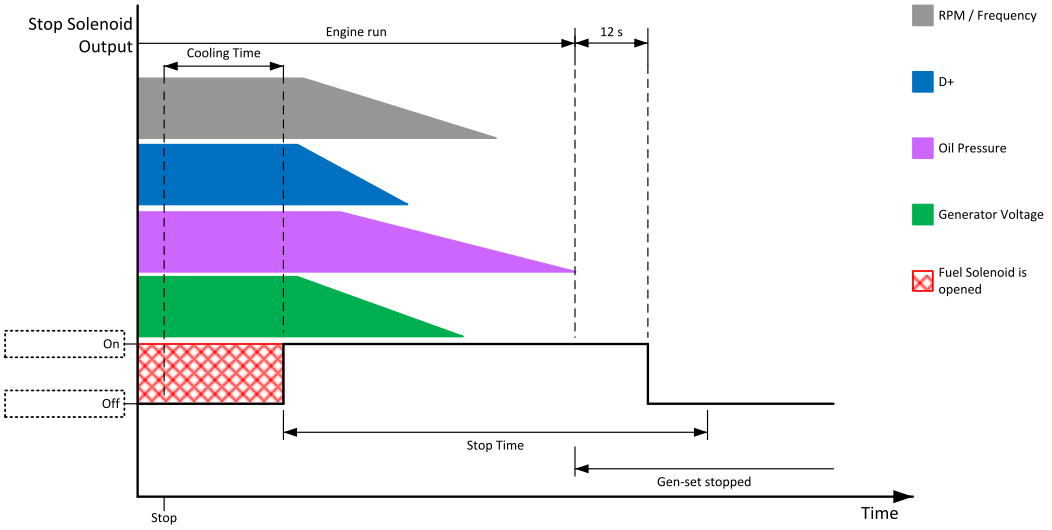


Image 5.17 Engine stops in **Stop Time (page 243)**

If the total stopping time will exceed setpoint **Stop Time (page 243)** then the **Wrn Stop Fail (page 578)** and binary outputs for stopping are activated. The controller will continuously try to stop the engine.

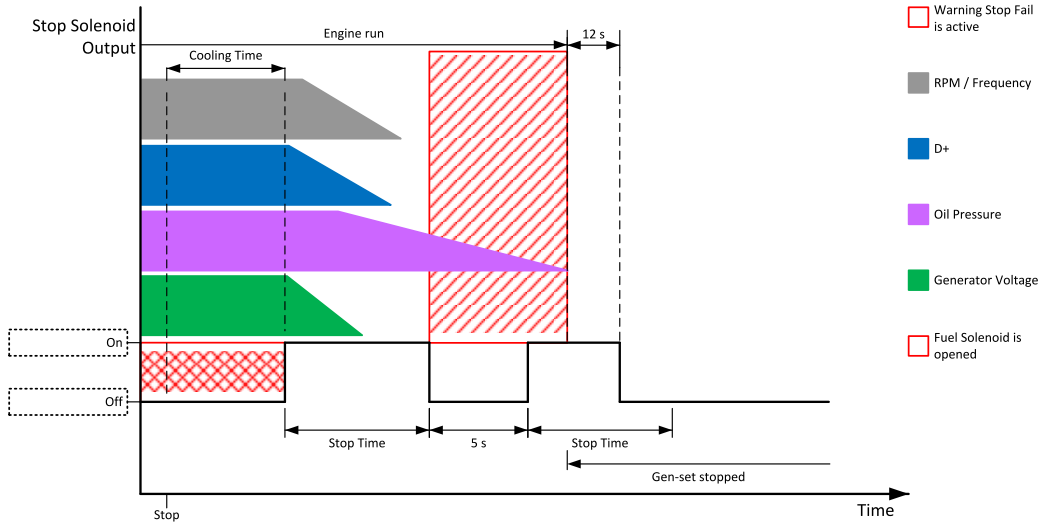


Image 5.18 Engine stops after first **Stop Time (page 243)**

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
BrksOff	GCB, MCB opened

5.5.11 Additional running engine indications

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

The following conditions are evaluated as additional running engine indication:

- Voltage on the D+ input is higher than the **D+ Threshold (page 246)** 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 246)**. 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 231)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.
- Binary input **OIL PRESSURE (PAGE 491)** is in logical 0.
- At least one phase of generator voltage is >25 % of nominal voltage.

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

5.5.12 RPM Measurement

InteliLite 4 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 50)**. Received data are converted using setpoint **Gear Teeth (page 219)**.

Measuring from generator frequency

RPM is calculated from generator frequency which is received from **Generator Voltage L1-N (page 433)**. To enable this measurement method adjust setpoint **Gear Teeth (page 219)** to Fgen->RPM. The calculation is based on expectation of 4 pole alternator. Following formula is used:

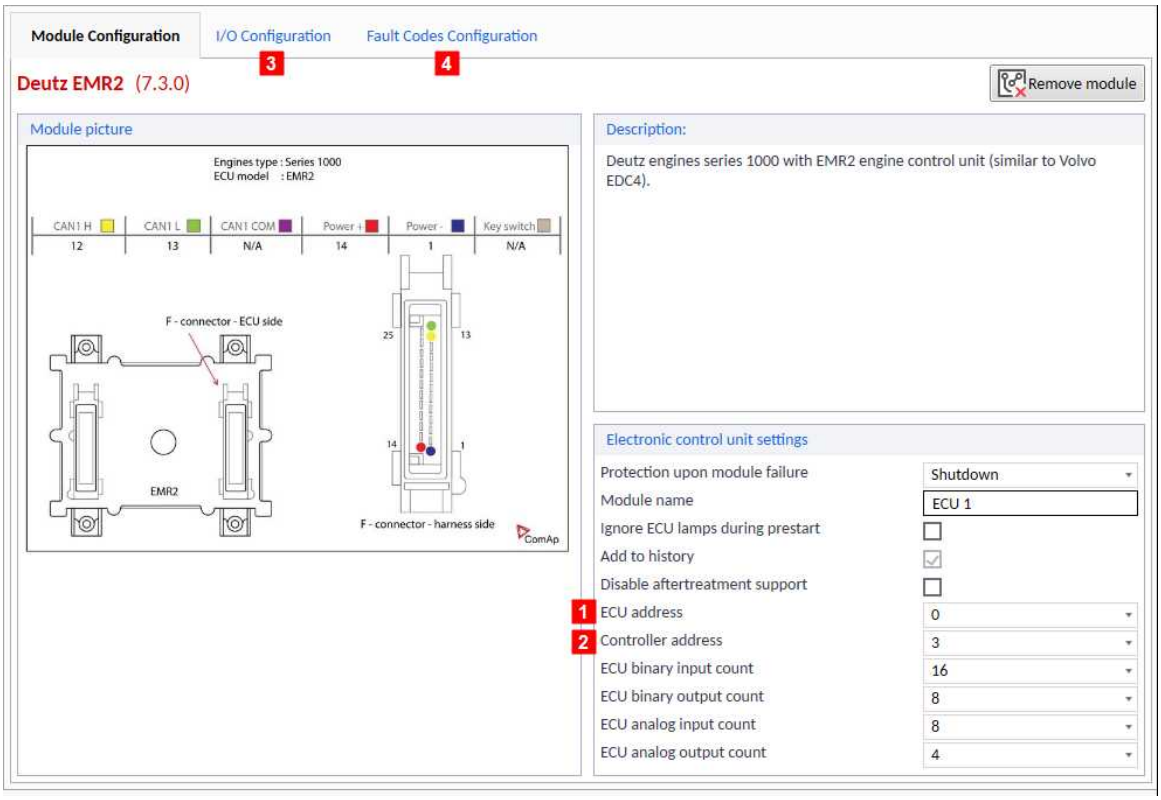
$$RPM = Hz * \frac{120}{4}$$

5.5.13 Multi ECU

InteliLite 4 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 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 1 ECU address and 2 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 228)** of the Controller Unit that sends commands frames to this ECU.

Moreover you can now also modify 3 I/O Configuration and recognized 4 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 480)**	**ECU 1 COMM FAIL (PAGE 511)**	**Wrn ECU 1 Comm Fail (page 571)**
2	**ECU COMMUNICATION FAIL BLOCK 2 (PAGE 480)**	**ECU 2 COMM FAIL (PAGE 511)**	**Wrn ECU 2 Comm Fail (page 571)**

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 511)**. 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 480)**. 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.

5.5.14 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.*

Record structure

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

Mains Frequency	Mfrq	Mains Frequency
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
Binary Inputs	BIN	Controller binary inputs
E-Stop	E-Stop	State of dedicated E-Stop input
Binary Outputs	BOUT	Controller binary outputs
Controller Mode	Mode	Controller mode

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

5.5.15 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 max. 5 seconds to a close and open command. Special attention should be paid to opening of motorized circuit breakers, as it could take more than 5 seconds on some types. In such cases it is necessary to use an undervoltage coil for fast opening.
- After opening the breaker, there is an internal delay before closing the breaker. Delay is 6 seconds – 5 seconds for OFF coil and 1 second for UV coil. After these 6 seconds, breaker can be closed again. There is no delay when opening a breaker.

Breaker control outputs

Close/Open	An output for control of a contactor. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.
ON coil	An output giving a 5 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 5 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 5 seconds in the moment the breaker has to be switched off. The output is intended for control of undervoltage coils of circuit breakers.

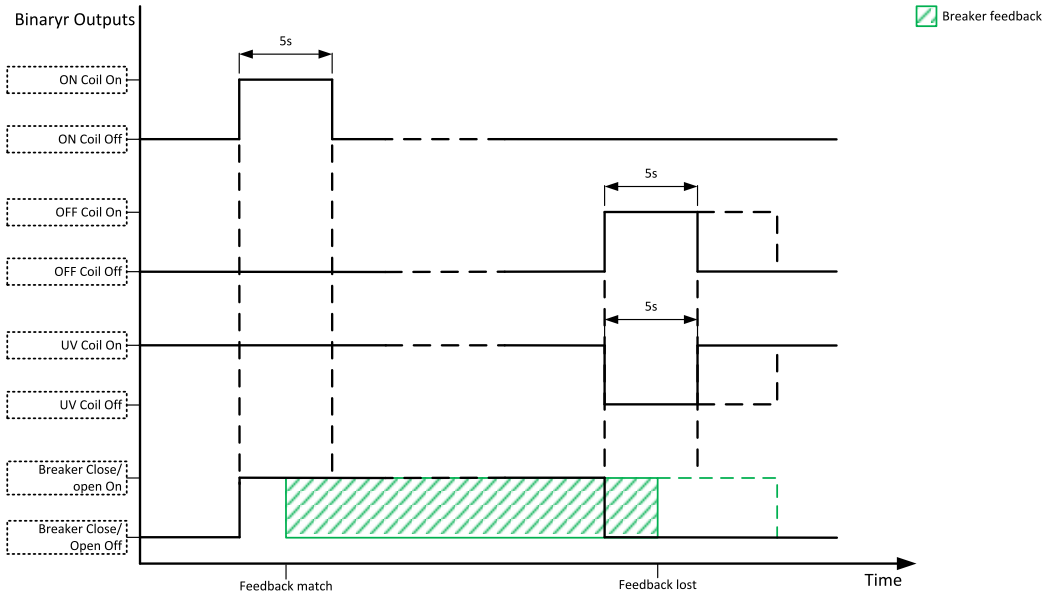


Image 5.19 Breaker control outputs

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 529)** is activated. This behavior is called "negative logic" and can be adjusted by the setpoint **MCB Logic (page 286)**. 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 580)** alarm: **MCB Opens On (page 288)** = Mains Fail, **Mains Undervoltage Delay (page 281)** ≤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 288)** = Gen Run will prevent triggering the **Wrn MCB Fail (page 580)** alarm.

Breaker failure detection

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

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

IMPORTANT: If a breaker feedback is configured, it will be required all the time. Otherwise alarms will be issued.

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

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

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

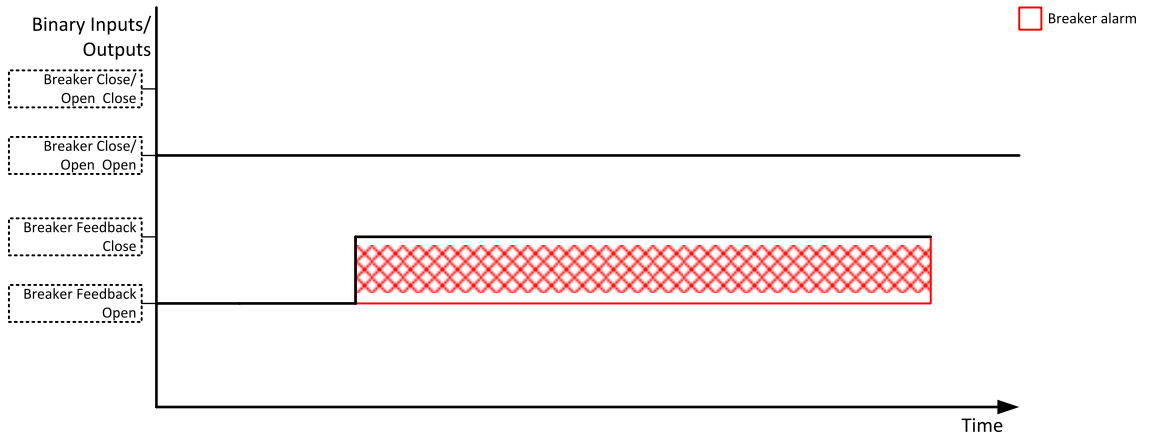


Image 5.20 Breaker failure – breaker close/open in steady position – open

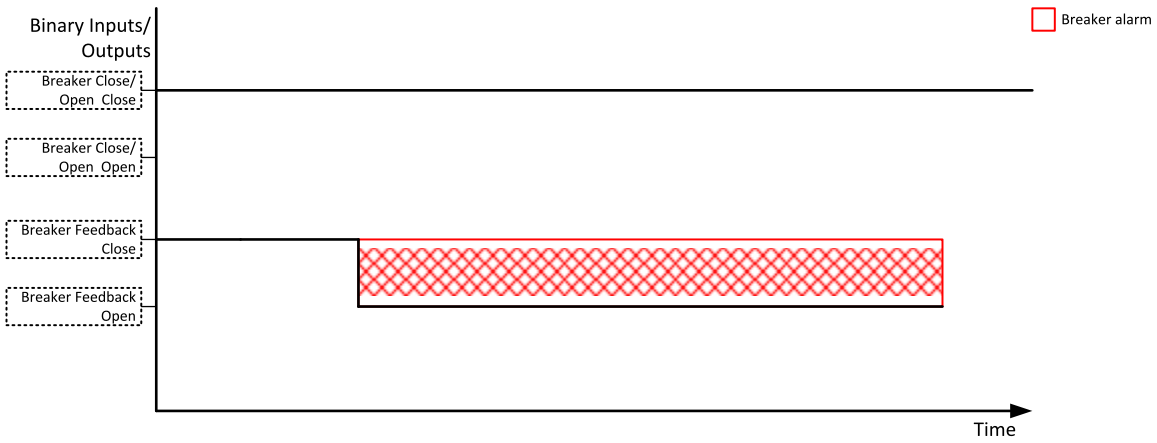


Image 5.21 Breaker failure – breaker close/open in steady position – close

When binary output breaker close/open opens there is 5 sec delay for breaker failure detection.

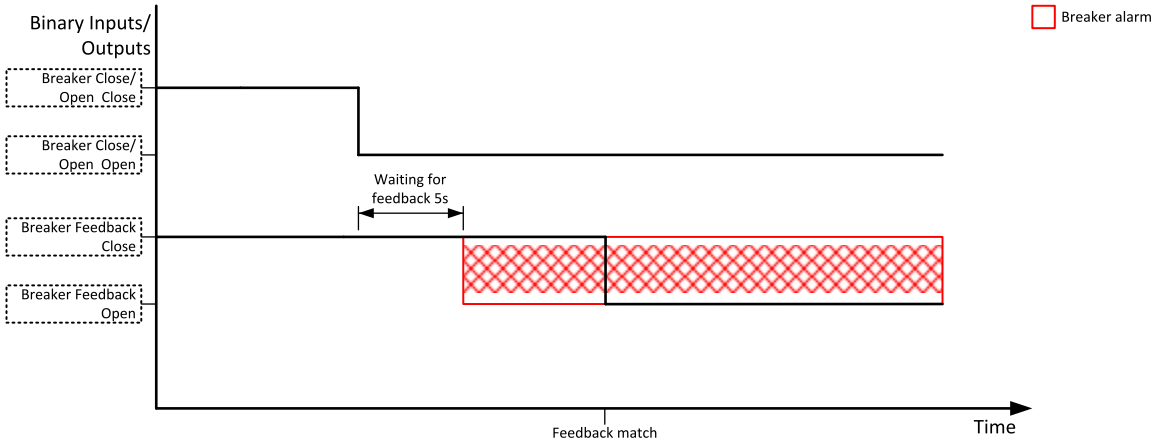


Image 5.22 Breaker failure – breaker close/open opens

When binary output breaker close/open closes there is 5 sec delay for breaker failure detection.

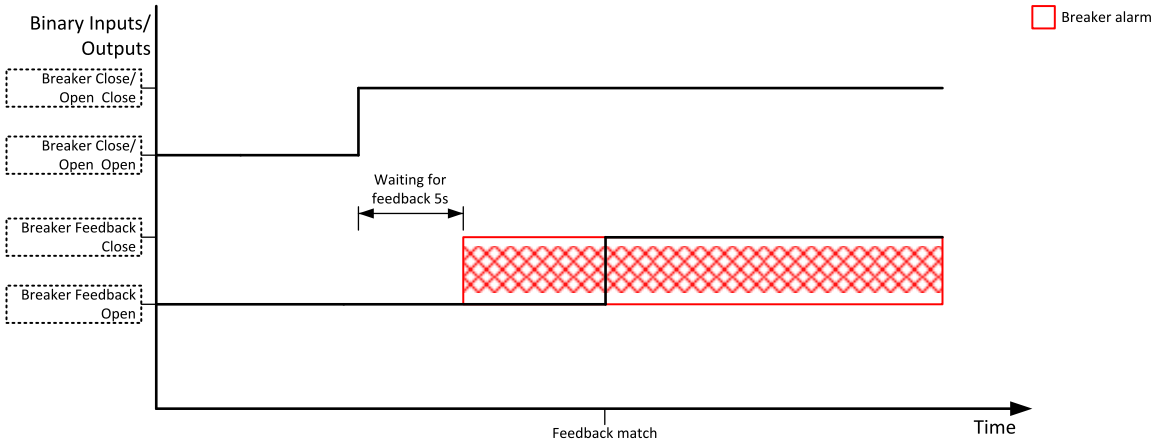


Image 5.23 Breaker failure – breaker close/open closes

5.5.16 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	LBO Alarm activation	Action: CB open	Action: Gen-set stop	SD Override blocking	Common LBO
History Record Only	1	Hst	-	✓	-	-	-	-	-	-	-
Alarm List Indication	1	ALI	✓	-	-	-	-	-	-	-	-
Alarmlist indication + history record	1	AHI	✓	✓	-	-	-	-	-	-	-
Warning	1	Wrn	✓	✓	✓	✓	✓	-	-	-	**AL Common Wrn** (page 505)
Shutdown	2	Sd	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common Sd** (page 504)
Breaker Open & Cool Down	2	BOC	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common BOC** (page 504)
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 241)** has elapsed or GCB is closed whichever happens first.

Exceptions are:

- Overspeed protection which has two limits defined via setpoints **Overspeed Sd (page 247)** and **Starting Overspeed Sd (page 247)**. 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 230)**.
- E-Stop and Emergency stop

The other way fixed protections can be blocked is by active LBI **SD OVERRIDE (PAGE 496)**.

Note: *LBI **SD OVERRIDE (PAGE 496)** (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 (PAGE 492)**

Generator and engine protections lists

Generator protections

	Alarms / Protection name
Current	**BOC Short Circuit (page 615)**
	BOC Overcurrent IDMT (page 616)
	BOC Current Unbalance (page 614)
Frequency	**BOC Generator Overfrequency (page 610)**
	BOC Generator Underfrequency (page 610)
Others	**ALI Gen Ph L1 Inverted (page 590)**
	ALI Gen Ph L2 Inverted (page 590)
	ALI Gen Ph L3 Inverted (page 590)
	ALI Gen Ph Rotation Opposite (page 591)
	Sd Earth Fault Current (page 615)
Power	**BOC Overload (page 615)**

	Alarms / Protection name
Voltage	Sd Generator L1 Overvoltage (page 603)
	Sd Generator L2 Overvoltage (page 603)
	Sd Generator L3 Overvoltage (page 603)
	Sd Generator L1L2 Overvoltage (page 604)
	Sd Generator L2L3 Overvoltage (page 604)
	Sd Generator L3L1 Overvoltage (page 604)
	BOC Generator L1 Undervoltage (page 604)
	BOC Generator L2 Undervoltage (page 605)
	BOC Generator L3 Undervoltage (page 605)
	BOC Generator L1L2 Undervoltage (page 605)
	BOC Generator L2L3 Undervoltage (page 605)
	BOC Generator L3L1 Undervoltage (page 606)
	BOC Gen Voltage Unbalance Ph-N (page 609)
	BOC Gen Voltage Unbalance Ph-Ph (page 609)

Engine protections

	Alarms / Protection name
Speed	Sd Overspeed (page 601)
	Sd Underspeed (page 601)

Mains protections

	Alarms / Protection name
Frequency	Mains Overfrequency (page 592)
	Mains Underfrequency (page 592)
Others	ALI Mains Ph L1 Inverted (page 591)
	ALI Mains Ph L2 Inverted (page 591)
	ALI Mains Ph L3 Inverted (page 591)
	ALI Mains Ph Rotation Opposite (page 591)

	Alarms / Protection name
Voltage	MP Mains L1 Overvoltage (page 610)
	MP Mains L1 Undervoltage (page 610)
	MP Mains L2 Overvoltage (page 611)
	MP Mains L2 Undervoltage (page 611)
	MP Mains L3 Overvoltage (page 611)
	MP Mains L3 Overvoltage (page 612)
	MP Mains L1L2 Overvoltage (page 612)
	MP Mains L1L2 Undervoltage (page 612)
	MP Mains L2L3 Overvoltage (page 612)
	MP Mains L2L3 Undervoltage (page 613)
	MP Mains L3L1 Overvoltage (page 613)
	MP Mains L3L1 Undervoltage (page 613)
	Mains Voltage Unbalance ph-n (page 592)
	Mains Voltage Unbalance ph-ph (page 592)

User Protections

InteliLite 4 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 32.

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.

Type	Name of activation	Description
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	LBO Alarm activation	Action: CB open	Action: Gen-set stop	SD Override blocking	Common LBO
History Record Only	1	Hst	-	✓	-	-	-	-	-	-	-
Alarm List Indication	1	ALI	✓	-	-	-	-	-	-	-	-
Alarmlist indication + history record	1	AHI	✓	✓	-	-	-	-	-	-	-
Warning	1	Wrn	✓	✓	✓	✓	✓	-	-	-	**AL Common Wrn** (page 505)
Shutdown	2	Sd	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common Sd** (page 504)
Breaker Open & Cool Down	2	BOC	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common BOC** (page 504)
Shutdown Override	2	Sd	✓	✓	✓	✓	✓	✓	✓	-	

Protection blocking

It is possible to configure one Protection Blocking to any **User Protections (page 128)**. 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 496)**.
Run Only Block Delay	The protection is blocked depending on engine state and time defined by setpoint **Run Only Block Delay (page 242)**. It can also be blocked by LBI **SD OVERRIDE (PAGE 496)**.
Force Block	The protection is blocked by LBI **PROTECTION FORCE DISABLE (PAGE 492)** or by LBI **SD OVERRIDE (PAGE 496)**.
Electrical Protection	The protection is blocked depending on engine state. It is unblocked once **Maximal Stabilization Time (page 241)** is elapsed or GCB is closed. It can also be blocked by LBI **SD OVERRIDE (PAGE 496)**.

Note: *LBI **SD OVERRIDE (PAGE 496)** (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 496)**.*

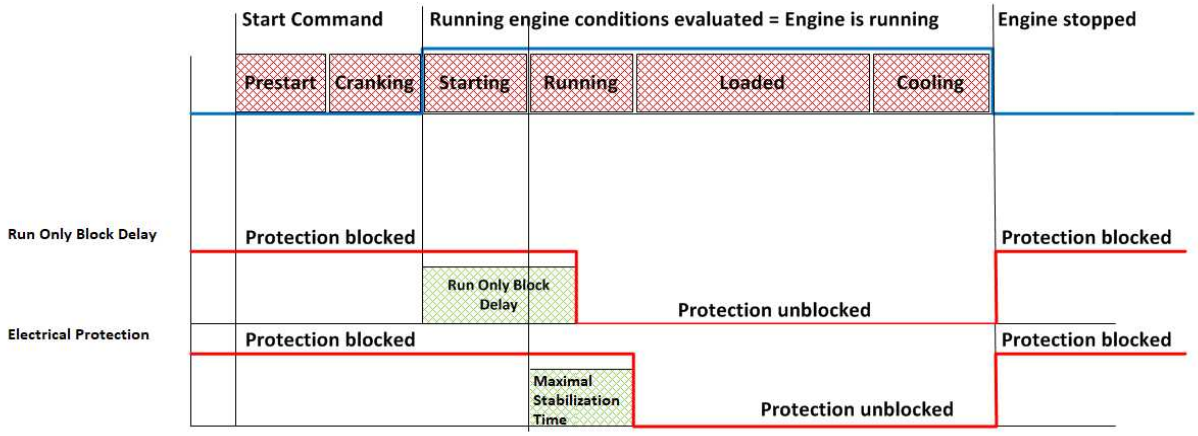


Image 5.24 Run only block delay and electrical protection blocking

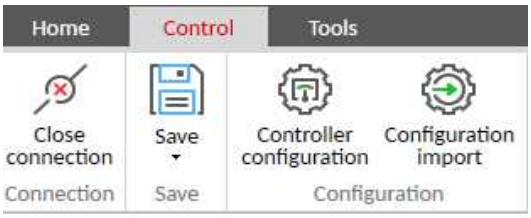
History record

- 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  .

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 124)** 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 453)**
- **Fixed Protections States 2 (page 453)**
- **Fixed Protections States 3 (page 454)**
- **Fixed Protections States 4 (page 454)**
- **Fixed Protections States 5 (page 454)**

User protections states

During the **Configuration of protections in InteliConfig (page 132)**, 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 454)**

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

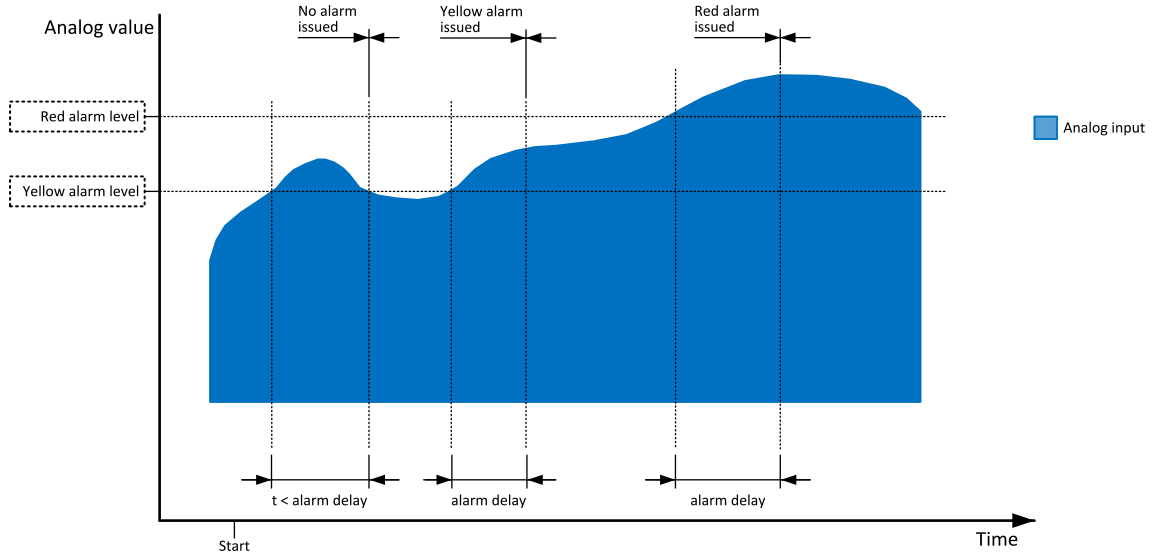


Image 5.25 Analog input alarm evaluation principle

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 242)**.
- 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 241)** 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 (page 492)** 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 484)**, 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 496)** 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 5.26 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.

History record only (Hst)

The event is recorded into the history. Standard alarm outputs (**HORN (PAGE 524)** and **ALARM (PAGE 507)**) are not activated.

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 524)** and **ALARM (PAGE 507)**) are not activated.

Alarm list indication + History record (AHI)

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

Warning (Wrn)

The alarm appears in the Alarm list and is recorded into the history log. Activates the output **AL COMMON WRN (PAGE 505)** as well as the standard alarm outputs (**HORN (PAGE 524)** and **ALARM (PAGE 507)**).

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!**

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 504)** as well as the standard alarm outputs (**HORN (PAGE 524)** and **ALARM (PAGE 507)**).

IMPORTANT: In case there is no feedback from breakers configured on physical binary input or in PLC, Breaker open and cool down alarm will be replaced by shutdown alarm type.

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 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 504)** as well as the standard alarm outputs (**HORN (PAGE 524)** and **ALARM (PAGE 507)**).

Shutdown override

If the Logical binary input **SD OVERRIDE (PAGE 496)** 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 496)** input.

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 136)**. 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.*

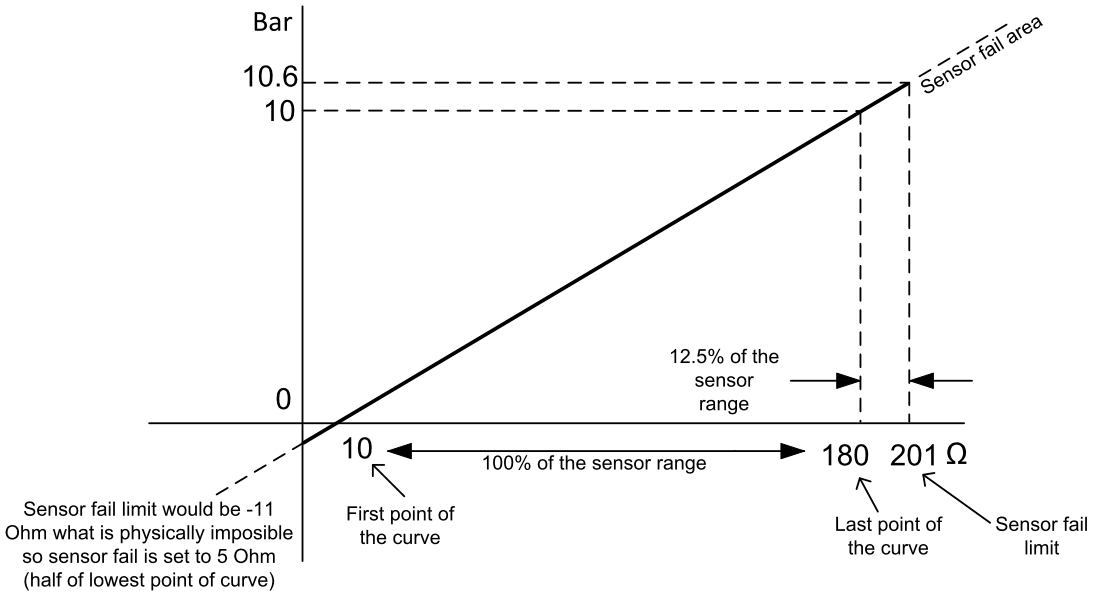


Image 5.27 Sensor failure detection principle

Remote alarm messaging

If the communication plug-in module is connected to the controller, the controller can send SMS messagesor emails at the moment when a new alarm appears in the **Alarm list (page 136)** or new event is written in the **History log (page 120)**. The message will contain a copy of the **Alarm list (page 136)** or reasons from the **History log (page 120)**. To enable this function first to check the controller internet connection. Then adjust setpoints **Event Message (page 399)**, **Wrn Message (page 400)**, **BOC Message (page 398)** and **Sd Message (page 400)** to ON. Also enter a valid GSM phone number or email address to the setpoints.

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 363)**.*

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

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). 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). Alarm type is selected by user during the configuration of binary or analog user protection. Then the alarm name follows, which can be adjusted by user during the configuration.

ECU alarms

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

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

Built-in alarms

Events specification	Protection type	Description
Wrn Battery Overvoltage	WRN	Battery voltage is out of limits given by **Battery Overvoltage (page 257)** setpoint.
Wrn Battery Undervoltage	WRN	Battery voltage is out of limits given by **Battery Undervoltage (page 256)** setpoint.
Sd Battery Flat	SD	If the controller switches off during starting sequence (**STARTER (PAGE 539)** output is active) it doesn't try to start again and activates this protection (controller assumes bad battery condition).
Sd Start Fail	SD	Gen-set start failed. All crank attempts were tried without success.
BOC Gen Lx Undervoltage Sd Gen Lx Overvoltage (where x=1,2,3)	SD BOC	The generator voltage is out of limits given by **Generator Undervoltage BOC (page 268)** and **Generator Overvoltage Sd (page 267)** setpoints.
BOC Gen V Unbalance	BOC	The generator voltage is unbalanced more than the value of **Voltage Unbalance BOC (page 269)** setpoint.
BOC Gen >, <Frequency	BOC	The generator frequency is out of limits given by **Generator Overfrequency BOC (page 270)** and **Generator Underfrequency BOC (page 271)** setpoints.
BOC Current Unbalance	BOC	The generator current is unbalanced more than the value of **Current Unbalance BOC (page 266)** setpoint.
BOC Current IDMT	BOC	Generator current exceeds the limit for IDMT protection given by **Nominal Current (page 211)** and **IDMT Overcurrent Delay (page 265)** setpoints.

Events specification	Protection type	Description
BOC Overload	BOC	The load is greater than the value given by **Overload BOC (page 263)** setpoint.
Sd Earth Fault	SD	This alarm is activated when Earth Fault value exceeds **Earth Fault Sd (page 404)** limit for at least **Earth Fault Delay (page 403)** period.
Sd Overspeed	SD	The protection comes active if the speed is greater than **Overspeed Sd (page 247)** setpoint.
Sd Underspeed	SD	During starting of the engine when the RPM reach the value of **Starting RPM (page 230)** setpoint the starter is switched off and the speed of the engine can drop under **Starting RPM (page 230)** again. Then the Underspeed protection is active. Protection evaluation starts 5 seconds after reaching **Starting RPM (page 230)**.
Emergency Stop	SD	If the input Emergency Stop is active shutdown is immediately activated.
E-Stop	SD	If the input E-Stop is active shutdown is immediately activated.
GCB Fail	SD	Failure of generator circuit breaker.
MCB Fail	WRN	Failure of mains circuit breaker.
Sd RPM Measurement Fail	SD	Failure of magnetic pick-up sensor for speed measurement. This alarm appears, if starter was disengaged for other reason than over-crossing **Starting RPM (page 230)** (like oil pressure or D+) and at the end of timer **Maximum Cranking Time (page 229)** there are no RPMs > **Starting RPM (page 230)** detected.
Wrn Stop Fail	WRN	Gen-set stop failed. See description at Gen-set Operation States chapter.
Charge Alternator Fail	WRN	Failure of alternator for charging the battery.
Wrn Override All Sd	WRN	The protection is active if the output Sd Override is active.
ALI Gen Ph-Rotation Opposite	ALI	Gen-set voltage phases are not wired correctly. GCB closing is prohibited by controller.
ALI Ph-Rotation Opposite	ALI	Voltage phases are not wired correctly. GCB closing is prohibited by controller.
MP Mains Lx >V MP Mains Lx <V (where x=1,2,3)	MP	The mains voltage is out of limits given by **Mains Undervoltage (page 279)** and **Mains Overvoltage (page 277)** setpoints.
Mains Voltage Unbalance	MP	The mains voltage is unbalanced more than the value of **Mains Voltage Unbalance (page 281)** setpoint.
Mains >, <Frequency	MP	The mains frequency is out of limits given by **Mains Overfrequency (page 282)** and **Mains Underfrequency (page 284)** setpoints.

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

5.5.17 Maintenance Timers

Maintenance timer contains two types of timers – **Maintenance Timer RunHours** and **Maintenance Timer xy 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 (it does not have to be a different value, editing it and confirming original value is enough)
- 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 259****.*

5.5.18 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 305)**
- **Timer 1 Repetition (page 307)**
- **Timer 1 First Occur. Date (page 306)**
- **Timer 1 First Occur. Time (page 307)**
- **Timer 1 Duration (page 307)**
- **Timer 1 Repeated (page 308)**
- **Timer 1 Repeat Day (page 308)**
- **Timer 1 Day (page 309)**
- **Timer 1 Repeated Day In Week (page 309)**
- **Timer 1 Repeat Day In Month (page 309)**
- **Timer 1 Repeat Week In Month (page 310)**
- **Timer 1 Refresh Period (page 311)**
- **Timer 1 Weekends (page 312)**
- **Timer 1 Setup (page 306)**

There are up to 2 Timers available in the InteliLite 4. For more information **see Group: Scheduler on page 301**.

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 305)****.*

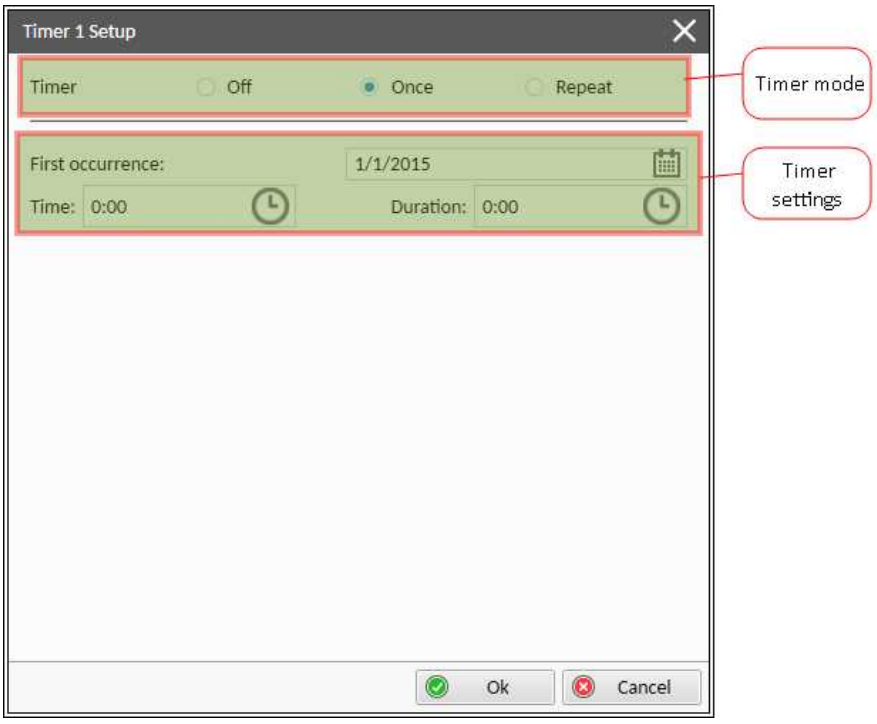


Image 5.28 Once mode – InteliConfig

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 305)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 307)** setpoint select Once mode. Then adjust **Timer 1 First Occur. Date (page 306)**, **Timer 1 First Occur. Time (page 307)** and **Timer 1 Duration (page 307)**.

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 305)****.*

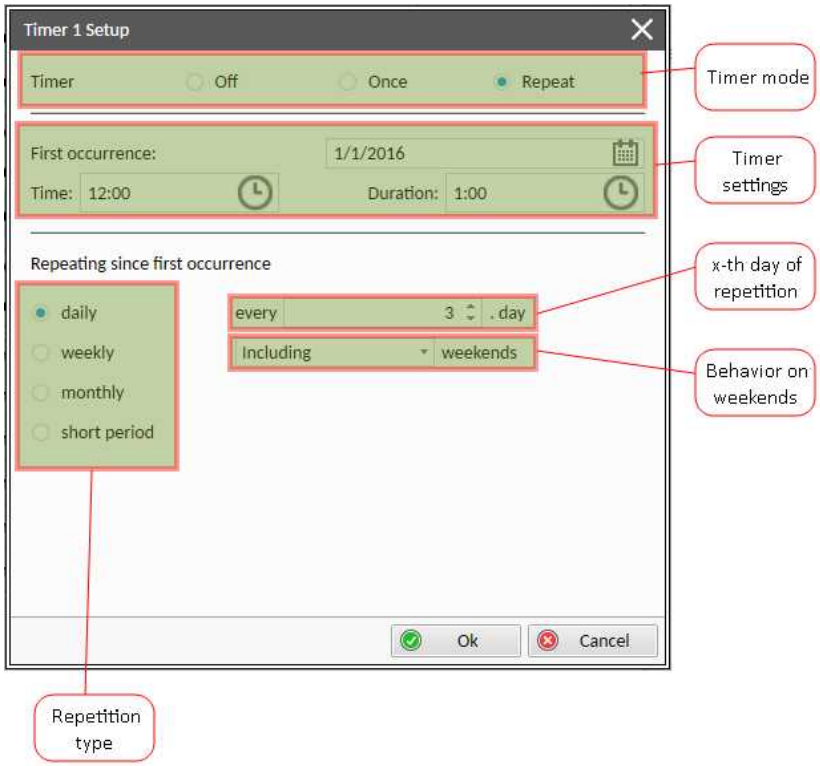


Image 5.29 Daily mode – InteliConfig

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 311)**) and behavior of timer on weekends (**Timer 1 Weekends (page 312)**).

> **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 305)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 307)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 306)**, **Timer 1 First Occur. Time (page 307)** and **Timer 1 Duration (page 307)**. In setpoint **Timer 1 Repeated (page 308)** select Daily and

adjust **Timer 1 Refresh Period (page 311)** (xth day of repetition) and **Timer 1 Weekends (page 312)** (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 305)****.*

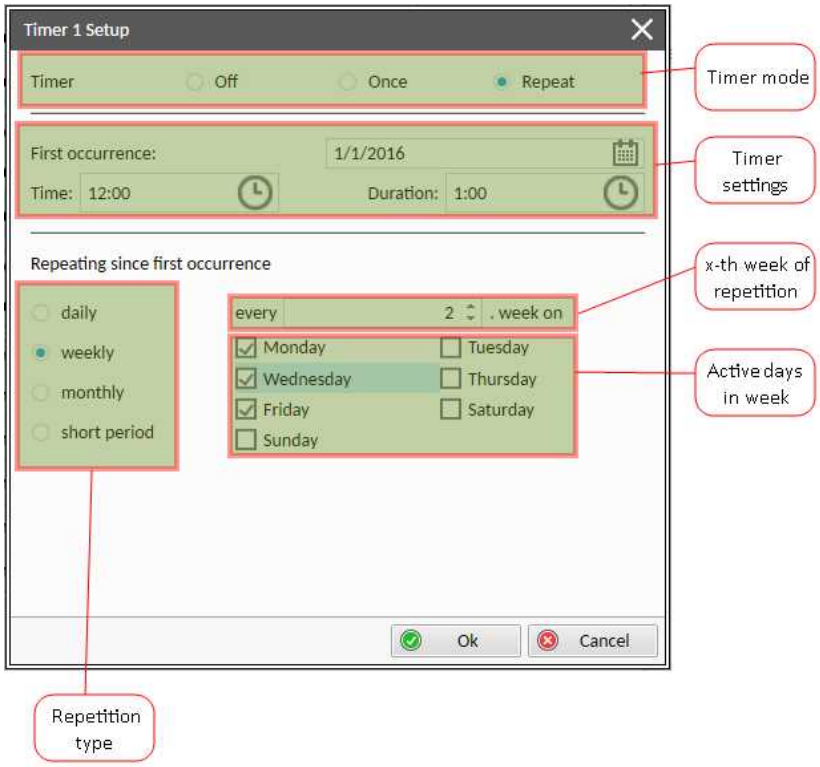


Image 5.30 Weekly mode – InteliConfig

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 311)**) and days when timer should be active (**Timer 1 Day (page 309)**).

> **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 305)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 307)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 306)**, **Timer 1 First Occur. Time (page 307)** and **Timer 1 Duration (page 307)**. In setpoint **Timer 1 Repeated (page 308)** select Weekly and adjust **Timer 1 Day (page 309)** (days when timer should be active) and **Timer 1 Refresh Period (page 311)** (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 305)****.*

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

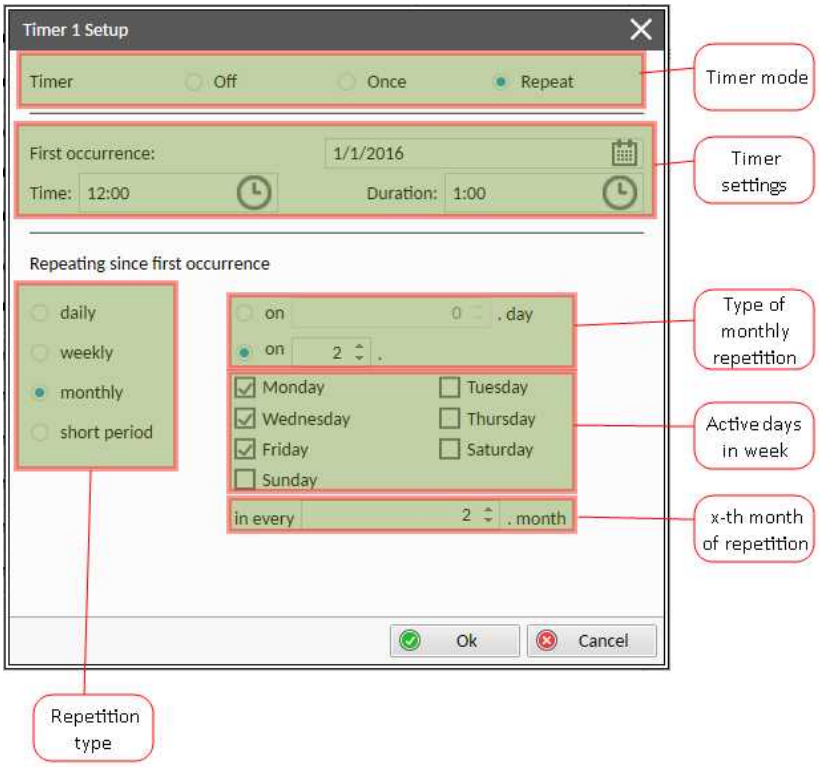


Image 5.31 Monthly mode – InteliConfig

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 309)**). 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.

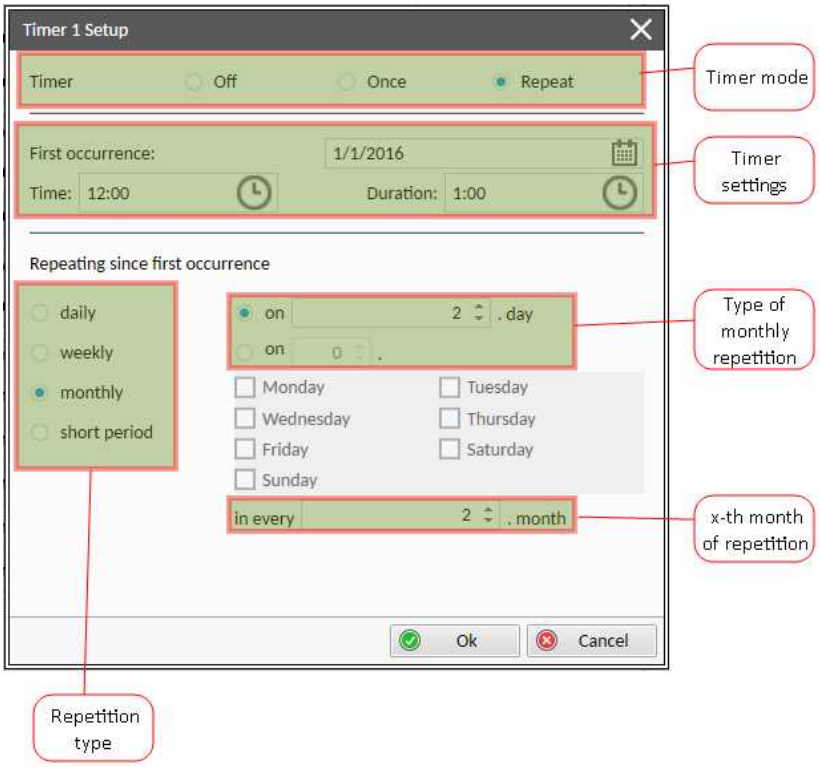


Image 5.32 Monthly mode – InteliConfig

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 305)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 307)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 306)**, **Timer 1 First Occur. Time (page 307)** and **Timer 1 Duration (page 307)**. In setpoint **Timer 1 Repeated (page 308)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 308)**, **Timer 1 Refresh Period (page 311)** (xth month of repetition) and **Timer 1 Repeat Day In Month (page 309)** (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 305)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 307)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 306)**, **Timer 1 First Occur. Time (page 307)** and **Timer 1 Duration (page 307)**. In setpoint **Timer 1 Repeated (page 308)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 308)**, **Timer 1 Refresh Period (page 311)** (xth month of repetition), **Timer 1 Repeated Day In Week (page 309)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 310)** (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 305)**.*

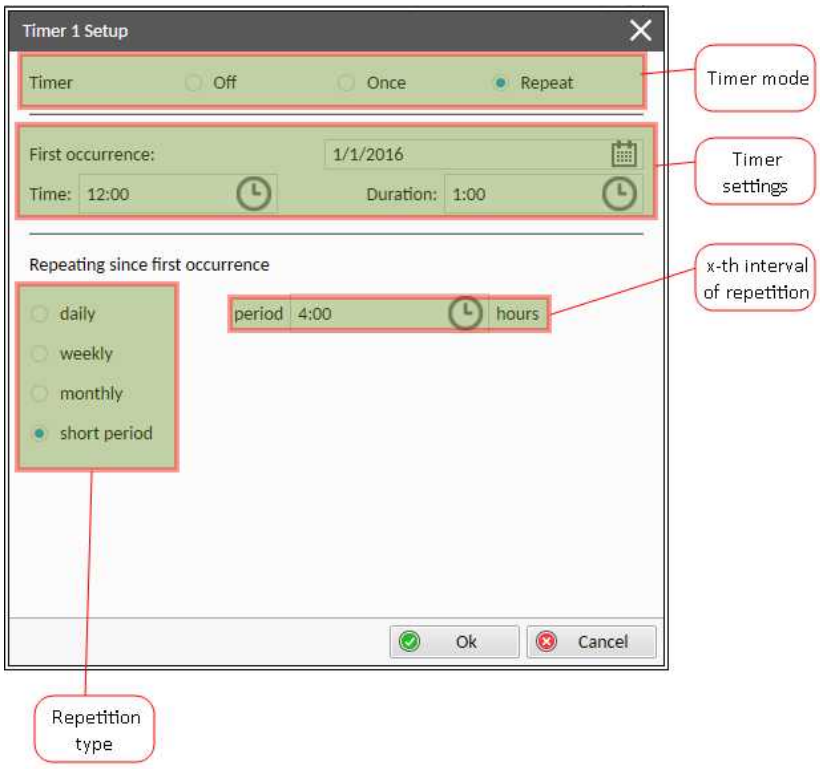


Image 5.33 Short period mode – InteliConfig

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 305)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 307)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 306)**, **Timer 1 First Occur. Time (page 307)** and **Timer 1 Duration (page 307)**. In setpoint **Timer 1 Repeated (page 308)**, select Short Period and adjust **Timer 1 Refresh Period (page 311)** (interval of repetition).

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

5.5.19 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 546)	AIN Switch01 On (page 298) AIN Switch01 Off (page 299)	AIN SWITCH01 (PAGE 503)
AIN SWITCH 02 (PAGE 546)	AIN Switch02 On (page 300) AIN Switch02 Off (page 301)	AIN SWITCH02 (PAGE 503)

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

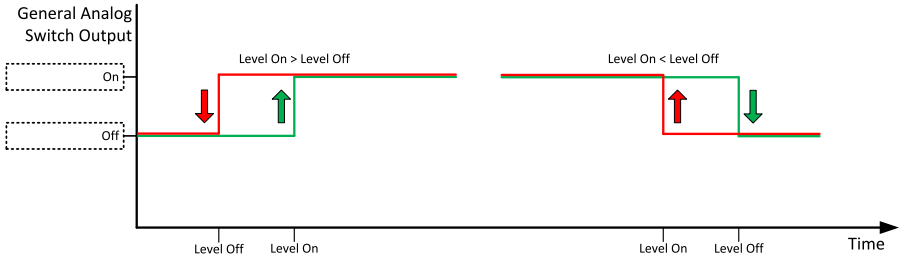


Image 5.34 Principle of analog switch

5.5.20 Voltage phase sequence detection

The controller detects phase sequence voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. When the phases are connected in different order the following alarms are detected:

- ALI Gen Ph Rotation Opposite (page 591)
- ALI Mains Ph Rotation Opposite (page 591)

5.5.21 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 2 stages which are numbered 1-2. 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 450)**.

Load shedding outputs

Stage	LBO
Stage 1	LOAD SHEDDING STAGE 1 (PAGE 527)
Stage 2	LOAD SHEDDING STAGE 2 (PAGE 527)

How the Load shedding controls the Load shedding outputs

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

Load shedding has 2 steps and each step is linked with its own binary output, **LOAD SHEDDING STAGE 1 (PAGE 527)**, **LOAD SHEDDING STAGE 2 (PAGE 527)**.

The Load shedding outputs can be activated one by one in the order 1, 2. The conditions for activation are defined by setpoints **Load Shedding Level (page 293)** and **Load Shedding Delay (page 294)**.

The Load shedding outputs are deactivated one by one according to the conditions given by the setpoints **Load Reconnection Level (page 294)**, **Load Reconnection Delay (page 295)**, **AUTO LOAD RECONNECTION (PAGE 295)**.

If manual reconnection of the load is desired the **Auto Load Reconnection (page 295)** setpoint must be disabled and the **MANUAL LOAD RECONNECTION (PAGE 489)** digital input must be configured.

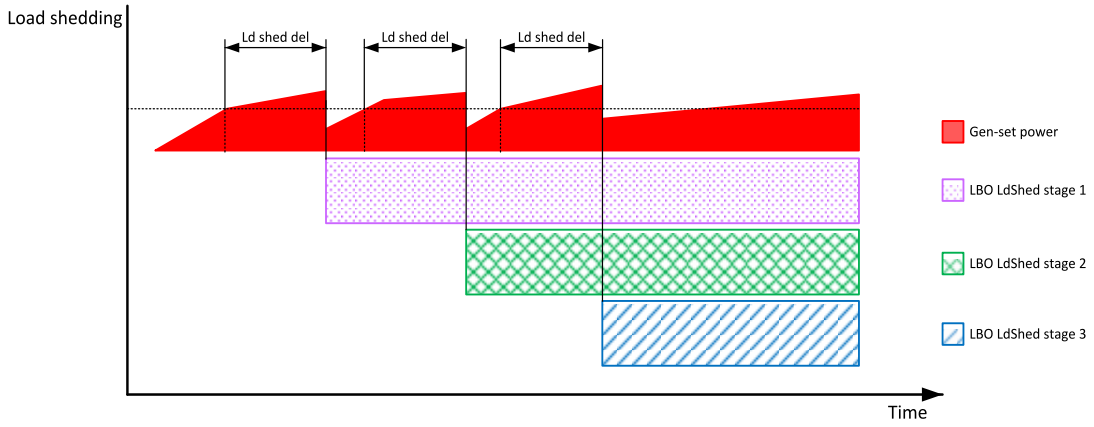


Image 5.35 Load shedding

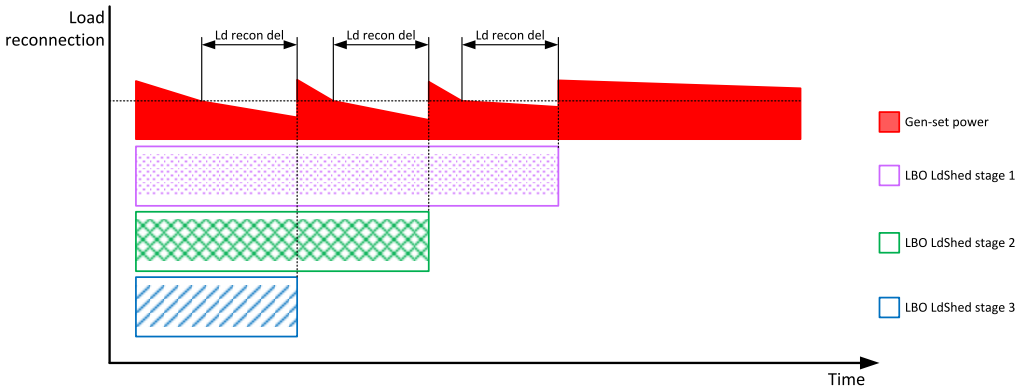


Image 5.36 Load reconnection

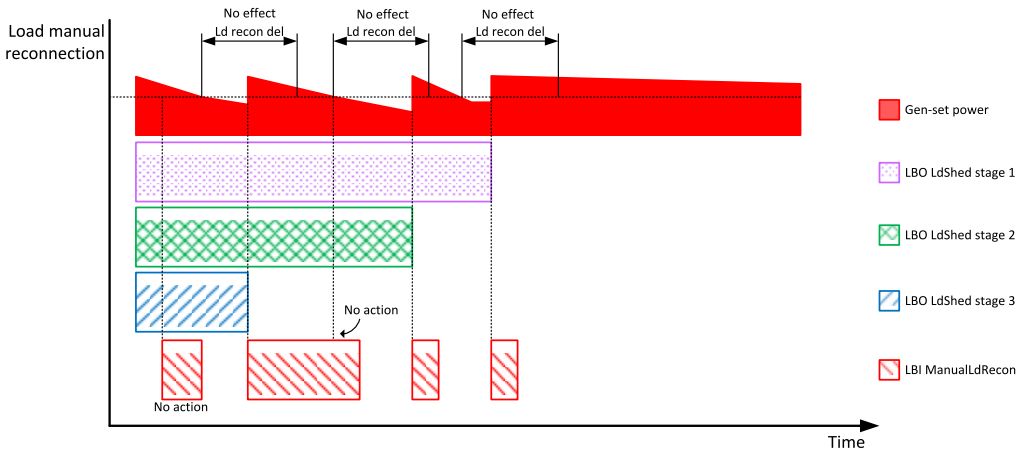


Image 5.37 Load manual reconnection

5.5.22 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 296)** 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 296)** setpoint level, or above **Dummy Load Off (page 297)** level.

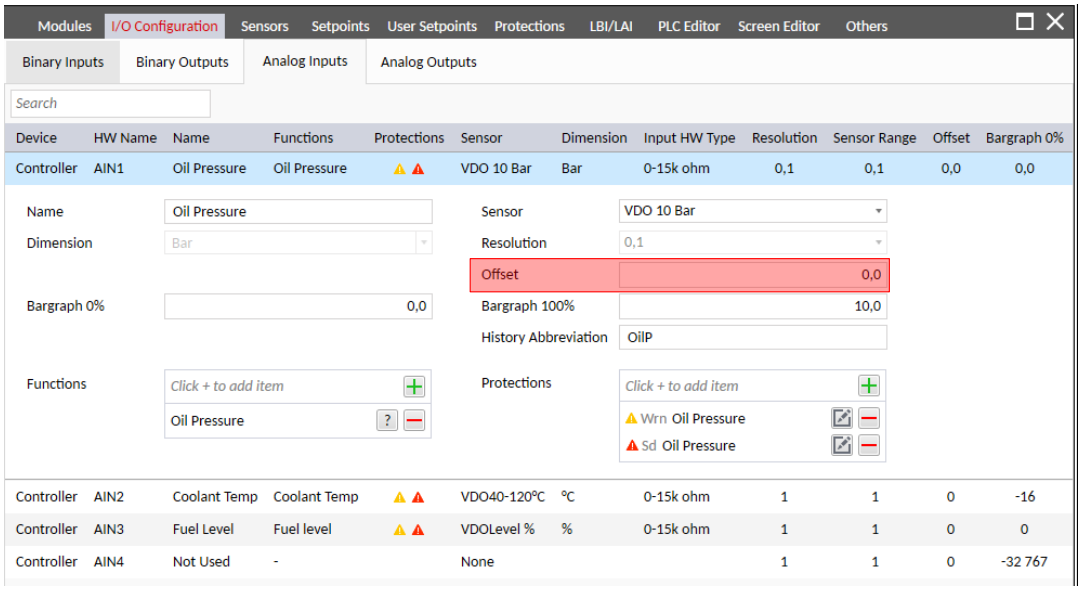
- Power is bellow level set by **Dummy Load On (page 296)** – in this case controller will wait for a period of time specified in **Dummy Load On Delay (page 297)** before activating **DUMMY LOAD STAGE 1 (PAGE 510)** LBO if no Dummy Load was active before. Otherwise the original outputs will stay on and controller will activate next stage of Dummy Load LBO.
- Power is above level set by **Dummy Load Off (page 297)** – in this case controller will wait for time set by setpoint **Dummy Load Off Delay (page 297)** before deactivating the highest active stage of Dummy Load (If **DUMMY LOAD STAGE 1 (PAGE 510)**, **DUMMY LOAD STAGE 2 (PAGE 511)** are active, controller will deactivate **DUMMY LOAD STAGE 2 (PAGE 511)**). If no Dummy Load outputs are active, nothing will happen.
- Controller will always work only with Dummy Load Stages up to highest one configured (if you only configure **DUMMY LOAD STAGE 1 (PAGE 510)** and no **DUMMY LOAD STAGE 2 (PAGE 511)**, there will effectively only be one stage and if **DUMMY LOAD STAGE 1 (PAGE 510)** is already active and **Dummy Load On Delay (page 297)** timer elapses, unconfigured **DUMMY LOAD STAGE 2 (PAGE 511)** will not be activated.

IMPORTANT: Check how big your load bank is and set the Dummy Load On (page 296) and Dummy Load Off (page 297) setpoints to correct levels, so that when dummy load is activated , power will not immediately go over the Dummy Load Off (page 297).

5.5.23 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..)*

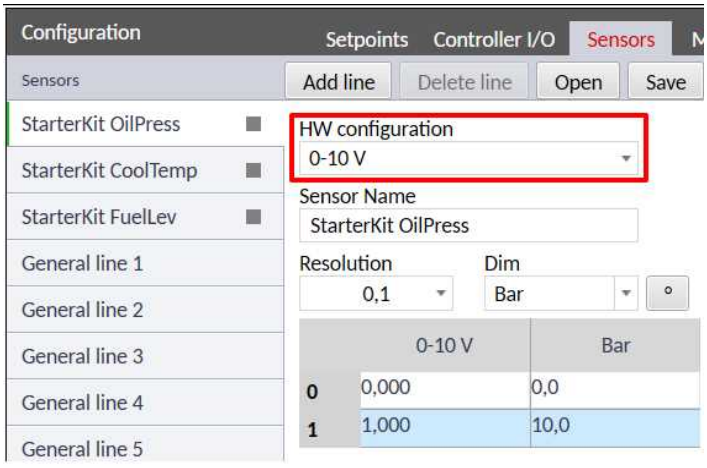
Sensor curve HW configuration

InteliLite 4 analog inputs allows you to select Input HW type. Three HW configuration options are available:

- 0-15 kΩ
- 0-10 V
- 0-20 mA passive

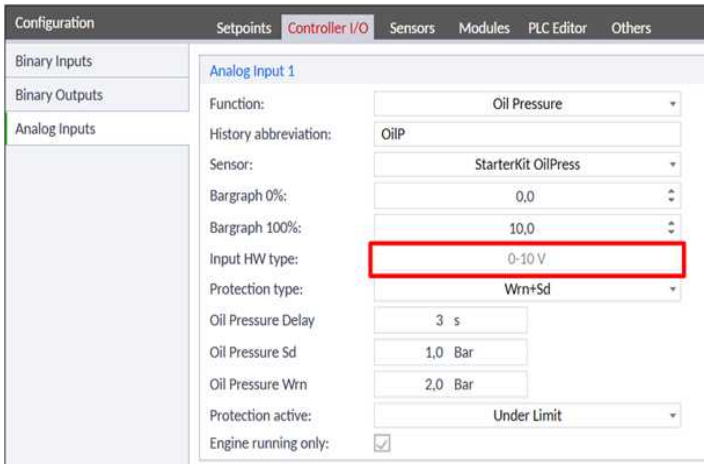
Setup controller analog input in this way to use other than the default HW configuration (0-15 kΩ):

1. Start with a sensor configuration and select requested HW configuration



2. Use the adjusted sensor with an analog input and the requested HW configuration will be used with the analog input automatically. There is no need to use a jumper, configured Input HW type is used by

controller automatically.



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 547) has to be in percentage and setpoint Fuel Tank Volume (page 253) has to be adjusted correctly.**

5.5.24 Power formats and units

InteliLite 4 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
Small	0.1 kW / kVA / kVAr	1 V	1 A
Standard	1 kW / kVA / kVAr	1 V	1 A

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

5.5.25 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.

List of available PLC blocks

PLC block	Number of blocks
OR/AND	16
XOR/RS	2
Comparator with hysteresis (Comp Hyst)	2
Comparator with delay (Comp Time)	2
Timer	1
Delay	4
Counter	0

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 152)** for more information.
- Add PLC blocks into the sheets. See **Adding PLC blocks (page 152)** for more information.
- Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 153)** for more information.

- Create connections between inputs, blocks and outputs. See **Creating wires (page 155)** for more information.
- Adjust properties of the blocks. See **List of PLC blocks (page 549)** for more information about blocks.

Working with sheets

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

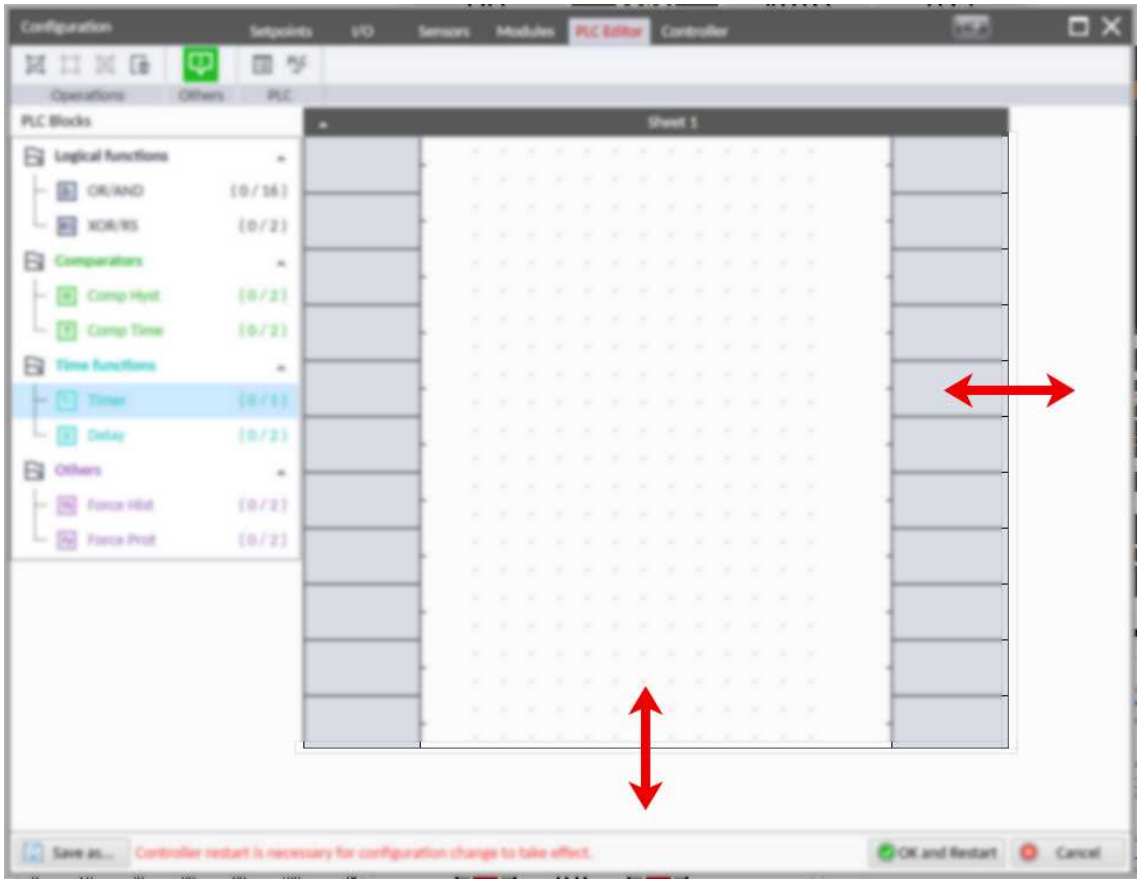


Image 5.38 Adjusting PLC sheet

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 549)** for more information about blocks.
- Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs (page 153)** for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

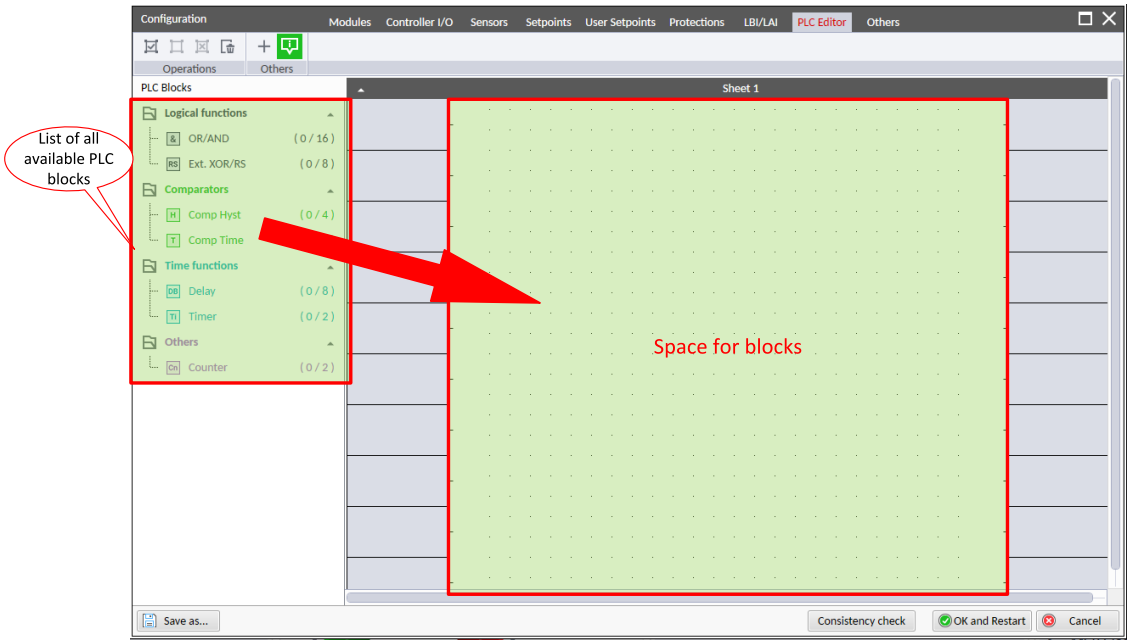


Image 5.39 Adding PLC blocks

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

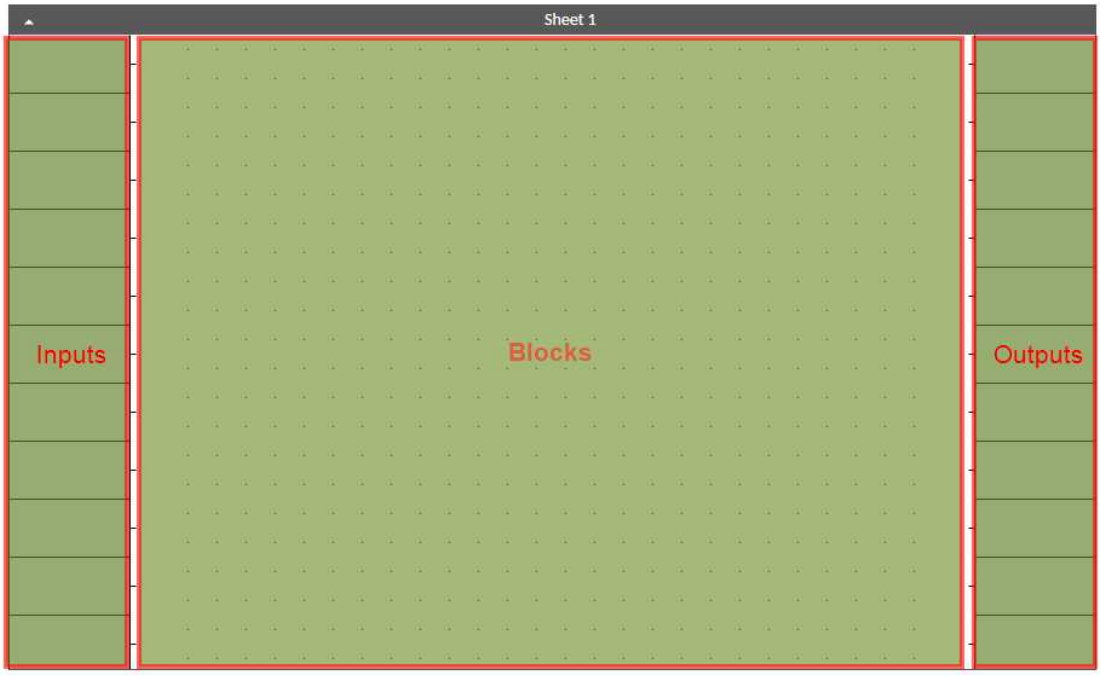


Image 5.40 Blank sheet of PLC Editor

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.

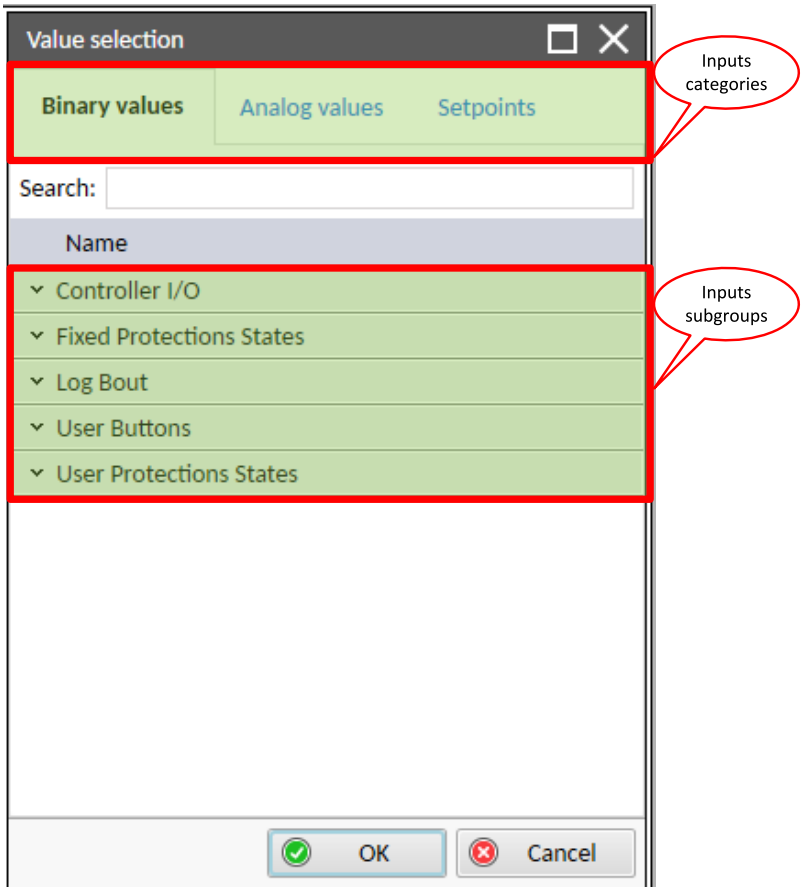


Image 5.41 PLC inputs

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).

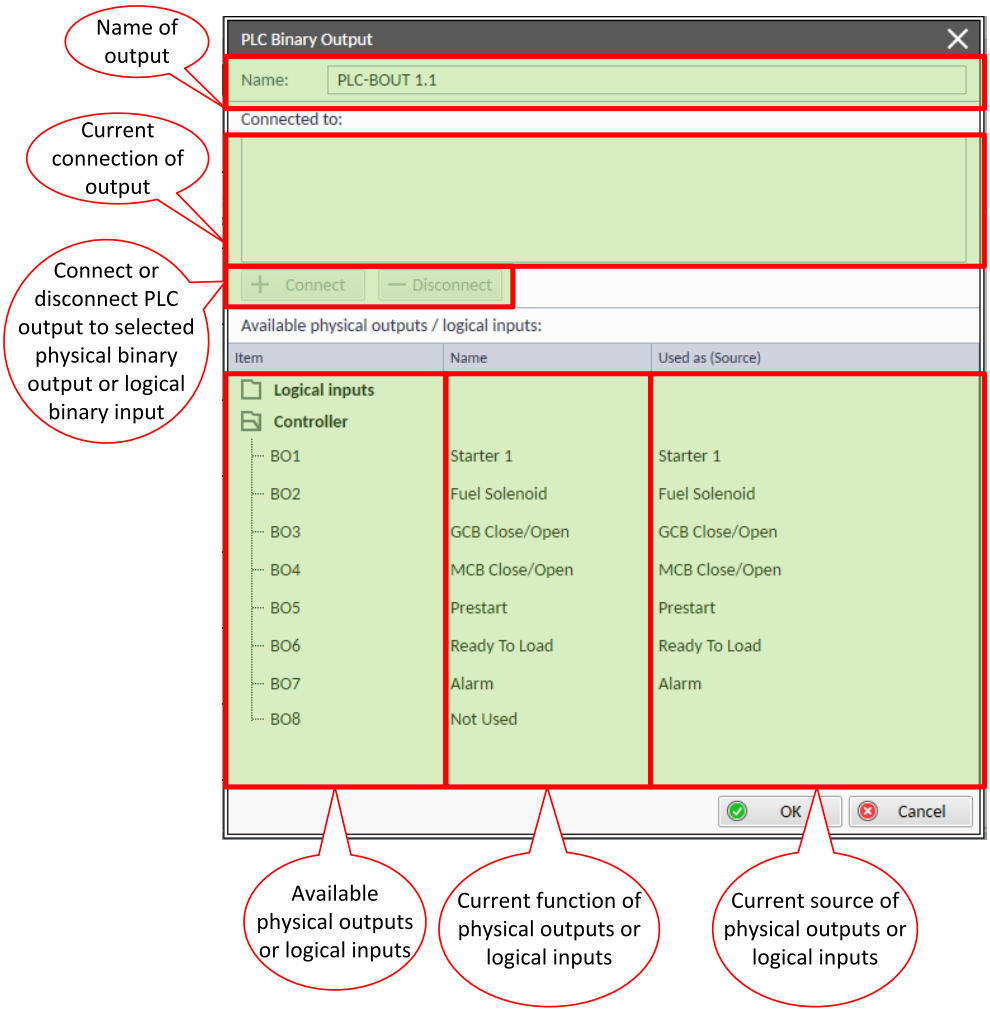


Image 5.42 PLC outputs

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.

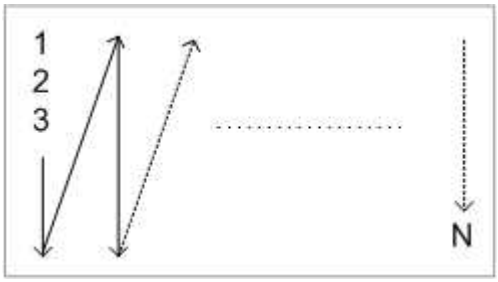
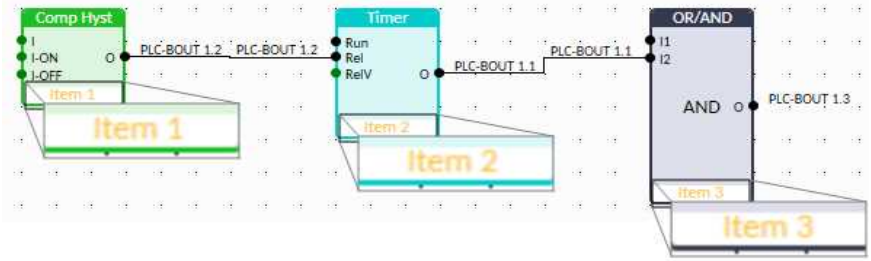
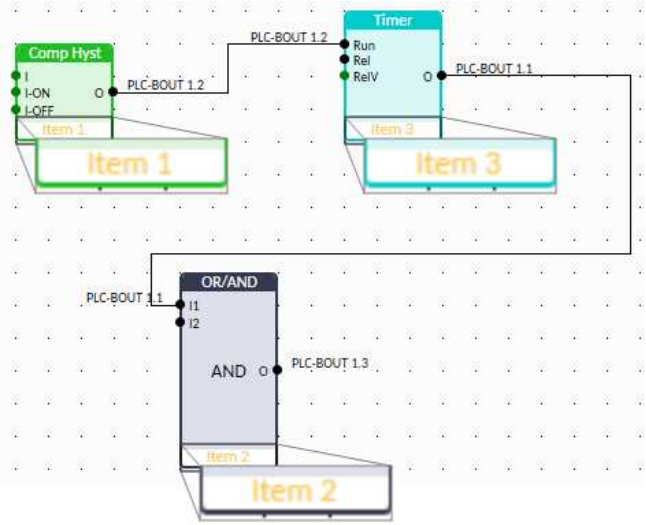


Image 5.43 PLC execution logic

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





Other functions

Consistency check

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

Delete whole content of sheet

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

Hints

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

PLC monitor

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

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

5.5.26 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 353)** or by logical binary input **GEO-FENCING ENABLE (PAGE 488)**.

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 353)** and **Home Longitude (page 354)** and radius named Fence Radius adjusted via setpoints **Fence 1 Radius (page 356)** and **Fence 2 Radius (page 358)**.

The Protection can be different for both circles and are adjusted via setpoints **Fence 1 Protection (page 355)** and **Fence 2 Protection (page 357)**.

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

5.5.27 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:

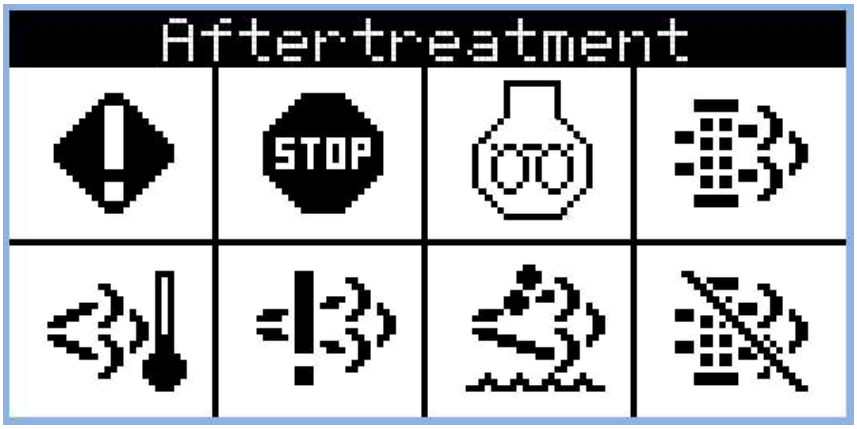


Image 5.44 Example of active After-treatment screen

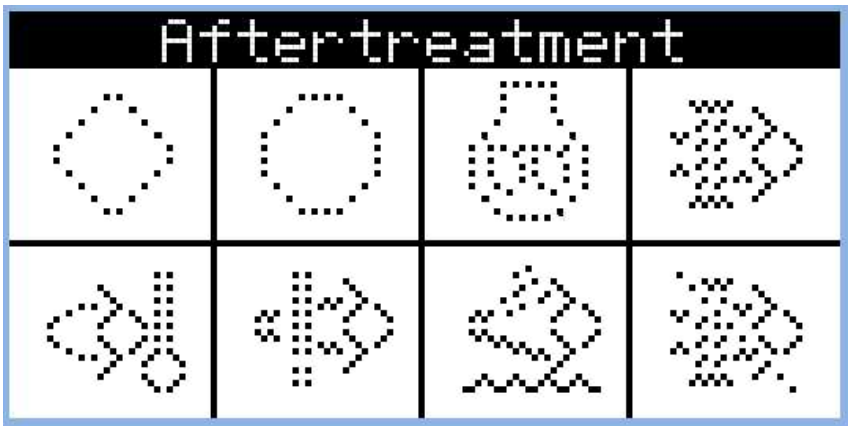
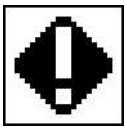
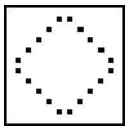
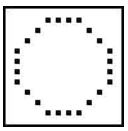
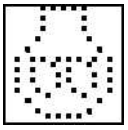
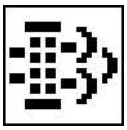
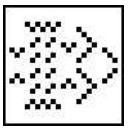
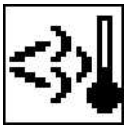
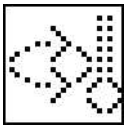
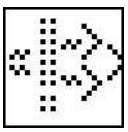


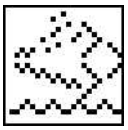
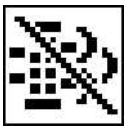
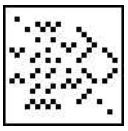
Image 5.45 Example of inactive After-treatment screen

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 572)	ECU Yellow Lamp (page 513)	ECU Yellow Lamp Blink (page 482) ECU Yellow Lamp Fast Blink (page 483) ECU Yellow Lamp Solid (page 483)
ECU Red Lamp			Wrn ECU Red Lamp (page 572)	ECU Red Lamp (page 513)	ECU Red Lamp Blink (page 481) ECU Red Lamp Fast Blink (page 481) ECU Red Lamp Solid (page 481)
ECU Wait To Start			Wrn ECU Wait To Start (page 572)	ECU Wait To Start (page 513)	ECU Wait To Start Blink (page 482) ECU Wait To Start Fast Blink (page 482) ECU Wait To Start Solid (page 482)
ATT DPF Lamp			Wrn ATT DPF Lamp (page 572)	ATT DPF Lamp (page 507)	ATT DPF Lamp Blink (page 475) ATT DPF Lamp Fast Blink (page 475) ATT DPF Lamp Solid (page 475)
ATT HEST Lamp			Wrn ATT HEST Lamp (page 573)	ATT HEST Lamp (page 508)	ATT HEST Lamp Blink (page 475) ATT HEST Lamp Fast Blink (page 476) ATT HEST Lamp Solid (page 476)
ATT SCR Error Lamp			Wrn ATT SCR Error Lamp (page 573)	ATT SCR Error Lamp (page 508)	ATT SCR Error Lamp Blink (page 477) ATT SCR Error Lamp Fast Blink (page 477) ATT SCR Error

Lamp name	Active icon	Inactive icon	Alarm	LBO	LBI
					LAMP SOLID (PAGE 477)
ATT DEF Level Lamp			Wrn ATT DEF Level Lamp (page 573)	ATT DEF LEVEL LAMP (PAGE 507)	ATT DEF LEVEL LAMP BLINK (PAGE 474) ATT DEF LEVEL LAMP FAST BLINK (PAGE 474) ATT DEF LEVEL LAMP SOLID (PAGE 474)
ATT Inhibited Lamp			Wrn ATT Inhibited Lamp (page 573)	ATT INHIBITED LAMP (PAGE 508)	ATT INHIBITED LAMP BLINK (PAGE 476) ATT INHIBITED LAMP FAST BLINK (PAGE 476) ATT INHIBITED LAMP SOLID (PAGE 477)

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:

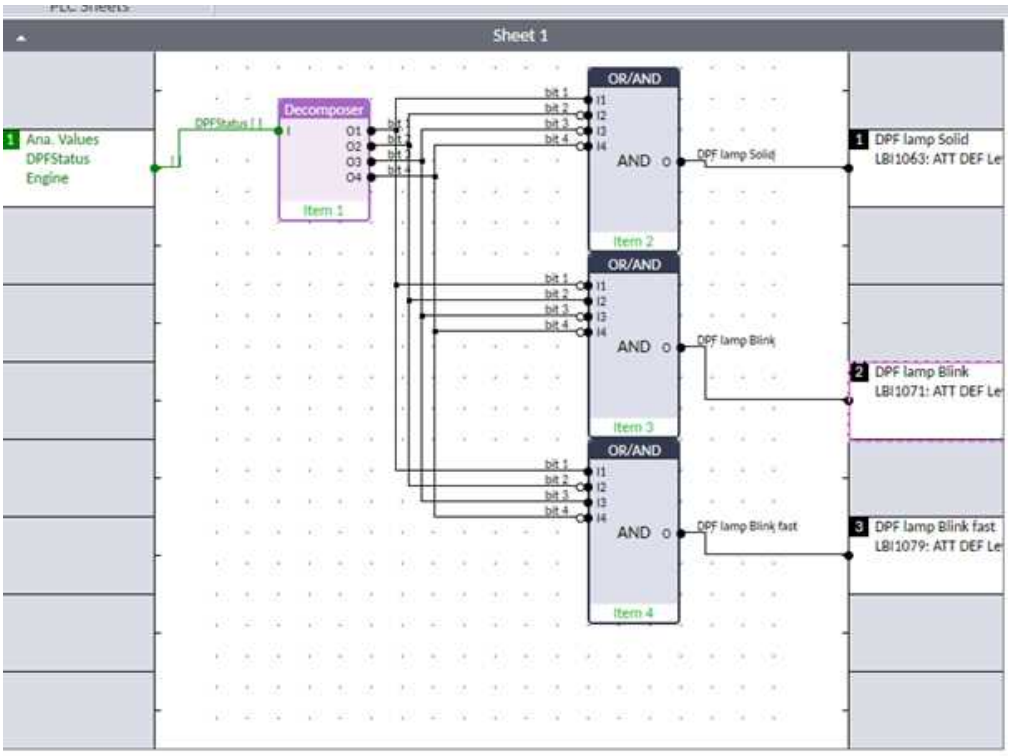


Image 5.46 The lamp state will be solid when signal is value 1, 2 = blink, 5 = blink fast

Control of After-Treatment regeneration function

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

- Controller is in MAN mode
- GCB muset be open only when **GCB Control Mode (page 221)** = Internal
- State Running

When these conditions are met, user can either switch LBI **ATT INTERLOCK (PAGE 477)** 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 475)**. Some ECUs however do not include LBI **ATT INTERLOCK (PAGE 477)** and closing just LBI **ATT FORCE REGEN (PAGE 475)** 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 476)**

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

General procedure of non-mission DPF regeneration

This is procedure from user standpoint, and its general idea of non-mission regeneration. There might be variations depends on specific engine manufacturer.

Regeneration start:

- *State:* lamps signals DPF regeneration is needed
- *User action:* open GCB, prepare Gen-set for regeneration (go to manual mode, turn on LBI GCB Disable, LBI Force Protections Override, set Overspeed Limit SP)
  - *CU action:* turn off protections and change limit for overspeed
- *User action:* close interlock (if interlock is available)
  - *State:* Regeneration conditions achieved
- *User action:* activate force regeneration

Regeneration end:

- *State:* lamps stop indicating, regeneration ended (engine now runs in Idle or Nominal speed)
- *User action:* turn of force regeneration (if its not pulse)
- *User action:* interlock open (if its available)
- *User action:* Turn off LBI GCB Disable, LBI Force Protection Override, SP Speed Override Limit
- *User action:* stop engine
  - Then user can do what he wants.

5.5.28 Alternate configuration

There are 3 sets of alternate configurations in a controller:

Configuration set 1	Configuration set 2	Configuration set 3
Nominal Power Split Phase 1 (page 409)	Nominal Power Split Phase 2 (page 414)	Nominal Power Split Phase 3 (page 419)
Nominal Power 1 (page 408)	Nominal Power 2 (page 413)	Nominal Power 3 (page 418)
Nominal RPM 1 (page 404)	Nominal RPM 2 (page 409)	Nominal RPM 3 (page 414)
Nominal Frequency 1 (page 405)	Nominal Frequency 2 (page 410)	Nominal Frequency 3 (page 415)
Nominal Voltage Ph-N 1 (page 405)	Nominal Voltage Ph-N 2 (page 410)	Nominal Voltage Ph-N 3 (page 415)
Nominal Voltage Ph-Ph 1 (page 405)	Nominal Voltage Ph-Ph 2 (page 410)	Nominal Voltage Ph-Ph 3 (page 415)
Nominal Current 1 (page 406)	Nominal Current 2 (page 411)	Nominal Current 3 (page 416)
Connection Type 1 (page 406)	Connection type 2 (page 411)	Connection type 3 (page 416)
ECU Speed Adjustment 1 (page 408)	ECU Speed Adjustment 2 (page 413)	ECU Speed Adjustment 3 (page 418)

Configuration sets can be changed via logical binary inputs **Alternate Config 2 (page 473)** and **Alternate Config 3 (page 473)**. Configuration set 1 is active when there is no input activated. In the case that the inputs **Alternate Config 2 (page 473)** and **Alternate Config 3 (page 473)** are active at the same time, configuration set 3 is taken in account.

ALTERNATE CONFIG 2 (PAGE 473)	ALTERNATE CONFIG 3 (PAGE 473)	Active configuration set
0	0	1
1	0	2
0	1	3
1	1	3

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

5.5.29 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.

5.5.30 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.

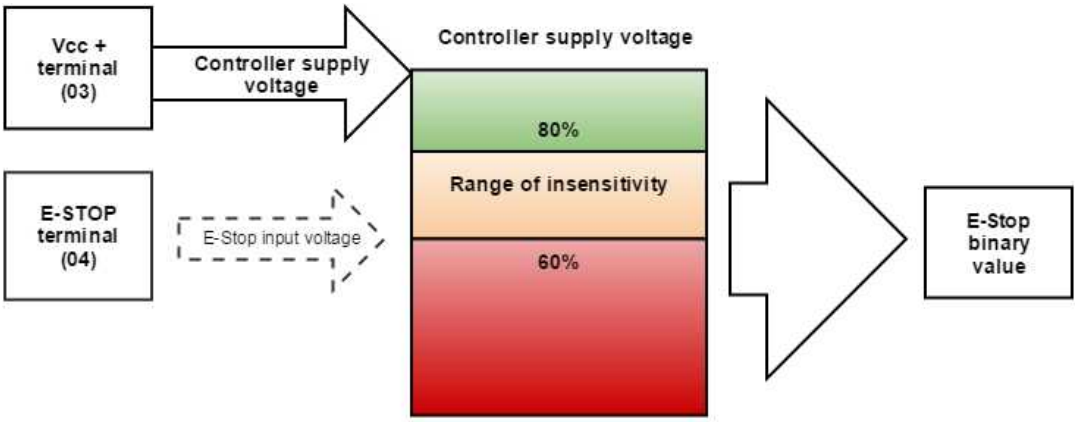


Image 5.47 SW principle of E-STOP

- 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 53**.

5.5.31 ECU Frequency selection

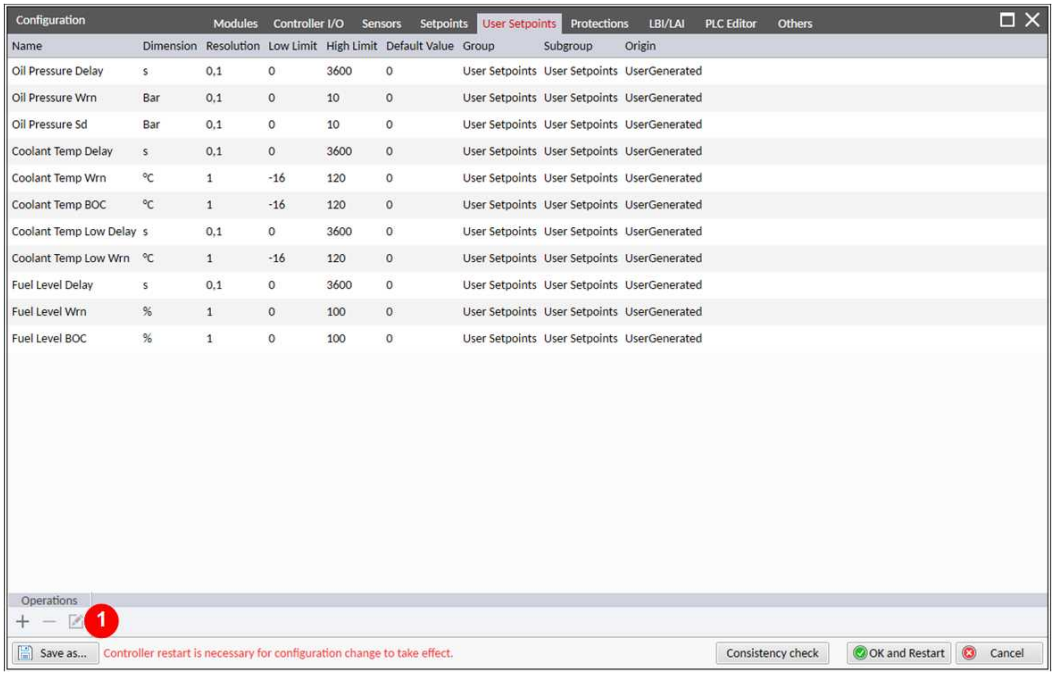
Value Ecu freq select is calculated from **Nominal Frequency (page 219)** setpoint. The sequence for frequency change is executed automatically (engine must be in still condition) in the following steps:

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

5.5.32 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 64. 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	✎

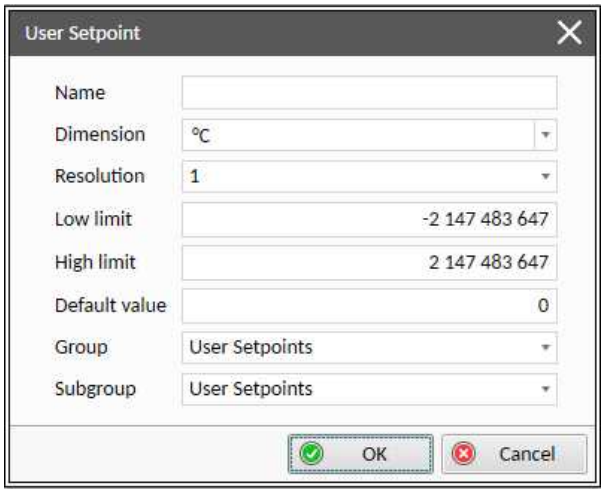


Image 5.48 Setting parameters of a user setpoint

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.

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5.6 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 167**) automatically logged in always while no other explicit user is logged in.*

5.6.1 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 167)** 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.

5.6.2 User accounts

User account must be created in the controller by an administrator before the particular user can login to the controller.

Note: *User accounts must be created for each controller separately and manually. It is not possible to transfer the accounts from one controller to another.*

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 175)**

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 168**).
- 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 13)**, **WebSupervisor (page 13)**.

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 174****.*

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 167)** 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 586)** 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 176**.

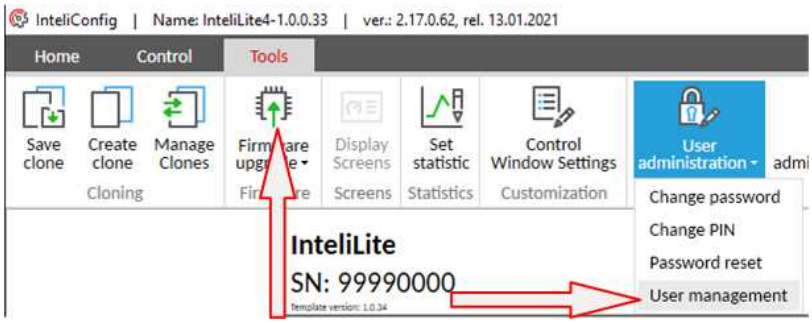
After reset procedure user accounts are in factory default state.

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.

5.6.3 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.

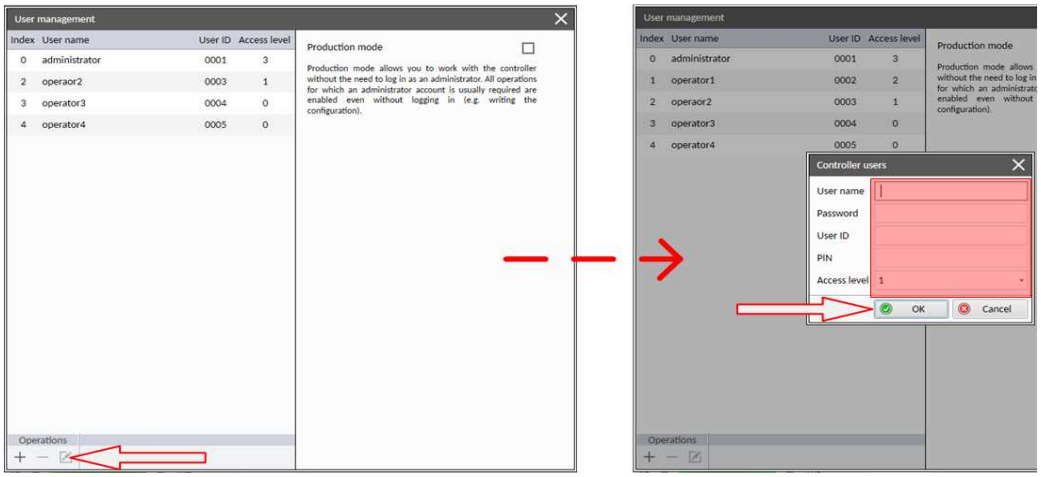
IMPORTANT: The total available number of accounts in the controller is 5.



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 167)**.

Note: *Rules for the* ***User accounts (page 167)*** *credentials apply and some items are optional*



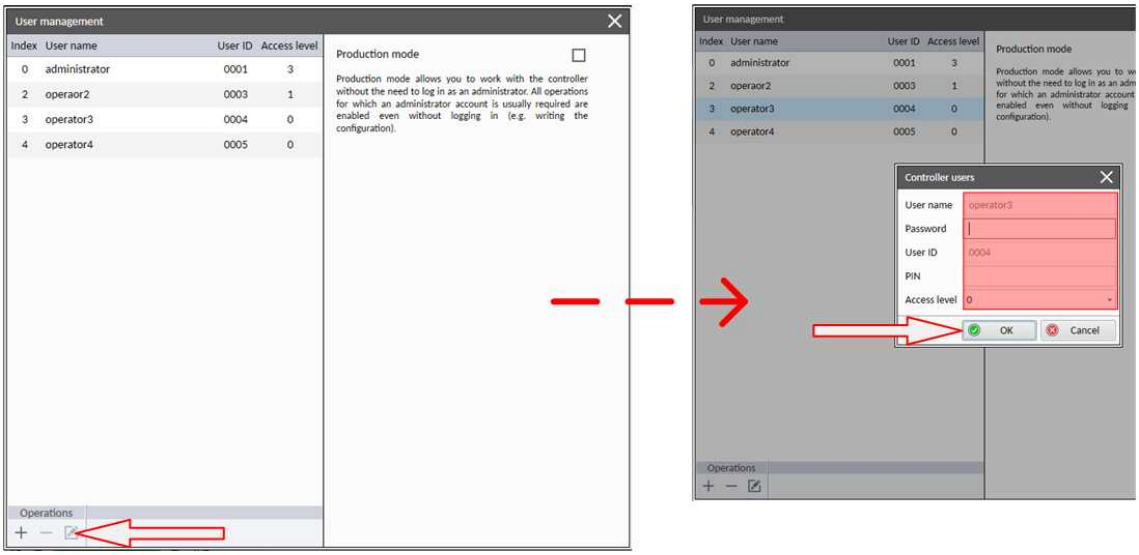
Deleting an account

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.*

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.*

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.

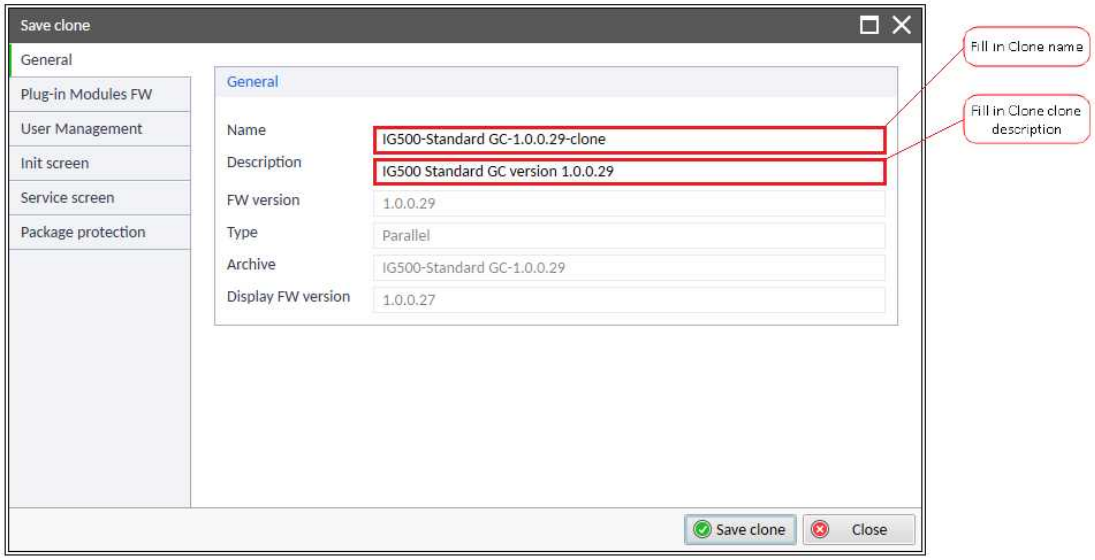


Image 5.49 Save the clone

- 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

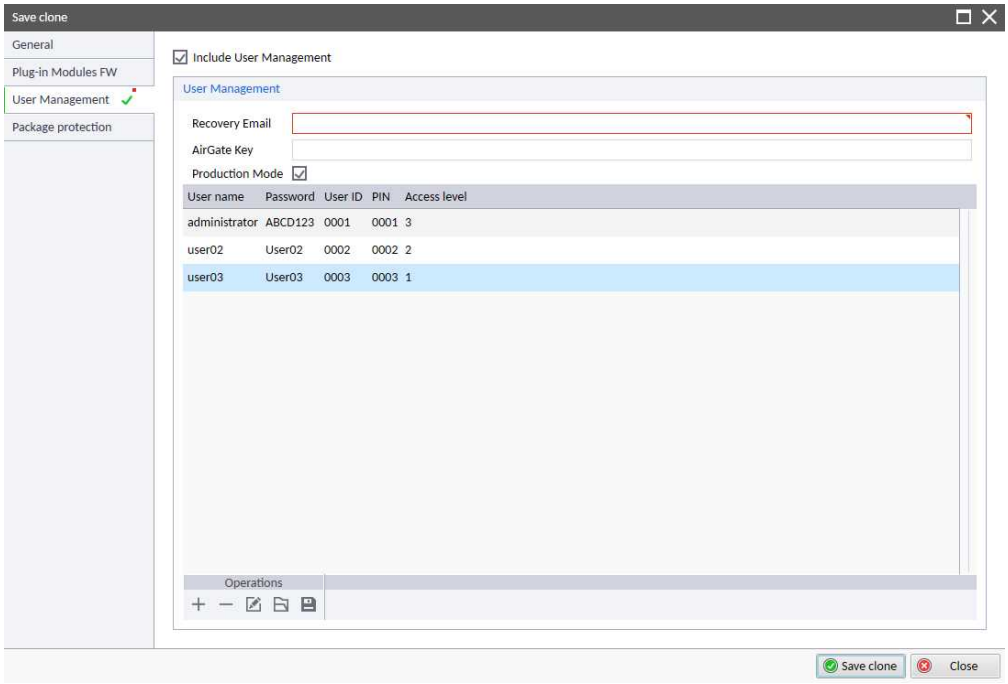


Image 5.50 Create accounts

- Package protection
  - Set up password for clone file

Create clone

To load the clone to the controller click on the Create Clone icon.

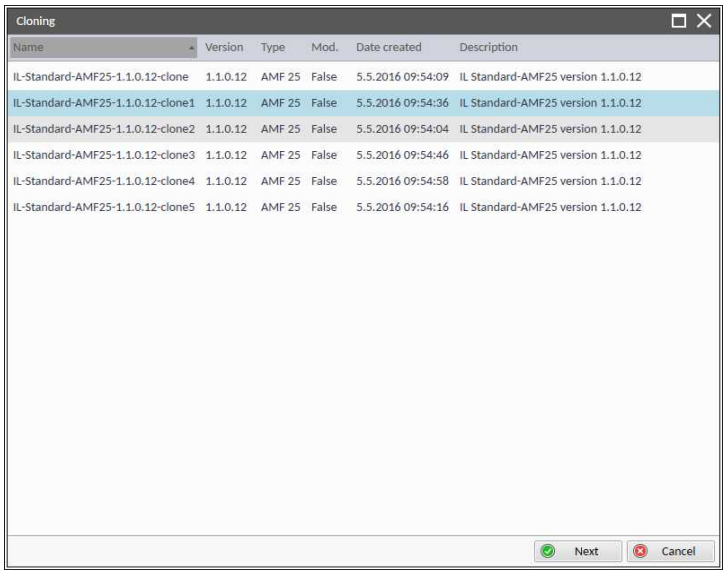


Image 5.51 Create clone

1. Select required clone and click on Next button
2. Following window appears

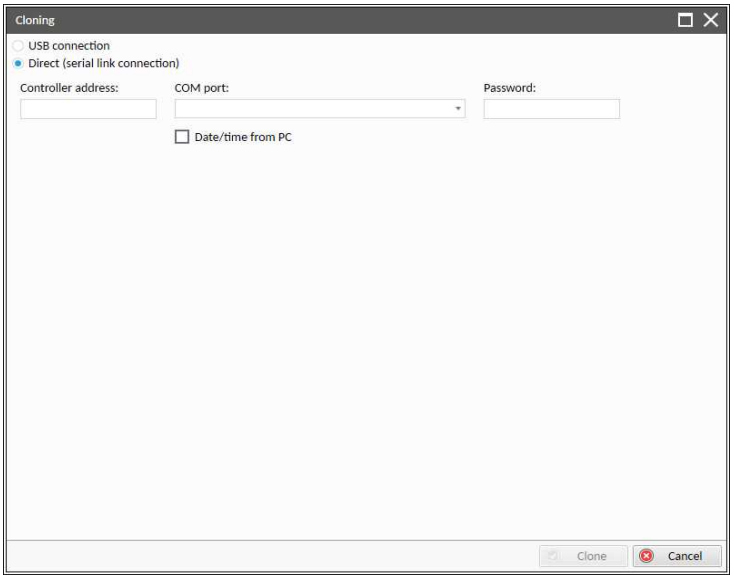


Image 5.52 Create clone

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.

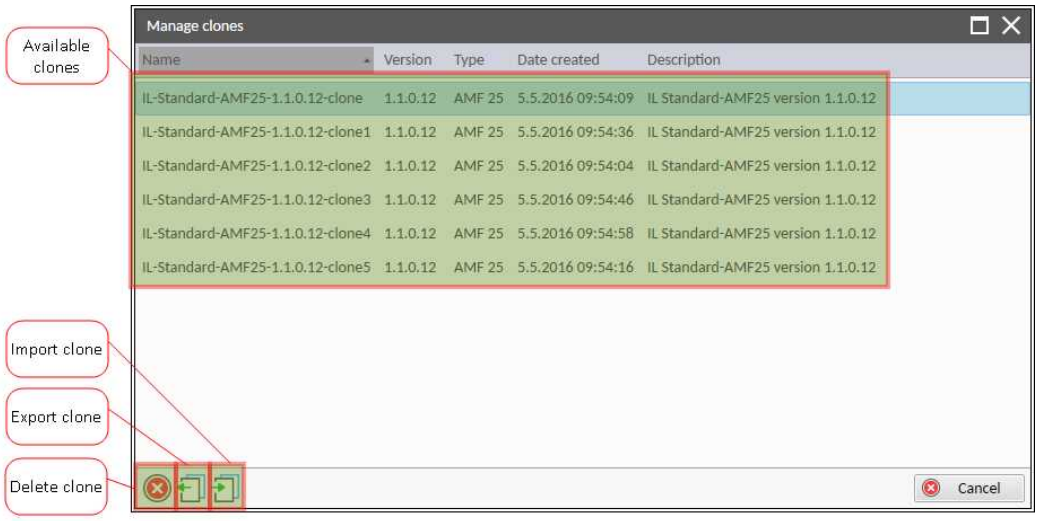


Image 5.53 ImEx Clone

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.

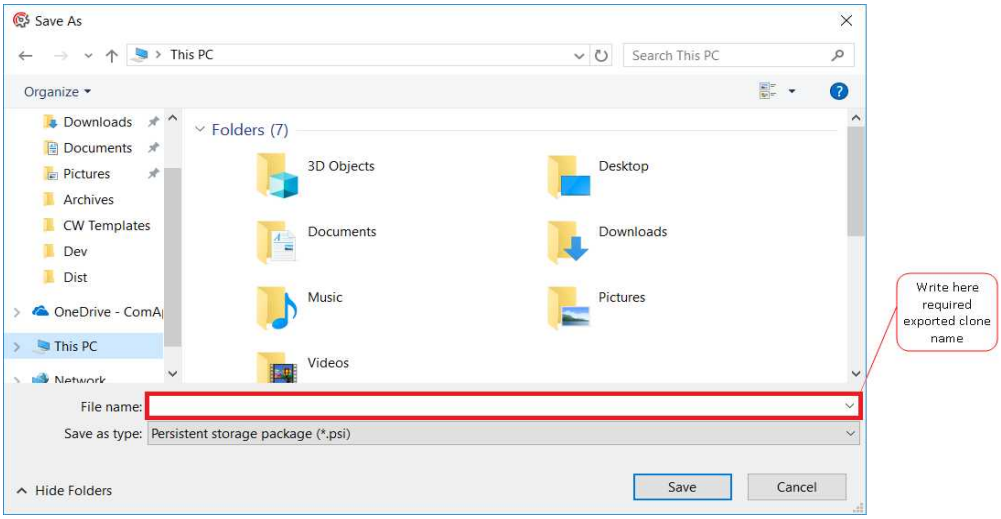


Image 5.54 Save as clone

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.

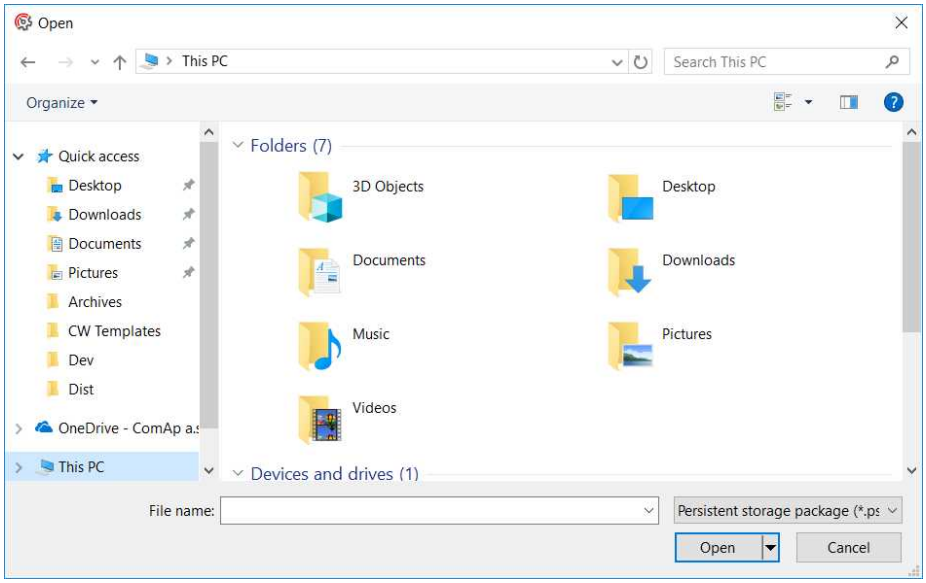


Image 5.55 Open clone

1. Go to location where is required clone saved
2. Select the clone
3. Click on Open button

5.6.4 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 587)** 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.

5.6.5 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

5.6.6 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

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

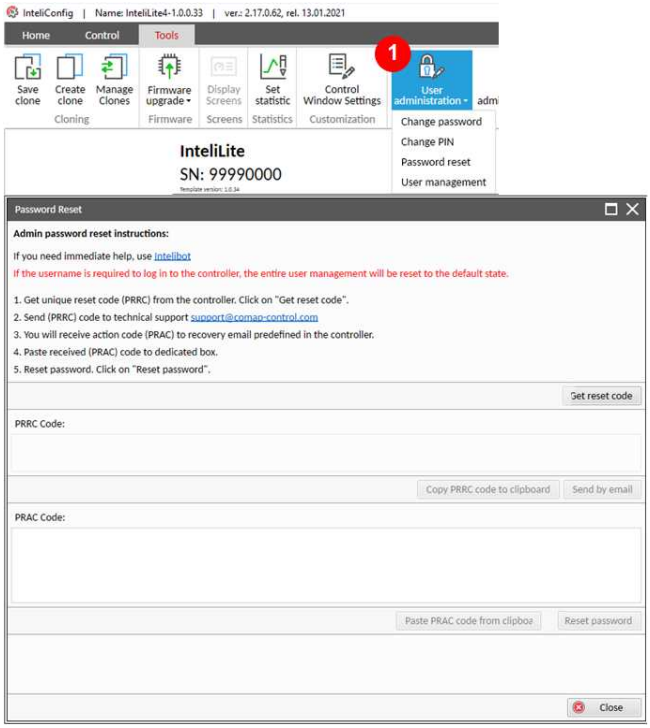
If **the administrator password is lost or controller is permanently locked** due to brute-force attack protection, proceed according to a procedure described below:

> **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,

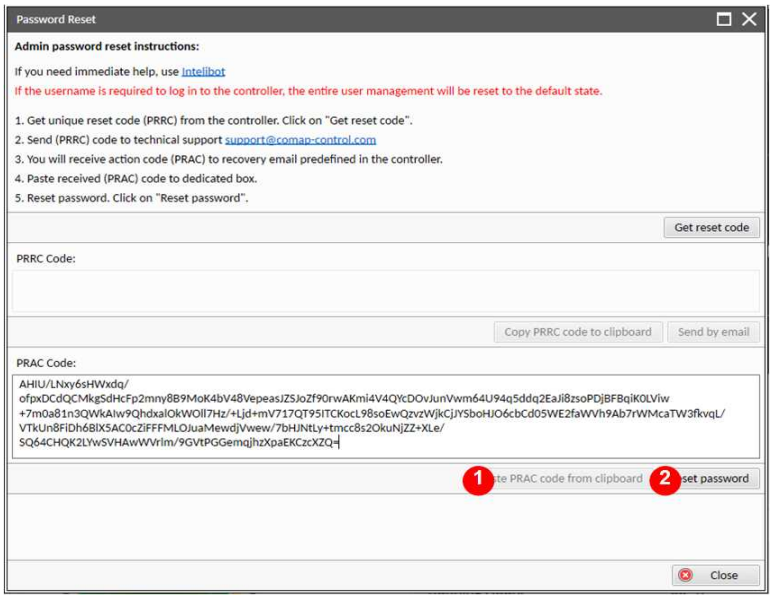
ComAp has received your request for resetting the password in the controller **N/A**, serial n umber **99990000**. Please perform following steps to finish the action.

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 CCS 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.

Hardening the storage of a credentials

The user credentials (passwords and access code) have been moved to a hardened storage to prevent the credentials to leak out of the hardware.

> **IMPORTANT: If a firmware rollback is inevitable, please keep in mind, when the firmware is first time updated to the new firmware (which uses hardened storage) a seamless transfer of the credentials into the hardened storage is performed. However, if the rollback to any previous firmware (which does not use hardened storage) is performed the credentials are NOT transferred back, so the previous firmware will not "see" any change of the credentials made through the new firmware. Moreover, as the transfer of the credentials into the hardened storage is performed only during very first update from an "old" to a "new" firmware, no change of the credentials performed in the "old" firmware after the rollback will be visible in the "new" firmware after a next update to the "new" firmware.**

Web interface can be disabled

A setpoint has been added to disable the CM3-Ethernet built-in web interface.

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

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6 Communication

6.1 PC 180
6.2 Connection to 3rd party systems 186

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6.1 PC

6.1.1 Direct communication 180
6.1.2 Remote communication 181

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 59**.

RS232 interface uses **COM1 Mode (page 359)** 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.*

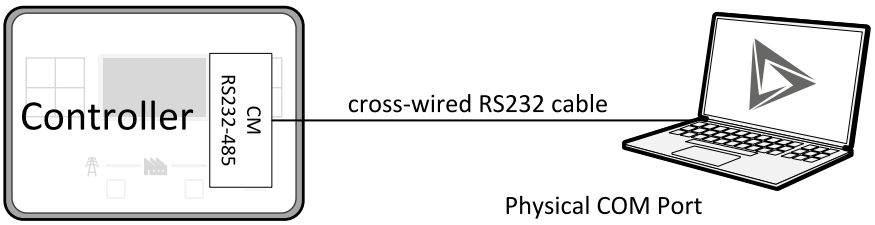


Image 6.1 Cross-wired RS232 cable is used

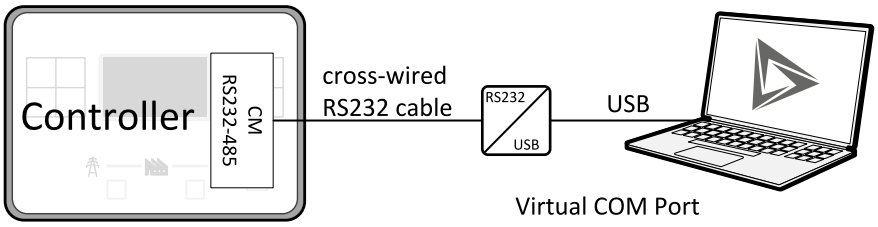


Image 6.2 Cross-wired RS232 cable and USB is used

Connection via RS485

A plug-in communication module CM-RS232-485 is necessary for communication via RS485 connection.

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

Connection via Ethernet

A plug-in communication module CM3-Ethernet is necessary for Ethernet connection.

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 59**.

This connection type is used for communication with the controller from InteliConfig or any other PC tool. This connection can be used regardless of whenever the AirGate is switched on or off. Five remote clients can be connected at the same time (direct or airgate connection).

To connect your PC tool to the controller use the INTERNET connection type and just put the CM3-Ethernet IP address into the Gen-set address box in the PC tool.

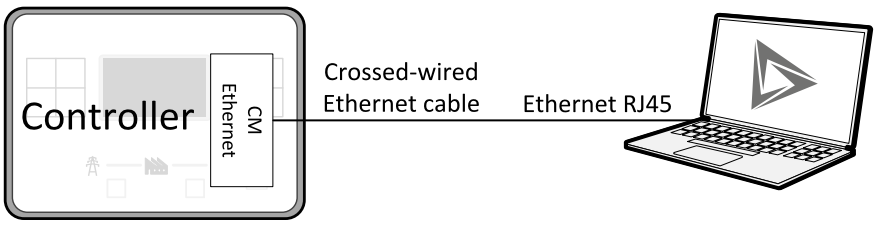


Image 6.3 Ethernet cable is used

Connection via USB

USB interface uses HID profile.

6.1.2 Remote communication

Ethernet LAN connection

Direct IP LAN connection is intended to be used if the 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 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.*

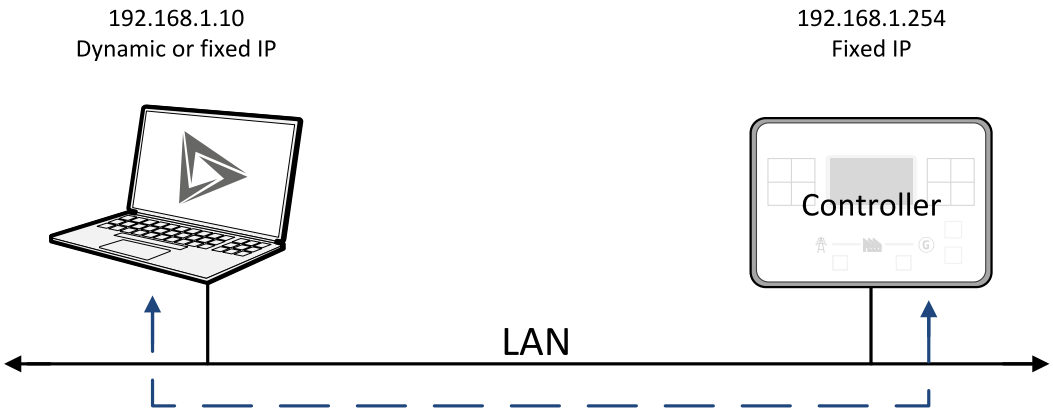


Image 6.4 Ethernet LAN connection

Note: *For information how to setup an AirGate connection,* ***see AirGate connection on page 68****.*

Setting-up static IP address

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

First way is to switch the CM3-Ethernet to manual IP address mode. Adjust the setpoint **IP Address Mode (page 384)** to Manual. In that case all setpoints of IP settings (**IP Address (page 385)**, **Subnet Mask (page 385)**, **Gateway IP (page 386)**, **DNS IP Address 1 (page 387)**) 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 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.*

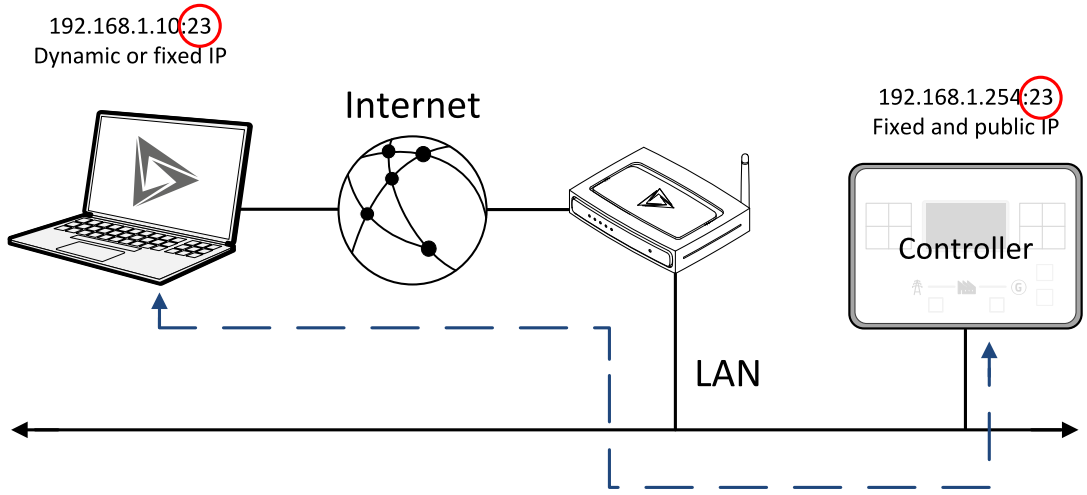
The second way to get the static IP address is to switch the CM3-Ethernet to automatic IP address mode. Adjust the setpoint**IP Address Mode (page 384)** to AUTOMATIC. In that case all IP settings are assigned by DHCP server. Then configure the DHCP server to assign always the same IP address (i.e. static IP address) to the particular 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 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 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. Five remote clients can be connected at the same time (direct or airgate connection).

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address (page 389)** 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 "global.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 InteliLite 4 controller equipped with the CM2-4G-GPS communication module is able to send Event SMS according to the setting of setpoint:

- **Event Message (page 399)**

> ***Note:** First, the setpoint **Telephone Number 1 (page 379)** 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 InteliLite 4 controller equipped with the CM2-4G-GPS communication module is able to send Alarm SMS according to the setting of setpoints:

- **Wrn Message (page 400)**
- **Sd Message (page 400)**
- **BOC Message (page 398)**

Note: *First, the setpoint **Telephone Number 1 (page 379)** 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 InteliLite 4 controller equipped with the CM3-Ethernet communication module is able to send an Event Email according to the setting of setpoint:

- **Event Message (page 399)**

Note: *Setpoints **Email Address 1 (page 396)** and **SMTP Sender Address (page 394)** or **SMTP Server Address (page 394)** 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 InteliLite 4 controller equipped with the CM3-Ethernet communication module is able to send Alarm Emails according to the setting of setpoints:

- **Wrn Message (page 400)**
- **Sd Message (page 400)**
- **BOC Message (page 398)**

Note: *Setpoints **Email Address 1 (page 396)** and **SMTP Sender Address (page 394)** or **SMTP Server Address (page 394)** 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 186
6.2.2 MODBUS-RTU, MODBUS/TCP 188

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".

- CM3-Ethernet module is required for SNMP function
- Supported versions – SNMP v1 and SNMP v2

The SNMP Agent function is to be enabled by the setpoint **SNMP Agent (page 392)** in the CM-Ethernet setpoint group. The setpoints **SNMP RD Community String (page 393)** and **SNMP WR Community String (page 393)** 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 InteliLite 4 controller is 1.3.6.1.4.1.28634.29. 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 CM-Ethernet setpoint group by the setpoints **SNMP Traps IP Address 1 (page 392)** and **SNMP Traps IP Address 2 (page 393)**. 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 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.

Operational events

This events are used for SNMP traps. See the list below:

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

6.2.2 MODBUS-RTU, MODBUS/TCP

MODBUS protocol is used for integration of the controller into a building management system or for remote monitoring via 3rd party monitoring tools.

- MODBUS-RTU can be used on serial interfaces (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 359)** or **COM2 Mode (page 361)** into the Modbus position. The serial speed for MODBUS-RTU communication is adjusted by the setpoint **COM1 MODBUS Communication Speed (page 360)** or **COM2 MODBUS Communication Speed (page 362)**.

- MODBUS/TCP can be used on the Ethernet interface (CM3-Ethernet module is required). Up to 3 clients can be connected simultaneously (MODBUS connection). The MODBUS/TCP server must be activated by the setpoint **MODBUS Server (page 391)**.

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

Configurable part of the map

The contents of the configurable part of the map is specified in the configuration table. It can be changed by the customer as well as exported in a human-readable format using the configuration tool.

Discrete inputs

The discrete inputs are read-only objects located in the address range 0-999. The source ComAp objects for discrete inputs can be:

- Single bit of any value of any binary type.
- Protection (e.g. 2nd-level protection of the state "xyz"). The input is high if the protection is active regardless of if it is configured or not.

Input registers

The input registers are read-only numeric values located in the address range 1000-2999. The source ComAp objects can be:

- Any controller value of any data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 190)**.

Holding registers

The holding registers are read-write numeric values located in the address range 3000-3999. The source ComAp objects can be:

- Any controller setpoint of a primitive data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 190)**.

Default contents of the configurable part

The default map of Modbus objects contain following items. This map expects the PC tool does have the function allowing the user to modify the map.

Object type	Starting object address	Controller object
Discrete inputs	0000	Physical binary inputs CU + configured *) modules Logical binary outputs Protections on binary inputs CU + configured *) modules Protections on analog inputs CU + configured *) modules All Built-in fixed protections
Input registers	1000	All configured *) visible values
Holding registers	3000	None

Note: **)*
Present in the default configuration.

IMPORTANT: The default map of a particular firmware branch and application must not change when a new version of the firmware is created. If new objects are added they must be added to free positions so, that the previous content is not affected.

IMPORTANT: The default map of a particular firmware branch must not contain different values in different applications at the same Modbus address. It means if a ComAp object does not make sense in some application type the respective Modbus address must be left unassigned.

Mapping data types to registers

As there are multiple data types in the controller but only one data type in MODBUS (the register, which is 2 byte long), a mapping table is necessary to compose and decompose the MODBUS messages correctly.

Data type	Meaning	Number of registers	Data maping
Integer8	1-byte signed integer	1	MSB = sign extension LSB = value
Unsigned8	1-byte unsigned integer	1	MSB = 0 LSB = value
Integer16	2-byte signed integer	1	MSB = value, MSB LSB = value, LSB
Unsigned16	2-byte unsigned integer	1	MSB = value, MSB LSB = value, LSB
Integer32	4-byte signed integer	2	MSB1 = value, byte 3 (MSB)

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

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

Note:
**) 1 .. level 1 (yellow), 2 .. level 2 (red), 3 .. sensor fail*
***) Bit0 – alarm is active, Bit1 – alarm is confirmed*
****) String encoding is UTF-8*

Error codes (exception codes)

An exception code is returned by the controller (server) if the query sent from the client could not be completed successfully.

The controller responds with the error codes in as follows:

- 01 – Illegal function is returned if an incompatible type of operation is applied for a specific object, e.g. if function 03 is applied to a binary object.
- 02 – illegal address is returned if the client tries to perform an operation with an object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be obtained by reading the registers 4205 – 4206.

Reserved registers

There are several registers with specific meanings. These registers are available in all controllers regardless of the configuration.

Register addresses	Number of registers	Access	Data type	Meaning
4200 - 4201	2	read/write	Time	RTC Time in BCD code
4202 - 4203	2	read/write	Date	RTC Date in BCD code
4204	1	read/write	Unsigned8	Index of the language that is used for text data provided by MODBUS (e.g. alarmlist messages).
4205 - 4206	2	read	Unsigned32	Last application error. To be read after the device returns the exception code 04. It contains specific information about the error.
4207 - 4208	2	read/write	Unsigned32	Writing:command argument Reading: command return value
4209	1	write	Unsigned16	Command code
4010	1	-	-	Not implemented
4211	1	write	Unsigned16	Password
4212 - 4213	2	read	Unsigned32	Communication status
4214	1	read	Unsigned8	Number of items in the Alarmlist
4215 - 4241	27	read	Alarm	1. record in alarm list
4242 - 4268	27	read	Alarm	2. record in alarm list
4269 - 4295	27	read	Alarm	3. record in alarm list
4296 - 4322	27	read	Alarm	4. record in alarm list
4323 - 4349	27	read	Alarm	5. record in alarm list
4350 - 4376	27	read	Alarm	6. record in alarm list
4377 - 4403	27	read	Alarm	7. record in alarm list
4404 - 4430	27	read	Alarm	8. record in alarm list
4431 - 4457	27	read	Alarm	9. record in alarm list
4458 - 4484	27	read	Alarm	10. record in alarm list
4485 - 4511	27	read	Alarm	11. record in alarm list
4512 - 4538	27	read	Alarm	12. record in alarm list
4539 - 4565	27	read	Alarm	13. record in alarm list
4566 - 4592	27	read	Alarm	14. record in alarm list
4593 - 4619	27	read	Alarm	15. record in alarm list
4620 - 4646	27	read	Alarm	16. record in alarm list

List of commands and arguments

"Commands" are used to invoke a specific action in the controller via the communication channel. The list of available actions is in the table below. The general procedure of writing a command via Modbus is as follows:

1. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
2. Write the command code into the register 44210 (register address 4209). Use function 6.

3. (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
4. 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

» 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
01227	9018	**Nominal Power**	**kW**	Integer	2	**0**	0	32767	Generator

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

Response: (Numbers in Hex)						
01	03	02	00	C8	B9	D2
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data $00C8_{hex}$ = **200_{dec}**		CRC	

Read nominal power is 200 kW.

› Reading all binary inputs as Modbus register

Table: Values									
Allowed Modbus functions: 03, 04									
Register 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).*

› Nominal Power – writing

Table: Setpoints									
Allowed Modbus functions: 03, 04, 06, 16									
Register address	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
03008	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	1	5000	Basic Settings

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

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

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)	2.5 W
RTC battery	Replaceable (3 V)
Fusing power	4 A w/o BOUT consumption
E-Stop fusing	10 A
Max. Power Dissipation	7 W

Operating conditions

Protection degree (front panel)	IP 65
Operating temperature	-20 ˚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

Display

Type	Build-in monochromatic 3.2"
Resolution	132 × 64 px

Communications

USB Device	Non-isolated type B connector
CAN 1	Non-isolated, 250 / 50 kbps, Terminator impedance 120 Ω

Current measurement

Measurement inputs	3ph Gen 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
Close/Open indication	0-2 VDC close contact 6-36 VDC open contact

Binary outputs

Number	8
Max. current	BO1,2=5 A (60 °C); BO1,2=4 A (70 °C), BO3-8=0.5 A
Switching to	positive supply terminal

Analog inputs

Number	3, 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	45 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

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8.1 Controller objects

8.1.1 List of controller objects types

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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 203)**.

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Group: Basic settings

Subgroup: Name

Gen-Set Name

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	0 .. 15 characters [-]		
Default value	InteliLite4	**Alternative config**	NO
Step	[-]		
Comm object	8637	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

User defined name, used for the controller identification at remote phone or mobile connection. Gen-set Name is maximally 15 characters long and can be entered using InteliConfig or from controller's configuration menu.

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

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Subgroup: Power settings

Nominal Power

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	8276	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint **Connection type (page 213)** is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

Note: *To lock this setpoint against editing you also have to lock setpoint **Nominal Power 1 (page 408)**, **Nominal Power 2 (page 413)** and **Nominal Power 3 (page 418)**.*

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Nominal Power Split Phase

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	9977	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint* ***Connection type (page 213)*** *is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.*

Note: *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Power Split Phase 1 (page 409)***, ***Nominal Power Split Phase 2 (page 414)*** *and* ***Nominal Power Split Phase 3 (page 419)***.

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Subgroup: Current settings

Nominal Current

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	1 .. 65 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	8275	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**.		
Description			

It is current limit for mains current protections and means maximal continuous mains current. Nominal Current can be different from mains rated current value.

Note: *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Current 1 (page 406)***, ***Nominal Current 2 (page 411)*** *and* ***Nominal Current 3 (page 416)***.

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Gen CT Ratio Prim

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	1 .. 10000 [A]		
Default value	500 A	**Alternative config**	NO
Step	1 A		
Comm object	8274	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set.			

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Gen CT Ratio Sec

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	- [/1A / /5A]		
Default value	/5A	**Alternative config**	NO
Step	-		
Comm object	10556	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set.			

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CT Location

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Load / Gen-set / None [-]		
Default value	Gen-set	**Alternative config**	NO
Step	[-]		
Comm object	11625	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts position of current measurement.

Load	Current CT's are physically placed on Load (typically between GCB and MCB).
Gen-set	Current CT's are physically placed on Gen-set (typically before GCB).
None	There are no current CT's.

When option None is selected, following objects are hidden/changed:

- Current screen is hidden
- Generator Power screen is hidden
- Statistics screens – values Gen-set kWh, Gen-set kVArh, Mains kWh and Mains kWArh are hidden
- Main screen – kW meter is replaced by generator voltage meter
  - Generator L1-N voltage is displayed for Monopahse, Splitphase L1L2, Splitphase L1L3 and High Leg delta connection types
  - Generator L1-L2 voltage is displayed for 3ph3w and 3ph4w connection types
- Group Load is hidden
- Group Statistics – values Gen-set kWh, Gen-set kVArh, Mains kWh and Mains kWArh are hidden

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Subgroup: Voltage settings

Connection type

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	11628	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

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L2 <= 20 V
L3 >=100 V</td></tr>
</table></td></tr>
</table>

SplPhL1L2	L1 >=100 V L2 >= 100 V L3 <= 20 V
Mono Phase	L1 >=100 V L2 <= 20 V L3 <= 20 V
Voltage Autodetect shutdown	

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Nominal Voltage Ph-N

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	8277	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**.		
Description			
Nominal voltage (phase to neutral). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Voltage Ph-N 1 (page 405)****,* ***Nominal Voltage Ph-N 2 (page 410)*** *and* ***Nominal Voltage Ph-N 3 (page 415)****.*			

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Nominal Voltage Ph-Ph

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	80 .. 40 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	11657	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**.		
Description			
Nominal system voltage (phase to phase). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Voltage Ph-Ph 1 (page 405)****,* ***Nominal Voltage Ph-Ph 2 (page 410)*** *and* ***Nominal Voltage Ph-Ph 3 (page 415)****.*			

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Nominal Voltage 3Ph Low Y

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	**Alternative config**	YES
Step	1 V		
Comm object	20811	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 213)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 215)** by the voltage autodetect function, if detected **Connection type (page 213)** 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**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	277 V	**Alternative config**	YES
Step	1 V		
Comm object	20812	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 213)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 215)** by the voltage autodetect function, if detected **Connection type (page 213)** 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**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	277 V	**Alternative config**	YES
Step	1 V		
Comm object	20813	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 213)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 215)** by the voltage autodetect function, if detected **Connection type (page 213)** 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**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	**Alternative config**	YES
Step	1 V		
Comm object	20814	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 213)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 215)** by the voltage autodetect function, if detected **Connection type (page 213)** is SplPhL1L2 or SplPhL1L3.			

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Nominal Voltage MonoPhase

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	**Alternative config**	YES
Step	1 V		
Comm object	20815	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 213)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 215)** by the voltage autodetect function, if detected **Connection type (page 213)** is MonoPhase.			

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Gen VT Ratio

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1.0 V/V	**Alternative config**	NO
Step	0.1 V/V		
Comm object	9579	**Related applications**	AMF, MRS
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 VT Ratio

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1.0 V/V	**Alternative config**	NO
Step	0.1 V/V		
Comm object	9580	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
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**	1.4.0
Range [units]	30 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	8278	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal system frequency (usually 50 or 60 Hz).

> ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Frequency 1 (page 405)***, ***Nominal Frequency 2 (page 410)*** *and* ***Nominal Frequency 3 (page 415)****.*

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Gear Teeth

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	FGen->RPM / 1 .. 500 [-]		
Default value	FGen->RPM	**Alternative config**	NO
Step	1		
Comm object	8252	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Number of teeth on the engine flywheel where the pick-up is installed. Set to zero if no pick-up is used and the Engine speed will be counted from the generator frequency.

> ***Note:*** *If no pickup is used, the D+ or W terminal should be used to prevent possible overcranking, which can occur if at least 25% of nominal generator voltage is not present immediately after exceeding firing speed.*

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Nominal RPM

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	100 .. 4 000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	8253	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM – revolutions per minute). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal RPM 1 (page 404)****,* ***Nominal RPM 2 (page 409)*** *and* ***Nominal RPM 3 (page 414)****.*			

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Subgroup: Controller settings

Controller Mode

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	OFF / MAN / AUTO / TEST [-]		
Default value	OFF	**Alternative config**	NO
Step	[-]		
Comm object	8315	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint can be used for changing the Controller mode remotely, e.g. via Modbus. Use the mode selector on the main screen for changing the mode from the front panel. Use mode selector in the control window for changing the mode from InteliConfig.			

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Power On Mode

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Previous / OFF [-]		
Default value	Previous	**Alternative config**	NO
Step	[-]		
Comm object	13000	**Related applications**	AMF, MRS
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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Default Application Select

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	AMF / MRS [-]		
Default value	AMF	**Alternative config**	NO
Step	[-]		
Comm object	12157	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the controller application.

AMF	Normal AMF operation
MRS	When MRS mode is selected the controller will not perform AMF functions anymore. MCB button I/O will be inactive and also mains measurement and protections will be disabled. The controller will keep TEST mode and the Gen-set in AUTO mode will be able to start by **REMOTE START/STOP (PAGE 495)** binary input.

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GCB Control Mode

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Internal / External / No Button [-]		
Default value	Internal	**Alternative config**	YES

Step	[-]		
Comm object	11771	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if **Controller Mode (page 220)** = GCB		
Description			

This setpoint adjusts control mode of GCB.

Internal	The breaker is controlled only from controller. Any unexpected change of **GCB FEEDBACK (PAGE 487)** causes **Sd GCB Fail (page 602)** immediately. Incorrect reaction of the **GCB FEEDBACK (PAGE 487)** on internal GCB Close/Open command causes **Sd GCB Fail (page 602)**
External	Controller does not control the GCB at all. The GCB is controlled externally, when the **GCB FEEDBACK (PAGE 487)** get changed, then the event "GCB Opened" or "GCB Closed" is recorded to the history log. Controller always accept the **GCB FEEDBACK (PAGE 487)** 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.**
No Button	GCB button and LBI GCB button are deactivated. › When selected in AMF mode, there is active warning **Wrn Wrong GCB Control Mode (page 593)** › The behavior of the controller is the same as GCB Control Mode would be switched to Internal › When selected in MRS mode and MAN mode the GCB is closed automatically the same way as in Auto mode – no manual command needed.

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Reset To Manual

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9983	**Related applications**	AMF, MRS
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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Backlight Timeout

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Disabled / 1 .. 255 [min]		
Default value	Disabled	**Alternative config**	NO
Step	1 min		
Comm object	10121	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
The display backlight is switched off when this timer exceed. When setpoint is adjusted to disabled then the display will be backlighted all the time.			

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Horn Timeout

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Disabled / 1 .. 600 s / Horn Reset [-]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8264	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Setting of horn behavior.

Disabled	Disabling the Horn sounding function
1 .. 600 [s]	Timeout for **HORN (PAGE 524)** binary output. The **HORN (PAGE 524)** output is active when this timeout elapsed.
Horn reset	LBO **HORN (PAGE 524)** 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**	1.4.0
Range [units]	Log0 / Log1 / Last valid state [-]		
Default value	Last valid state	**Alternative config**	NO
Step	-		
Comm object	21215	**Related applications**	AMF, MRS
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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Zero Power Mode

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Disabled / 1 .. 360 [min]		
Default value	Disabled	**Alternative config**	NO
Step	1 min		
Comm object	8548	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

The controller is switched to Zero Power Mode when there is no user interaction with the controller for the preset time period. For the controller wake up press button Start or activate Binary Input 1. The controller will not switch to Zero Power Mode if generator is running. In Zero Power Mode binary outputs go to high impedance.

Note: *Power consumption of controller in Zero Power Mode is 0 mA. Controller is internally disconnected from power supply.*

Note: *While there is USB power present (USB cable plagued) the controller is able to turn off when there is no user interaction but wake up is not possible. USB power has to be cut off (USB cable un-plugged).*

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Run Hours Source

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	AUTO / ECU / INTERNAL [-]		
Default value	AUTO	**Alternative config**	NO
Step	[-]		
Comm object	13345	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	23885	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoints enables / disables history records when any 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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Mains Voltage Detection in MRS

Setpoint group	Protections	**Related FW**	1.4.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	16070	**Related applications**	MRS
Config level	Advanced		
Setpoint visibility	Only in MRS application		
Description			

This setpoint enables/disables **Wrn Mains Voltage Detected (page 593)** alarm.

Enabled	Normal behavior. Alarm **Wrn Mains Voltage Detected (page 593)** is active when there is some voltage on Mains terminals in MRS Operation Mode and generator is running.
Disabled	Alarm **Wrn Mains Voltage Detected (page 593)** is not active when there is some voltage on Mains terminals in MRS Operation Mode and generator is running.

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Subgroup: HMI Settings

Main Screen Line 1

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	RPM / PF / Run Hours / ATT / AIN1 [-]		
Default value	PF	**Alternative config**	NO
Step	[-]		
Comm object	13346	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts line 1 on Main screen.

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Main Screen Line 2

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	RPM / PF / Run Hours / ATT / AIN1 [-]		
Default value	RPM	**Alternative config**	NO
Step	[-]		
Comm object	14628	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts line 2 on Main screen.			

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Screen Filter

Setpoint group	Basic settings	**Related FW**	1.4.0
Range [units]	Enable / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	15889	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Every analog value showed on CU screen is filtered when setpoint is enabled.			

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Group: Communication Settings

Subgroup: Controller Address

Controller Address

Setpoint group	Communication Settings	**Related FW**	1.4.0
Range [units]	1 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	24537	**Related applications**	AMF, MRS
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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Group: Engine settings

Subgroup: Starting

Fuel Solenoid

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	Diesel / Gas [-]		
Default value	Diesel	**Alternative config**	NO
Step	[-]		
Comm object	9100	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Determines behavior of the Binary output **FUEL SOLENOID (PAGE 516)**

Diesel:	Output is activated before binary output **STARTER (PAGE 539)**. Lead of output is adjusted via setpoint **Fuel Solenoid Lead (page 238)**. The output is deactivated if Emergency Stop comes or Gen-set is stopped and in pause between repeated starts.
Gas:	Output is activated together with binary output **IGNITION (PAGE 525)** 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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Cranking Attempts

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	1 .. 10 [-]		
Default value	3	**Alternative config**	NO
Step	1		
Comm object	8255	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Maximal number of cranking attempts.			

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Maximum Cranking Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	1 .. 255 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8256	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	5 .. 60 [s]		
DefaultFixed value	8 s	**Alternative config**	NO
Step	1 s		
Comm object	8257	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Pause between **Cranking Attempts (page 229)**. **PRESTART (PAGE 534)** output is active in this pause until Cranking Fail Pause elapses.			

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Prestart Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 3600 [s]		
Default value	2 s	**Alternative config**	NO
Step	1 s		
Comm object	8394	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Time of closing of the **PRESTART (PAGE 534)** output prior to the engine start. Set to zero if you want to leave the output **PRESTART (PAGE 534)** open.

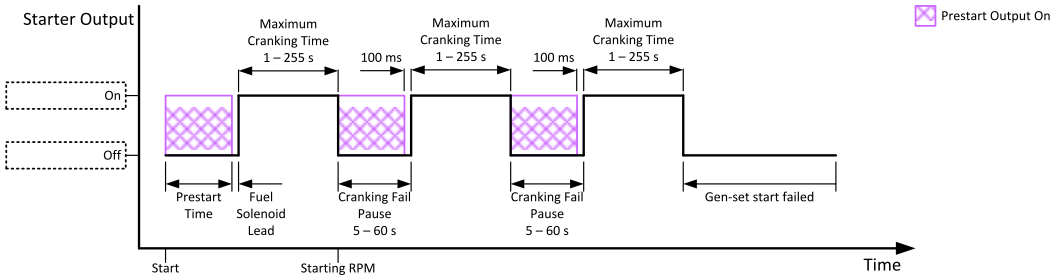


Image 8.1 Prestart Time

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Starting RPM

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	5 .. 50 [%]		
Default value	25%	**Alternative config**	NO
Step	1 % of **Nominal RPM (page 220)**		
Comm object	8254	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the "firing" speed level as percent value of the **Nominal RPM (page 220)**. If this level is exceeded the engine is considered as started.

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Starting Oil Pressure

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	Disabled / 0,1 .. 10,0 [bar]		
Default value	4,5 bar	**Alternative config**	NO
Step	0,1 bar		
Comm object	9681	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Oil pressure limit for starting. The controller will stop cranking (**STARTER (PAGE 539)** 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**	1.4.0
Range [units]	0.0 .. **Prestart Time (page 230)** [s]		
Default value	0.1 s	**Alternative config**	NO
Step	1.0 s		
Comm object	14412	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint defines the time before starting when logical binary output **GLOW PLUGS (PAGE 522)** will be active.

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Idle RPM

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	100 .. 4000 [RPM]		
Default value	900 RPM	**Alternative config**	NO
Step	1 RPM		
Comm object	9946	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts idle speed of engine.			

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Subgroup: Choke

Choke Function

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	Disabled /Fixed Time / Temp Based [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	15717	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO **CHOKE (PAGE 509)** is configured.		
Description			

This setpoint defines choke function behavior.

Disabled	Choke function is disabled and logical binary output **CHOKE (PAGE 509)** is activated under no circumstances.
Fixed Time	Choke time is fixedly defined by **Choke Time (page 233)** setpoint.
Temp Based	Choke time is calculated using actual engine (coolant) temperature. Setpoints **Choke Start Temp (page 234)** and **Choke Increment (page 235)** are taken into consideration.

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Choke Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 3600 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	13011	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO **CHOKE (PAGE 509)** is configured and setpoint **Choke Function (page 232)** = Fixed Time.		
Description			

Defines time logical binary output **CHOKE (PAGE 509)** is activated for when fixed time is used. When setpoint **Choke Function (page 232)** is set to *Temp Based* value, *Choke Time* value have no effect.

> ***Note:*** *If setpoint **Choke Lead (page 237)** is set to nonzero value, total time the CHOKE output is activated still matches value set by Choke Time setpoint. This mean Choke Timeshould be longer than Choke Leadto ensure expected Choke behavior.*

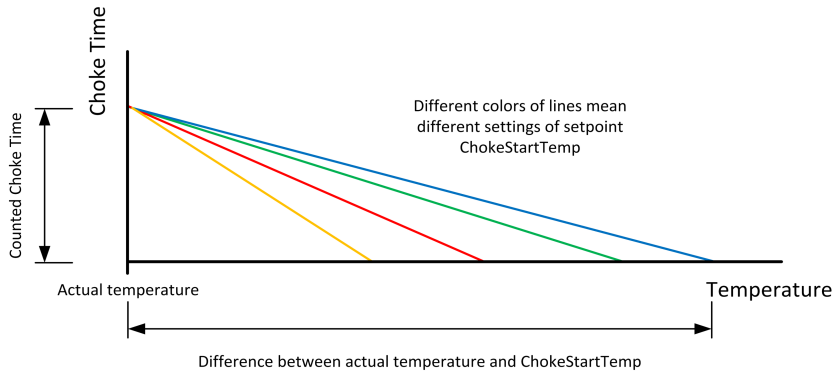
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Choke Start Temp

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	-20,0 .. 80,0 [°C]		
Default value	0,0 °C	**Alternative config**	NO
Step	0,1 °C		
Comm object	15716	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO **CHOKE (PAGE 509)** is configured and setpoint **Choke Function (page 232)** = Temp Based.		

Description

This setpoint adjust the base temperature for Choke function. When temperature will be higher than this setpoint, Choke Time will be always 0. When temperature will be lower than this setpoint, Choke Time will be calculated by curve adjusted via setpoint **Choke Increment (page 235)**. When setpoint **Choke Function (page 232)** is set to *Fixed Time* value, setpoint *Choke Start Temp* has no effect.



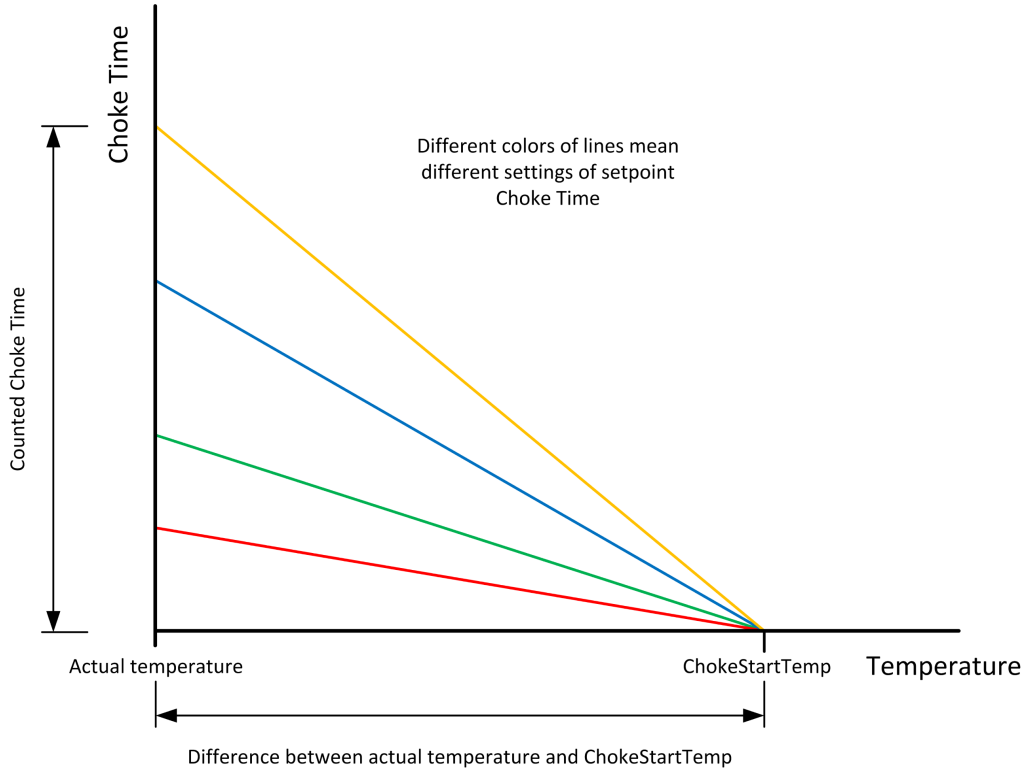
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Choke Increment

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0,00 .. 20,00 [s/°C]		
Default value	0,00 s/°C	**Alternative config**	NO
Step	0,01 s/°C		
Comm object	15715	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO **CHOKE (PAGE 509)** is configured and setpoint **Choke Function (page 232)** = Temp Based.		

Description

This setpoint adjust the maximal time of activation of binary output **CHOKE (PAGE 509)**. Calculated time depends on engine (coolant) temperature. Setpoint adjust curve which is used for calculating actual Choke Time. When setpoint **Choke Function (page 232)** is set to *Fixed Time* value, setpoint *Choke Increment* has no effect.



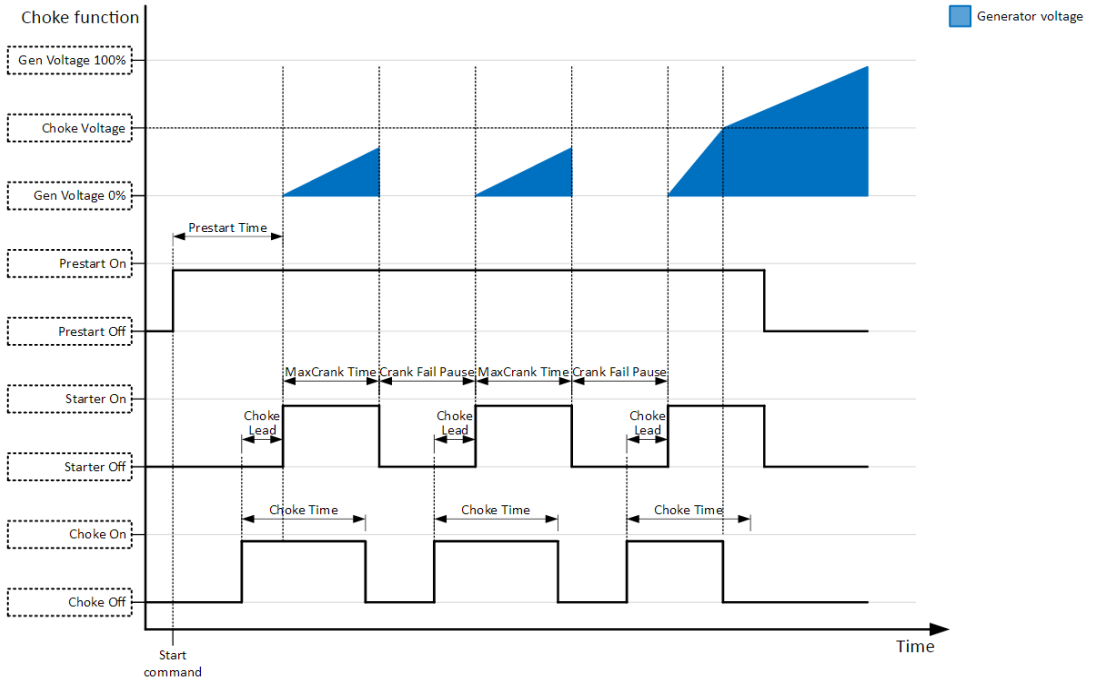
Note: *If setpoint **Choke Lead (page 237)** is set to nonzero value, total time the CHOKE output is activated still matches calculated value (based on actual temperature and setpoints Choke Increment and **Choke Start Temp (page 234)**) This mean that adjusted parameters should ensure that calculated Choke Time will be longer than Choke Leadto ensure expected Choke behavior.*

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Choke Voltage

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	Disabled / 1–100 [%]		
Default value	Disabled	**Alternative config**	NO
Step	1 %		
Comm object	15718	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO **CHOKE (PAGE 509)** is configured.		
Description			

This setpoint adjust threshold level for deactivation of **CHOKE (PAGE 509)** binary output. When generator voltage is higher than this level, then logical binary output CHOKE is deactivated. In multiphase system it is sufficient to deactivate CHOKE LBO when at least one voltage crosses this threshold. In case setpoint *Choke Voltage* is set to *Disabled* value, no voltage is taken into account and CHOKE LBO isn't deactivated on the voltage basis.



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Choke Lead

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. Prestart Time [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	15774	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO **CHOKE (PAGE 509)** is configured.		
Description			

This setpoint adjust the lead of logical binary output CHOKE. **CHOKE (PAGE 509)** is activated before logical binary output **STARTER (PAGE 539)**.

> ***Note:*** *In case Choke Lead is longer than 8 s (cranking fail pause), Choke Lead will be limited to 8 s (cranking fail pause time). This limitation is applied only for cranking fail pause, Choke Lead in Prestart stays unchanged.*

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Subgroup: Starting Timers

Fuel Solenoid Lead

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0,0 .. 25,0 [s]		
Default value	0,5 s	**Alternative config**	NO
Step	0,1 s		
Comm object	10525	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Delay between **FUEL SOLENOID (PAGE 516)** and **STARTER (PAGE 539)** logical binary outputs.**FUEL SOLENOID (PAGE 516)** is active before **STARTER (PAGE 539)**. Lead time is adjusted via this setpoint.

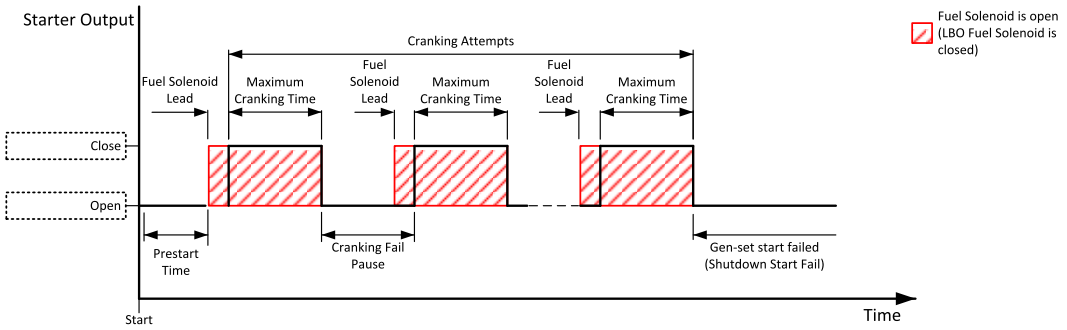


Image 8.2 Fuel Solenoid Lead

***Note:** LBO **PRESTART (PAGE 534)** goes to logical zero when Fuel Solenoid Lead goes to logical one.*

***Note:** This setpoint is used only for diesel **Fuel Solenoid (page 228)**.*

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Idle Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	12 s	**Alternative config**	NO
Step	1 s		
Comm object	9097	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Idle Time delay starts when RPM exceeds **Starting RPM (page 230)**. Start fail is detected when during Idle state RPM decreases below 2 RPM.
The output **IDLE/NOMINAL (PAGE 525)** 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.*

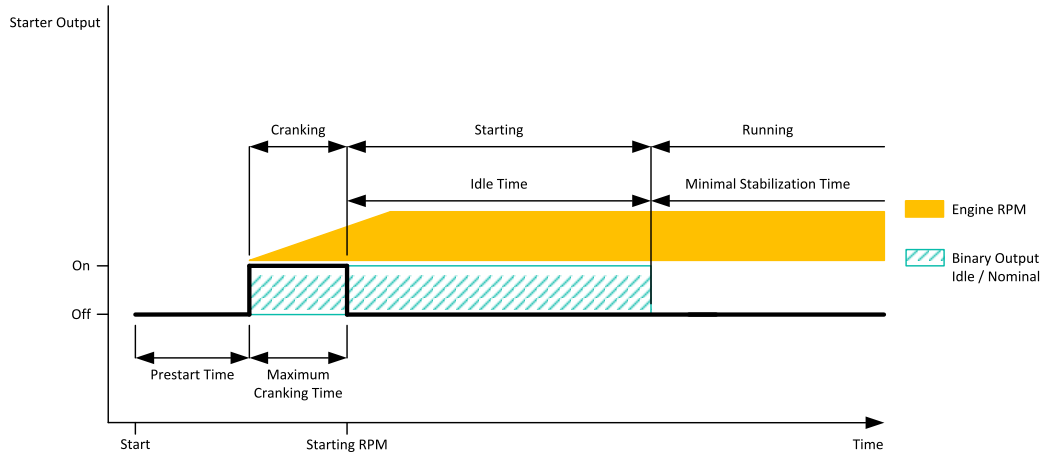


Image 8.3 Idle Time 1

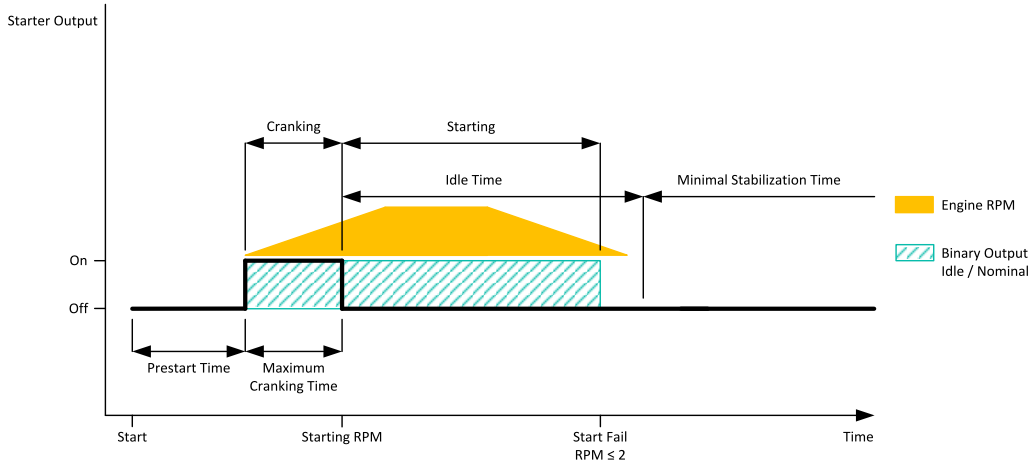


Image 8.4 Idle Time 2

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Minimal Stabilization Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	1 .. **Maximal Stabilization Time (page 241)** [s]		
Default value	2 s	**Alternative config**	NO
Step	1 s		
Comm object	8259	**Related applications**	AMF, MRS
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.

Note: *When starting the engine, setpoint should be set >300 s.*

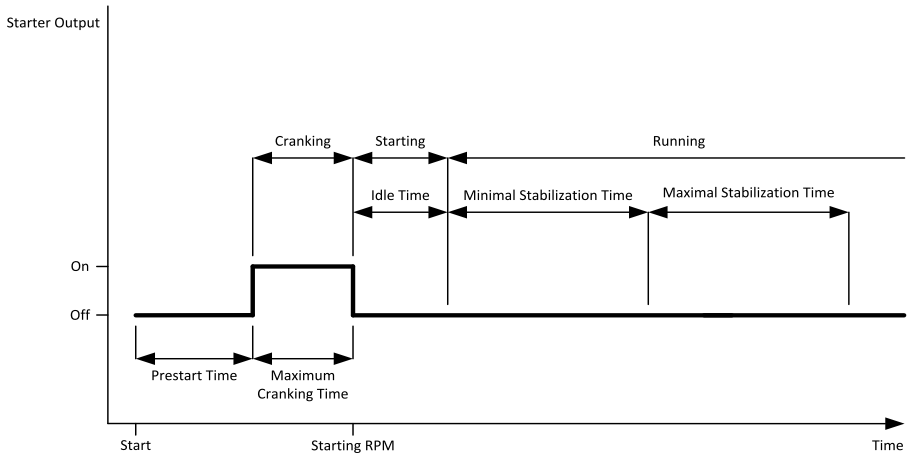


Image 8.5 Minimal Stabilization Time

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Maximal Stabilization Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	**Minimal Stabilization Time (page 240)** .. 3600 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8313	**Related applications**	AMF, MRS
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.*

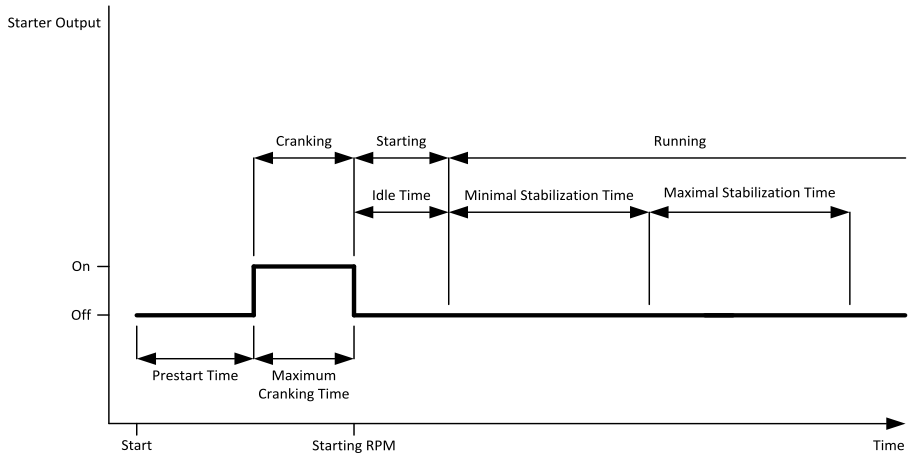


Image 8.6 Maximal Stabilization Time

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Run Only Block Delay

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	10023	**Related applications**	AMF, MRS
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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Subgroup: Stopping

Cooling Speed

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	Idle / Nominal [-]		
Default value	Nominal	**Alternative config**	NO
Step	[-]		
Comm object	10046	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Selects the function of the binary output **IDLE/NOMINAL (PAGE 525)** 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 525)** must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor.*

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Subgroup: Stopping Timers

Cooling Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 3 600 [s]		
Default value	30 s	**Alternative config**	NO
Step	1 s		
Comm object	8258	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Runtime of the unloaded Gen-set to cool the engine before stop.			

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Stop Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	9815	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Under normal conditions the engine must certainly stop within this period after the **FUEL SOLENOID (PAGE 516)** has been de-energized and the **STOP SOLENOID (PAGE 540)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off.

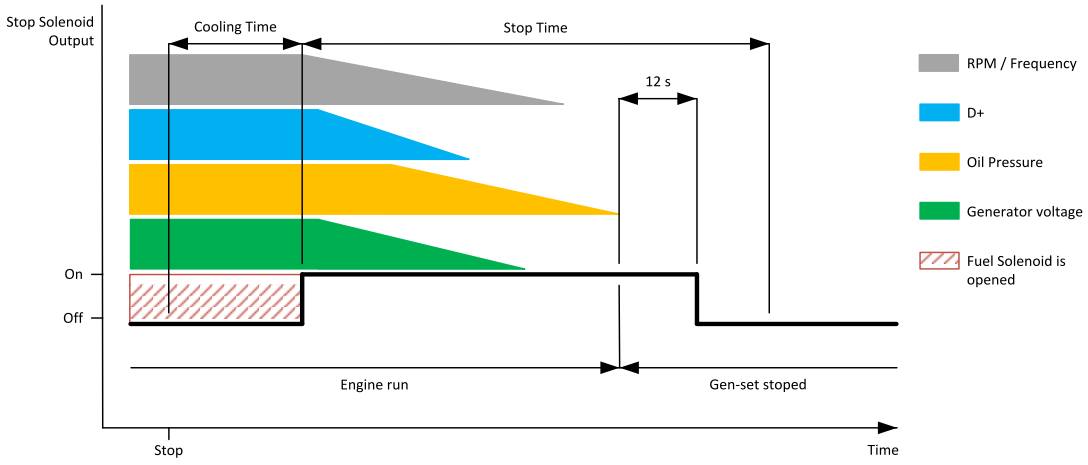


Image 8.7 Stop Time 1

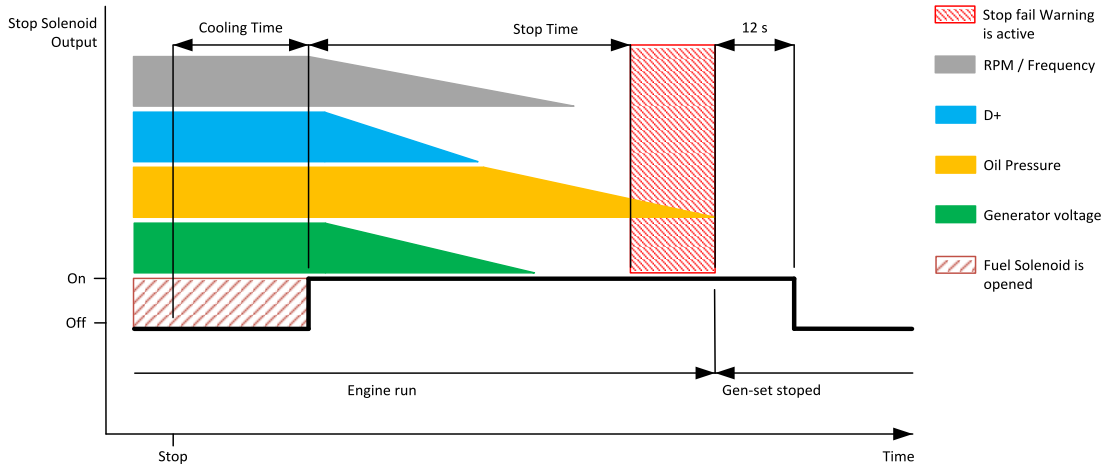


Image 8.8 Stop Time 2

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After Cooling Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 3 600 [s]		
Default value	180 s	**Alternative config**	NO
Step	1 s		
Comm object	8662	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Runtime of engine after cooling pump. Binary output **COOLING PUMP (PAGE 509)** 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**	1.4.0
Range [units]	Enabled / ChargeFail / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9683	**Related applications**	AMF, MRS
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.

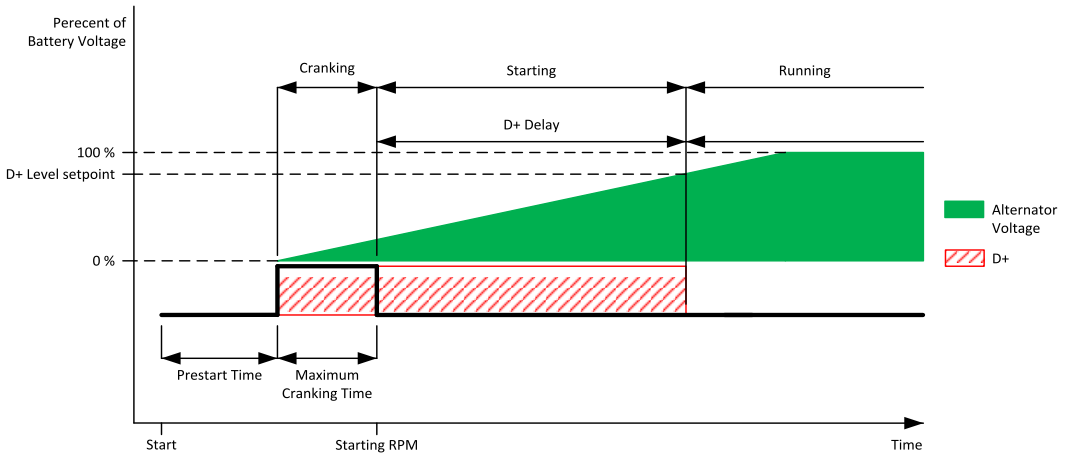


Image 8.9 D+ Function 1

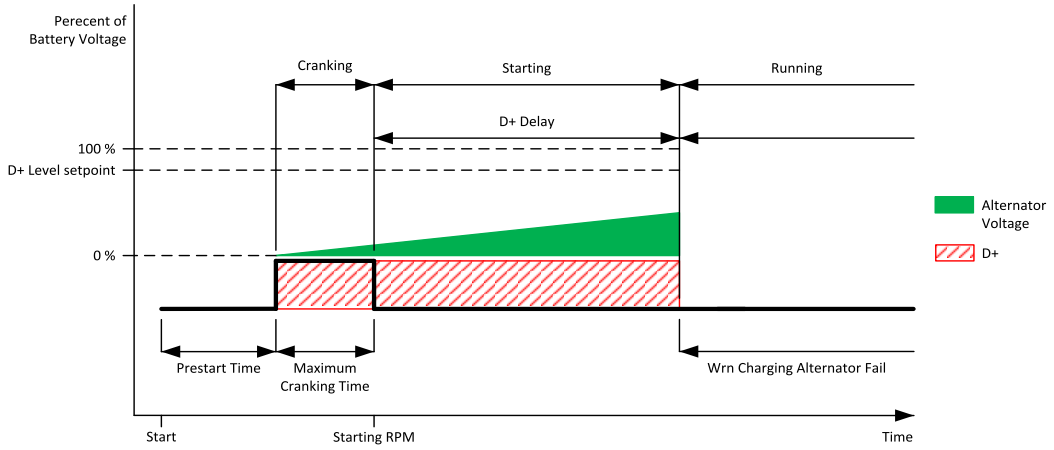


Image 8.10 D+ Function 2

***Note:** Delay of this function is adjusted via **D+ Delay (page 246)** setpoint, threshold of this function is adjusted via D+ Level setpoint.*

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D+ Threshold

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0..100 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	14959	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 244)** is not set to *Disabled* value.		
Description			
This setpoint adjusts threshold level for **D+ Function (page 244)**.			

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D+ Delay

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	1..255 [s]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	14960	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 244)** is not set to *Disabled* value.		
Description			
This setpoint adjusts delay for **D+ Function (page 244)**. This delay is used for: › Alarm **Wrn Charging Alternator Fail (page 577)**. › For engine running condition – disengagement of starter			

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D+ Alarm Type

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	No Protec/Wrn/Sd [-]		
Default value	Wrn	**Alternative config**	NO
Step	[-]		
Comm object	15751	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 244)** is not set to *Disabled* value.		
Description			
This setpoint adjusts type of alarm **Wrn Charging Alternator Fail (page 577)**.			

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Subgroup: Engine Protections

Overspeed Sd

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	**Underspeed Sd (page 249)**50 .. 200 [%]		
Default value	115%	**Alternative config**	NO
Step	1 % of **Nominal RPM (page 220)**		
Comm object	8263	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for over speed protection. Relative to the nominal speed.			

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Starting Overspeed Sd

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	100 ..200 [%]		
Default value	115%	**Alternative config**	NO
Step	1 %		
Comm object	11033	**Related applications**	AMF, MRS
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 248)**. This period starts to be counted once the RPM exceeds the value **Starting RPM (page 230)**. The threshold **Overspeed Sd (page 247)** starts to be valid once this period elapsed.
The type of reaction of the overspeed protection within the **Starting Overspeed Time (page 248)** is defined by the setpoint **Starting Overspeed Protection (page 248)**, 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.

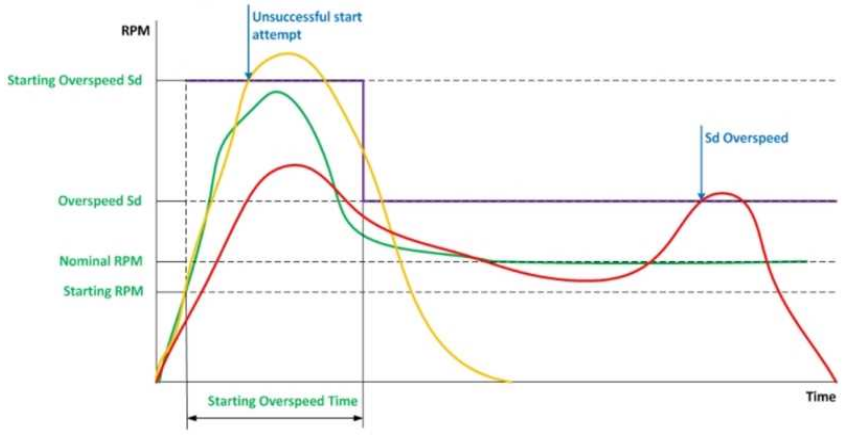


Image 8.11 Staring speed overshoot › Ovespeed Sd

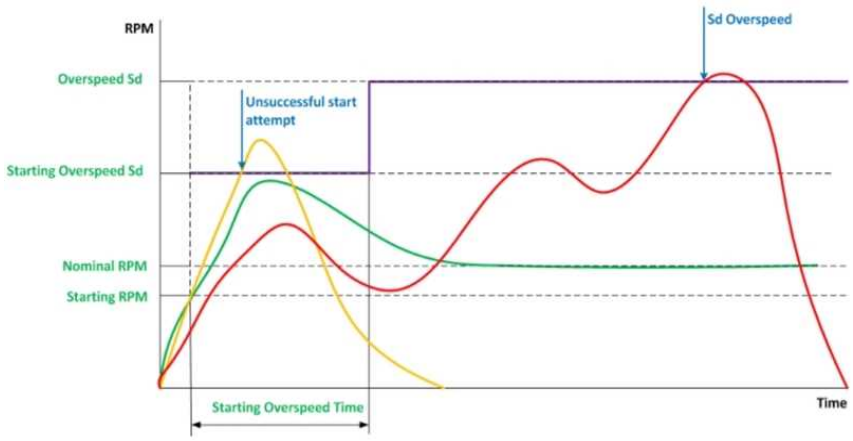


Image 8.12 Staring speed overshoot ‹ Ovespeed Sd

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Starting Overspeed Time

Setpoint group	Engine protection	**Related FW**	1.4.0
Range [units]	0 .. 255 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	14108	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Time when **Starting Overspeed Sd (page 247)** level is used for overspeed protection. This time starts countdown when starting RPM are reached.			

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Starting Overspeed Protection

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	OverSpd Sd / NextStartAt [-]		
Default value	OverSpd Sd	**Alternative config**	NO
Step	[-]		
Comm object	15808	**Related applications**	AMF, MRS
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 248)**.			

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 229)**.

back to List of setpoints

Underspeed Sd

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. **Overspeed Sd (page 247)** [%]		
Default value	25%	**Alternative config**	NO
Step	1 % of **Nominal RPM (page 220)**		
Comm object	8260	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for underspeed protection. Relative to the nominal speed.			

back to List of setpoints

Oil Pressure Delay

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	3.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	65535	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Oil Pressure (page 593)**/**Sd Oil Pressure (page 607)** user protection.			

back to List of setpoints

Oil Pressure Wrn

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0.0 .. 10.0 [bar]		
Default value	2.0 bar	**Alternative config**	YES
Step	0.1 bar		
Comm object	65534	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Oil Pressure (page 593)** user protection.			

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Oil Pressure Sd

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0.0 .. 10.0 [bar]		
Default value	1.0 bar	**Alternative config**	YES
Step	0.1 bar		
Comm object	65533	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Sd Oil Pressure (page 607)** user protection.			

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Coolant Temp Delay

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	5.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	65532	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Coolant Temp (page 577)**/**BOC Coolant Temp (page 607)** user protection.			

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Coolant Temp Wrn

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	-16 .. 120 [°C]		
Default value	80 °C	**Alternative config**	YES
Step	1 °C		
Comm object	65531	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Coolant Temp (page 577)** user protection.			

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Coolant Temp BOC

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	-16 .. 120 [°C]		
Default value	90 °C	**Alternative config**	YES
Step	1 °C		
Comm object	65530	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **BOC Coolant Temp (page 607)** user protection.			

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Coolant Temp Low Delay

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	0.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	65529	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Coolant Temp Low (page 577)** user protection.			

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Coolant Temp Low Wrn

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	-16 .. 120 [°C]		
Default value	5 °C	**Alternative config**	YES
Step	1 °C		
Comm object	65528	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Coolant Temp Low (page 577)** user protection.			

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Fuel Level Delay

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	10.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	65527	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Fuel Level (page 577)**/**BOC Coolant Temp (page 607)** user protection.			

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Fuel Level Wrn

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0 .. 100 [%]		
Default value	20 %	**Alternative config**	YES
Step	1 %		
Comm object	65526	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Fuel Level (page 577)** user protection.			

back to List of setpoints

Fuel Level BOC

Setpoint group	User Setpoints	**Related FW**	1.4.0
Range [units]	0 .. 100 [%]		
Default value	10 %	**Alternative config**	YES
Step	1 %		
Comm object	65525	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **BOC Coolant Temp (page 607)** user protection.			

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Subgroup: Fuel Theft Protection

Fuel Tank Volume

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 10 000 [l]		
Default value	200 l	**Alternative config**	NO
Step	1 l		
Comm object	11103	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if the logical analog input **FUEL LEVEL (PAGE 547)** is or ECU is configured		
Description			
Define a capacity of Gen-set fuel tank.			

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Maximal Fuel Drop

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	Disabled / 1 .. 50 [%/h]		
Default value	25 %/h	**Alternative config**	NO
Step	1%/h		
Comm object	12373	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Setpoint indicates the maximum allowable drop of fuel in fuel tank per running hour. When the engine is not running the maximal allowed fuel drop-off is preset to 5% of total tank volume per hour.			

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Maximal Fuel Drop Delay

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Alternative config**	NO
Step	s		
Comm object	14683	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
When the value of fuel drop per hour is higher than **Maximal Fuel Drop (page 253)** this delay starts count down. After count down of this delay alarm **Wrn Fuel Theft (page 594)** is activated.			

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Subgroup: Fuel Pump

Fuel Pump On

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. **Fuel Pump Off (page 255)** [%]		
Default value	20 %	**Alternative config**	NO
Step	1 %		
Comm object	10100	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	All the time		
Description			

Threshold level for switching the binary output **FUEL PUMP (PAGE 516)** on.

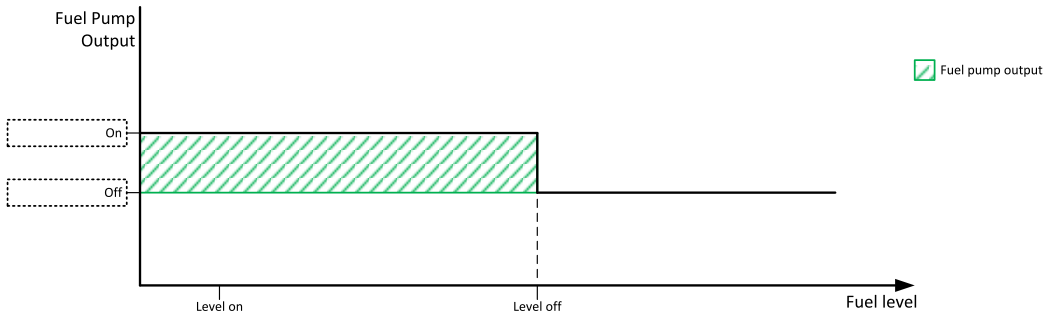


Image 8.13 Fuel Pump On

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 485) is configured then binary output FUEL PUMP (PAGE 516) is control by this binary input. Setpoints Fuel Pump On and Fuel Pump Off (page 255) 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**	1.4.0
Range [units]	**Fuel Pump On (page 254)** .. 100 [%]		
Default value	90 %	**Alternative config**	NO
Step	1 %		
Comm object	10101	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	All the time		
Description			

Threshold level for switching the binary output **FUEL PUMP (PAGE 516)** off.

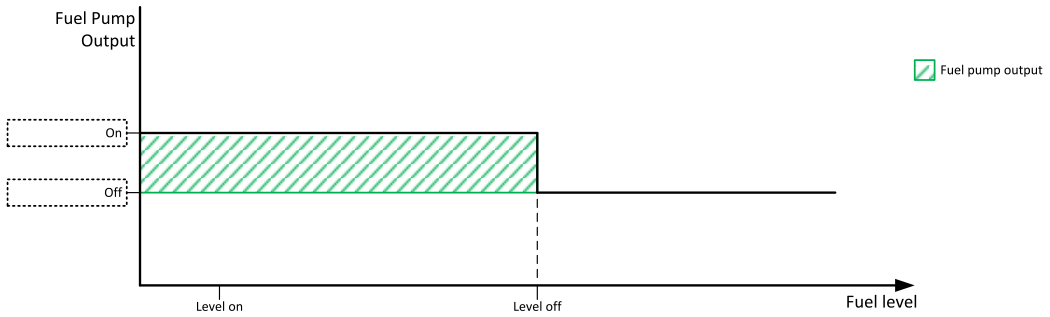


Image 8.14 Fuel Pump Off

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 485) is configured then binary output FUEL PUMP (PAGE 516) is control by this binary input. Setpoints Fuel Pump On (page 254) 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**	1.4.0
Range [units]	Disabled / 1 .. 600 [s]		
Default value	30 s	**Alternative config**	NO
Step	1 s		
Comm object	10685	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if the logical binary output **FUEL PUMP (PAGE 516)** is configured		
Description			
If the controller does not see the fuel increase during fuel transfer within this time alarm **AL Fuel Transfer Failed (page 577)** will be displayed and the **FUEL PUMP (PAGE 516)** will be turned off. Alarm **AL Fuel Transfer Failed (page 577)** will be displayed but this alarm becomes immediately inactive and it will be possible to delete this message by the Fault reset button. If the fault is deleted the controller will initiate the transfer again.			

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Subgroup: Battery Protections

Battery Undervoltage

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	8.0 V .. **Battery Overvoltage (page 257)** [V]		
Default value	18.0 V	**Alternative config**	NO
Step	0.1 V		
Comm object	8387	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for low battery voltage.			

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Battery Overvoltage

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	**Battery Undervoltage (page 256)** .. 40.0 [V]		
Default value	36.0 V	**Alternative config**	NO
Step	0.1 V		
Comm object	9587	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for high battery voltage.			

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Battery <> Voltage Delay

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
DefaultFixed value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8383	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Battery Undervoltage (page 256)** and **Battery Overvoltage (page 257)** protection.			

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Subgroup: Ventilation

Ventilation Pulse Time

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0–3600 [s]		
Default value	30 s	**Alternative config**	NO
Step	1 s		
Comm object	15767	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when logical binary output **VENTILATION ON PULSE (PAGE 542)** or **VENTILATION OFF PULSE (PAGE 542)** is configured.		
Description			
This setpoint defines duration of pulse generated on logical binary outputs **VENTILATION ON PULSE (PAGE 542)** or **VENTILATION OFF PULSE (PAGE 542)** at the moment when logical binary output **VENTILATION (PAGE 542)** is activated or deactivated respectively.			

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Subgroup: ECU Settings

ECU Speed Adjustment

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	9948	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			
Enables to adjust engine speed in ECU via CAN bus. Nominal speed corresponds to 50 %. This setpoint should be used only for Volvo Penta and Scania engines. It has no effect on other engine brands.			

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Manual ECU Activation Timeout

Setpoint group	Engine settings	**Related FW**	1.4.0
Range [units]	0 .. 300 [min]		
Default value	60 min	**Alternative config**	NO
Step	1 min		
Comm object	19707	**Related applications**	AMF, MRS
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. LBO ECU Power Relay is activated by Start button. This LBO is active until Stop button is pressed, or until timeout elapses or until mode is changed.			

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Group: Maintenance Timers

Subgroup: Maintenance Timer 1

Maintenance Timer 1 RunHours

Setpoint group	Maintenance Timers	**Related FW**	1.4.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Alternative config**	NO
Step	1 h		
Comm object	13853	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Alternative config**	NO
Step	1 month		
Comm object	20583	**Related applications**	AMF, MRS
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 445)** 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 445)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 1 Protection

Setpoint group	Maintenance Timers	**Related FW**	1.4.0
Range [units]	Warning / BOC [-]		
Default value	Warning	**Alternative config**	NO
Step	[-]		
Comm object	20586	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 1 RunHours (page 259)** and **Maintenance Timer 1 Interval (page 259)**.			

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Subgroup: Maintenance Timer 2

Maintenance Timer 2 RunHours

Setpoint group	Maintenance Timers	**Related FW**	1.4.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Alternative config**	NO
Step	1 h		
Comm object	13854	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Alternative config**	NO
Step	1 month		
Comm object	20584	**Related applications**	AMF, MRS
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 445)** 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 445)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 2 Protection

Setpoint group	Maintenance Timers	**Related FW**	1.4.0
Range [units]	Warning / BOC [-]		
Default value	Warning	**Alternative config**	NO
Step	[-]		
Comm object	20587	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 2 RunHours (page 260)** and **Maintenance Timer 2 Interval (page 261)**.			

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Subgroup: Maintenance Timer 3

Maintenance Timer 3 RunHours

Setpoint group	Maintenance Timers	**Related FW**	1.4.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Alternative config**	NO
Step	1 h		
Comm object	13855	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Alternative config**	NO
Step	1 month		
Comm object	20585	**Related applications**	AMF, MRS
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 446)** 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 446)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 3 Protection

Setpoint group	Maintenance Timers	**Related FW**	1.4.0
Range [units]	Warning / BOC [-]		
Default value	Warning	**Alternative config**	NO
Step	[-]		
Comm object	20588	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 3 RunHours (page 262)** and **Maintenance Timer 3 Interval (page 262)**.			

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Group: Generator settings

Subgroup: Overload Protection

Overload BOC

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	**Overload Wrn (page 264)** .. 200 [%]		
Default value	120 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 210)**		
Comm object	8280	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. **Overload BOC (page 263)** [%]		
Default value	120 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 210)**		
Comm object	9685	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of **Nominal Power (page 210)**) protection. This is only warning.			

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Overload Delay

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8281	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for protections **Overload BOC (page 263)** and **Overload Wrn (page 264)**.			

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Subgroup: Current Protection

Short Circuit BOC

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	100 .. 500 [%]		
Default value	250 %	**Alternative config**	NO
Step	1 % of **Nominal Current (page 211)**		
Comm object	8282	**Related applications**	AMF, MRS
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 BOC Delay

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	0.00 .. 10.00 [s]		
Default value	0.04 s	**Alternative config**	NO
Step	0.01 s		
Comm object	9991	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Delay for **Short Circuit BOC (page 264)** protection.			

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IDMT Overcurrent Delay

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	1.0 .. 600.0 [s]		
Default value	4.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8283	**Related applications**	AMF, MRS
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

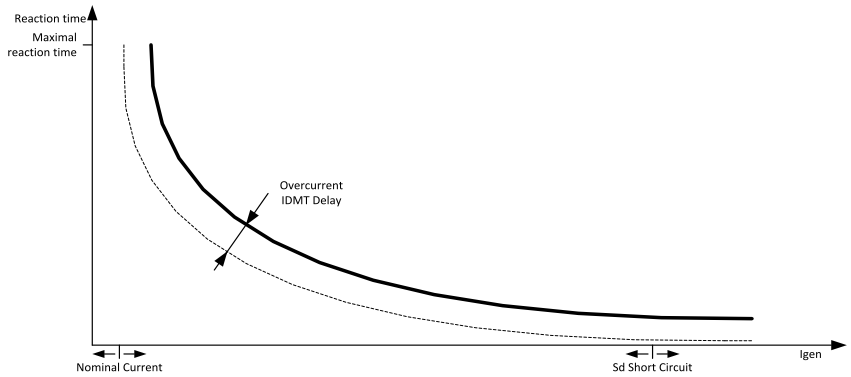


Image 8.15 IDMT Overcurrent Delay

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Current Unbalance BOC

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	1 .. 200 [%] of **Nominal Current (page 211)**		
Default value	50 %	**Alternative config**	NO
Step	1 % of **Nominal Current (page 211)**		
Comm object	8284	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**		
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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Current Unbalance BOC Delay

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8285	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**		
Description			
Delay for **Current Unbalance BOC (page 266)** protection.			

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Subgroup: Voltage Protection

Generator Overvoltage Sd

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	**Generator Overvoltage Wrn (page 267)** .. 200 [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-N (page 215)** or **Nominal Voltage Ph-Ph (page 215)**		
Comm object	8291	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	**Generator Undervoltage Wrn (page 268)** .. **Generator Overvoltage Sd (page 267)** [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-N (page 215)** or **Nominal Voltage Ph-Ph (page 215)**		
Comm object	9686	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	**Generator Undervoltage BOC (page 268)** .. **Generator Overvoltage Wrn (page 267)** [%]		
Default value	70 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-N (page 215)** or **Nominal Voltage Ph-Ph (page 215)**		
Comm object	9687	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. **Generator Undervoltage Wrn (page 268)** [%]		
Default value	70 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-N (page 215)** or **Nominal Voltage Ph-Ph (page 215)**		
Comm object	8293	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	9103	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Generator Overvoltage Sd (page 267)**, **Generator Overvoltage Wrn (page 267)**, **Generator Undervoltage BOC (page 268)** and **Generator Undervoltage Wrn (page 268)** protection.			

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Voltage Unbalance BOC

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	1 .. 200 [%] of **Nominal Voltage Ph-Ph (page 215)** or **Nominal Voltage Ph-N (page 215)**		
Default value	10 %	**Alternative config**	NO
Step	1 %		
Comm object	8288	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**		
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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Voltage Unbalance BOC Delay

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	3.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8289	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**		
Description			
Delay for **Voltage Unbalance BOC (page 269)** protection.			

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Subgroup: Frequency Protection

Generator Overfrequency BOC

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	**Generator Overfrequency Wrn (page 270)** .. 200,0 [%]		
Default value	110,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 219)**		
Comm object	8296	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	**Generator Underfrequency Wrn (page 270)** .. **Generator Overfrequency BOC (page 270)** [%]		
Default value	110,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 219)**		
Comm object	9688	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	**Generator Underfrequency BOC (page 271)** .. **Generator Overfrequency Wrn (page 270)** [%]		
Default value	85,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 219)**		
Comm object	9689	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0,0 .. **Generator Underfrequency Wrn (page 270)** [%]		
Default value	85,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 219)**		
Comm object	8298	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8297	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Generator Overfrequency BOC (page 270)**, **Generator Overfrequency Wrn (page 270)**, **Generator Underfrequency Wrn (page 270)** and **Generator Underfrequency BOC (page 271)** protection.			

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Subgroup: Reverse Power Protection

Reverse Power Level

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	0 .. 50 [%]		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 210)**		
Comm object	8486	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	All the time		
Description			
Level for generator **Reverse Power Protection**.			

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Reverse Power Delay

Setpoint group	Generator settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8552	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	All the time		
Description			
Delay for generator **Reverse Power Protection**.			

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Group: Protections

Subgroup: Reverse Power Protection

Reverse Power Protection

Setpoint group	Protections	**Related FW**	1.4.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	13230	**Related applications**	AMF, MRS
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 272)** for time longer than the value of setpoint **Reverse Power Delay (page 272)**.

This setpoint adjusts behavior of generator Reverse power protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Reverse Power Level (page 272)**, **Reverse Power Delay (page 272)**
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE (PAGE 492)**.

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Group: Mains Settings

Subgroup: AMF Timers

Emergency Start Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0 .. 6 000 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8301	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Delay after the mains failure to the start command of the Gen-set.			

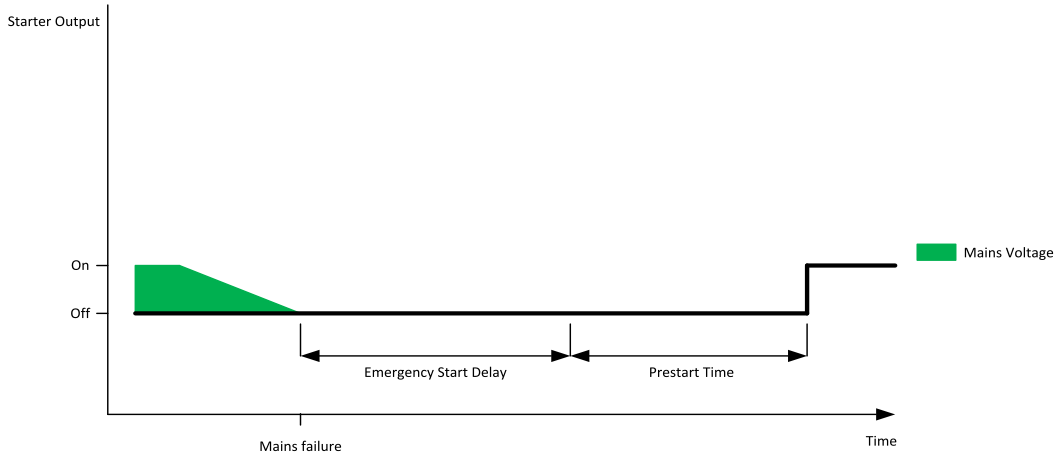


Image 8.16 Emergency Start Delay

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Mains Return Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	1 .. 3 600 [s]		
Default value	20 s	**Alternative config**	NO
Step	1 s		
Comm object	8302	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
This setpoint adjust the delay, how long mains has to be returned after mains fail to start load transfer to mains.			

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MCB Close Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8389	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Delay after mains returns to MCB closing, if the Gen-set is not running (e.g. is in start-up procedure).			

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Transfer Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8303	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

Transition Delay between power sources.

> **IMPORTANT: This setpoint is used in 2 functions:**
>
> - **Delay after GCB opening to MCB closing**
> - **Delay used in dual operation 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 288)** 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 518)** output straight away (100 ms) after the **MCB FEEDBACK (PAGE 490)** input deactivates.

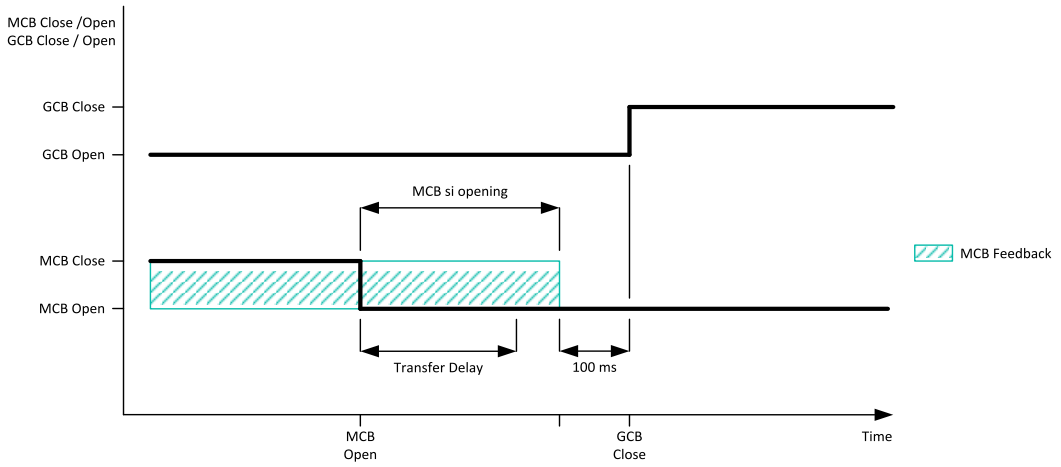


Image 8.17 Transfer Delay 1

If some delay between **MCB FEEDBACK (PAGE 490)** deactivation and closing of **GCB CLOSE/OPEN (PAGE 518)** output is required, then the Transfer Delay must be set to sum of "MCB opening" + "Delay" time.

Delay used in dual operation function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

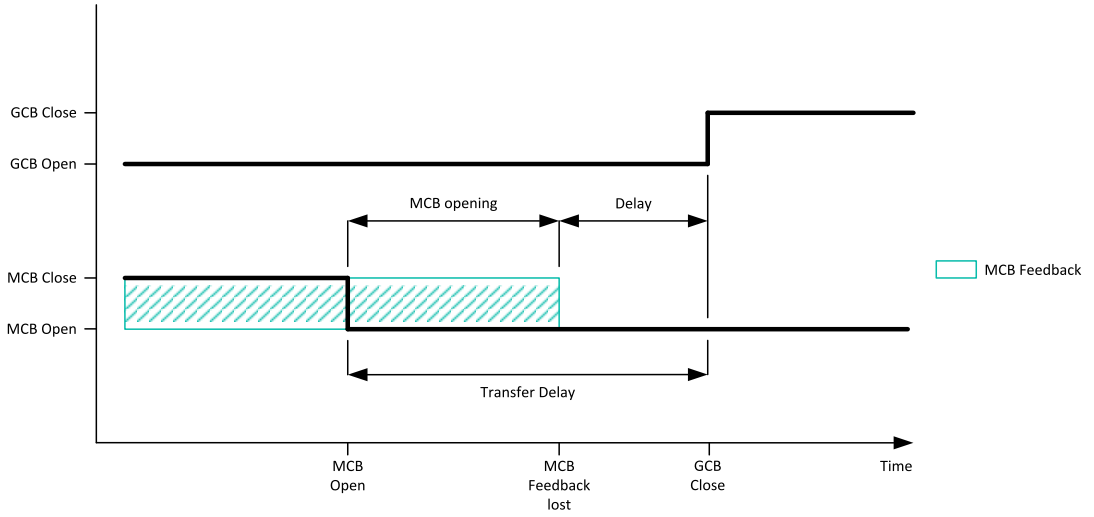


Image 8.18 Transfer Delay 2

This delay is also used in dual operation function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

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Subgroup: Mains Voltage Limits

Mains Overvoltage

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	**Mains Undervoltage (page 279)** .. 150 [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-Ph (page 215)**		
Comm object	8305	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Threshold for Mains overvoltage. All three phases are checked. Maximum out of three is used.			

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Mains Overvoltage Hys

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	100 .. **Mains Overvoltage (page 277)** [%]		
Default value	105 %	**Alternative config**	NO
Step	1 %		
Comm object	14132	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

Threshold defines the level of turning off Mains overvoltage protection.

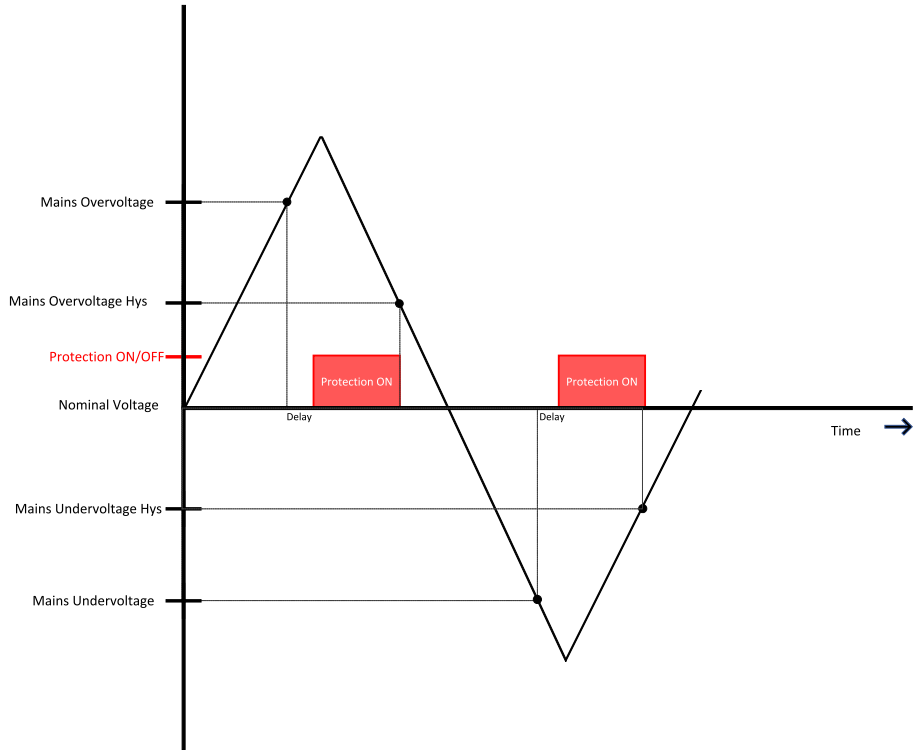


Image 8.19 Mains Overvoltage Hys

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Mains Undervoltage

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	50 .. **Mains Overvoltage (page 277)** [%]		
Default value	60 %	**Alternative config**	YES
Step	1 % of **Nominal Voltage Ph-Ph (page 215)**		
Comm object	8307	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Threshold for Mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

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Mains Undervoltage Hys

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	**Mains Undervoltage (page 279)** .. 100 [%]		
Default value	65 %	**Alternative config**	NO
Step	1 %		
Comm object	14130	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

Threshold defines the level of turning off Mains undervoltage protection.

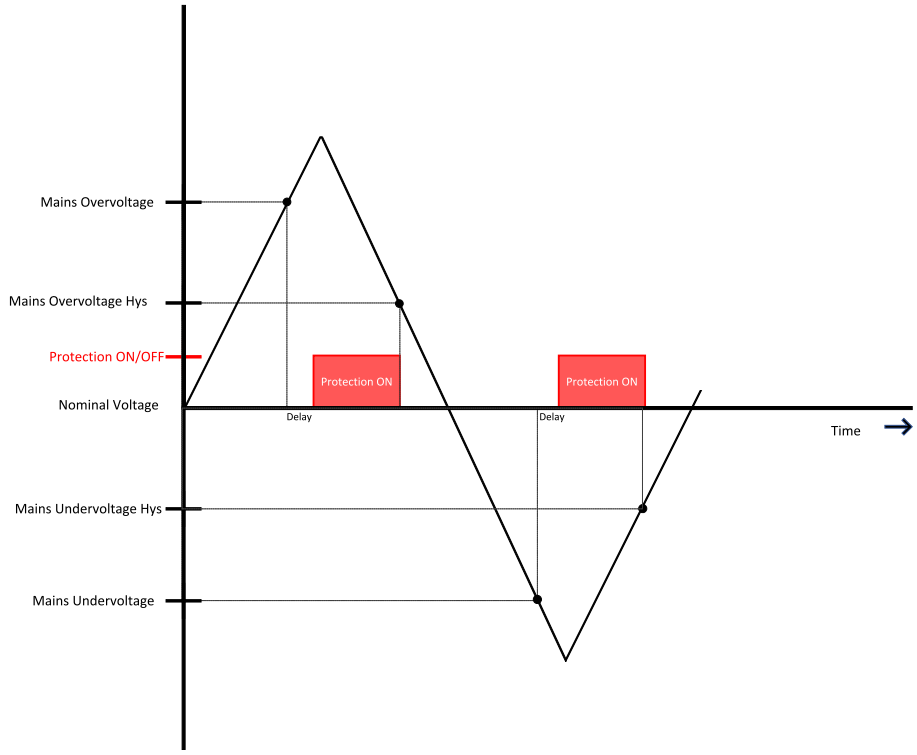


Image 8.20 Mains Undervoltage Hys

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Mains Overvoltage Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	8306	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Delay for **Mains Overvoltage (page 277)** protection.			

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Mains Undervoltage Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	8308	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Delay for **Mains Undervoltage (page 279)** protection.			

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Mains Voltage Unbalance

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	1 .. 150 [%] of **Nominal Voltage Ph-Ph (page 215)** or **Nominal Voltage Ph-N (page 215)**		
Default value	10 %	**Alternative config**	NO
Step	1 %		
Comm object	8446	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Threshold for Mains voltage unbalance.			

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Mains Voltage Unbalance Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8447	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Delay for **Mains Voltage Unbalance (page 281)** protection.			

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Subgroup: Mains Frequency Limits

Mains Overfrequency

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	**Mains Underfrequency (page 284)** .. 150 [%]		
Default value	102.0 %	**Alternative config**	NO
Step	1.0 % of **Nominal Frequency (page 219)**		
Comm object	8310	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Threshold for Mains overfrequency.			

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Mains Overfrequency Hys

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	100 .. **Mains Overfrequency (page 282)** [%]		
Default value	102.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	14134	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

Threshold defines the level of turning off Mains overfrequency protection.

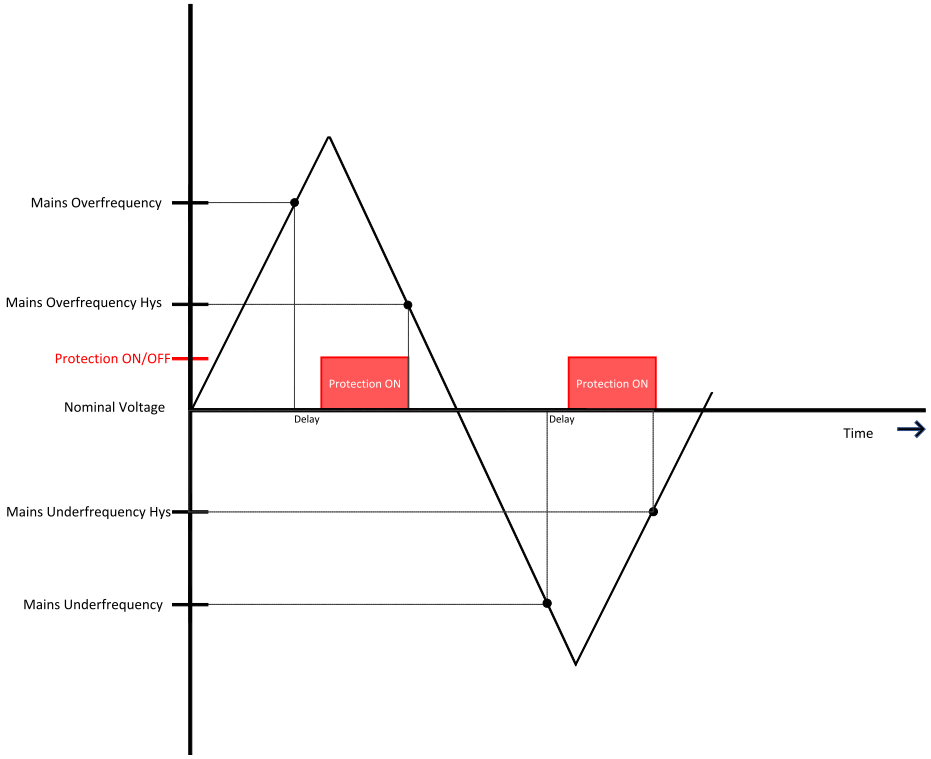


Image 8.21 Mains Overfrequency Hys

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Mains Underfrequency

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	50 .. **Mains Overfrequency (page 282)** [%]		
Default value	98.0 %	**Alternative config**	NO
Step	1.0 % of **Nominal Frequency (page 219)**		
Comm object	8312	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Threshold for Mains underfrequency.			

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Mains Underfrequency Hys

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	**Mains Underfrequency (page 284)** .. 100 [%]		
Default value	98.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	14135	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

Threshold defines the level of turning off Mains underfrequency protection.

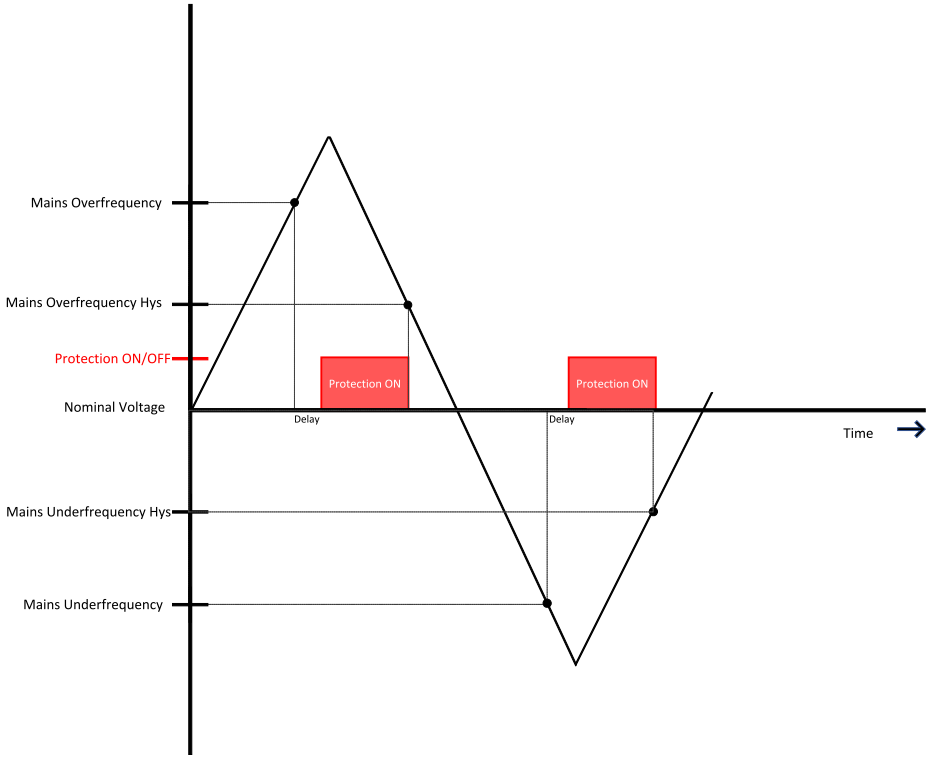


Image 8.22 Mains Underfrequency Hys

back to List of setpoints

Mains < > Frequency Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	0.5 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8311	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			
Delay for **Mains Underfrequency (page 284)** and **Mains Overfrequency (page 282)** protection.			

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Subgroup: AMF Settings

Return From Island

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	Manual / Auto [-]		
DefaultFixed value	Auto	**Alternative config**	NO
Step	[-]		
Comm object	9590	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
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 586)** 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	MCB is closed automatically after the timer **Mains Return Delay (page 274)** elapses.

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MCB Logic

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	Close On / Close Off [-]		
Default value	Close Off	**Alternative config**	NO
Step	[-]		

Comm object	8444	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

The setpoint influences the behavior of the output **MCB CLOSE/OPEN (PAGE 529)**.

Close On When the output **MCB CLOSE/OPEN (PAGE 529)** is active – MCB should be closed.

Close Off When the output **MCB CLOSE/OPEN (PAGE 529)** is active – MCB should be opened.

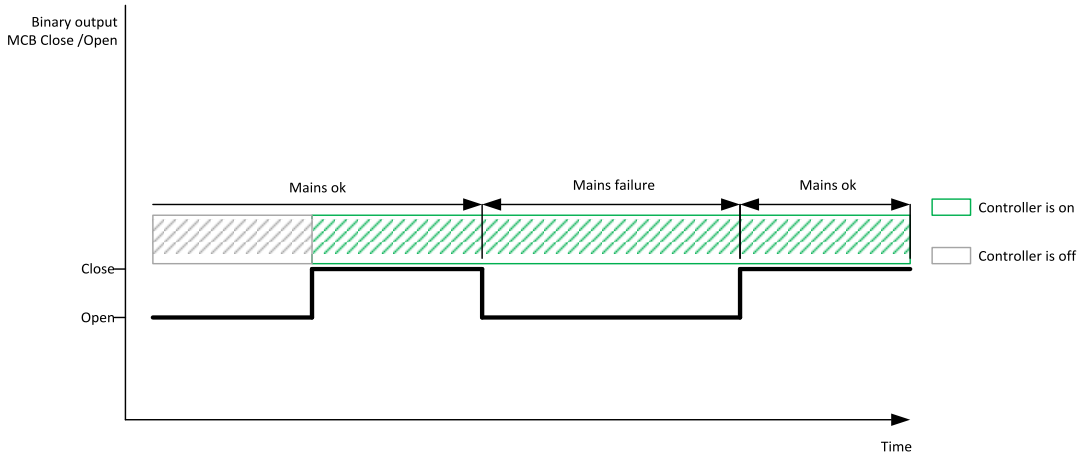


Image 8.23 MCB Logic 1

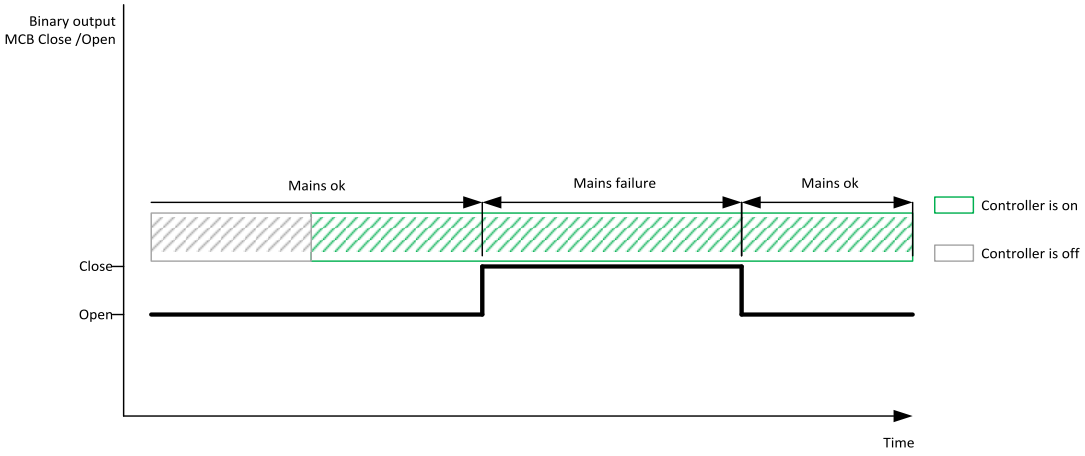


Image 8.24 MCB Logic 2

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MCB Opens On

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	Mains Fail / Gen Run [-]		
Default value	Gen Run	**Alternative config**	NO
Step	[-]		
Comm object	9850	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
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 275)** 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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Group: Dual operation

Subgroup: Dual Operation

Running Hours Max Difference

Setpoint group	Dual operation	**Related FW**	1.4.0
Range [units]	0,1 .. 1000,0 [h]		
Default value	10 h	**Alternative config**	NO
Step	0,1 h		
Comm object	16039	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)** and **COM2 Mode (page 361)**		
Description			

This setpoint adjusts the maximal allowed difference of dual operation running hours between Master and Slave. When difference is higher, swap of load between controllers is done.

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Running Hours Base

Setpoint group	Dual operation	**Related FW**	1.4.0
Range [units]	-10 000.0 .. 20 000.0 [h]		
Default value	0 h	**Alternative config**	NO
Step	0.1 h		
Comm object	16040	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)** and **COM2 Mode (page 361)**		
Description			

This setpoint modifies the running hours of controller used in dual operation function. Negative value is decrement from running hours, positive value is increment to running hours.

> **Example:**
> Master controller has 1000 h.
> Slave controller has 100 h.
> Adjust setpoint of slave controller to 900 h to have both controllers on "0" running hours in dual operation.

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Swap Gen-sets

Setpoint group	Dual operation	**Related FW**	1.4.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled h	**Alternative config**	NO
Step	[-]		
Comm object	16041	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)** and **COM2 Mode (page 361)**		
Description			

This setpoint enables or disables swapping of gen-sets on load in dual operation.

Enabled	Master and Slave are swapped based on their actual running hours.
Disabled	Master and Slave are not swapped. Controller with lower running hours starts and then runs until mains returns or until controller shutdown – then second controller starts.

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Master Error Protection

Setpoint group	Dual operation	**Related FW**	1.4.0
Range [units]	Monitoring / AL Indic / Wrn [-]		
Default value	AL Indic	**Alternative config**	NO
Step	[-]		
Comm object	16042	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)** and **COM2 Mode (page 361)**		
Description			
This setpoint adjust the type of protection for **Wrn Dual Operation Master Fail (page 575)** alarm.			

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Slave Error Protection

Setpoint group	Dual operation	**Related FW**	1.4.0
Range [units]	Monitoring / AL Indic / Wrn [-]		
Default value	AL Indic	**Alternative config**	NO
Step	[-]		
Comm object	16043	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)** and **COM2 Mode (page 361)**		
Description			
This setpoint adjust the type of protection for **Wrn Dual Operation Slave Fail (page 576)** alarm.			

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Transfer Delay

Setpoint group	Mains Settings	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8303	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 221)**		
Description			

Transition Delay between power sources.

> **IMPORTANT: This setpoint is used in 2 functions:**
>
> - **Delay after GCB opening to MCB closing**
> - **Delay used in dual operation 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 288)** 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 518)** output straight away (100 ms) after the **MCB FEEDBACK (PAGE 490)** input deactivates.

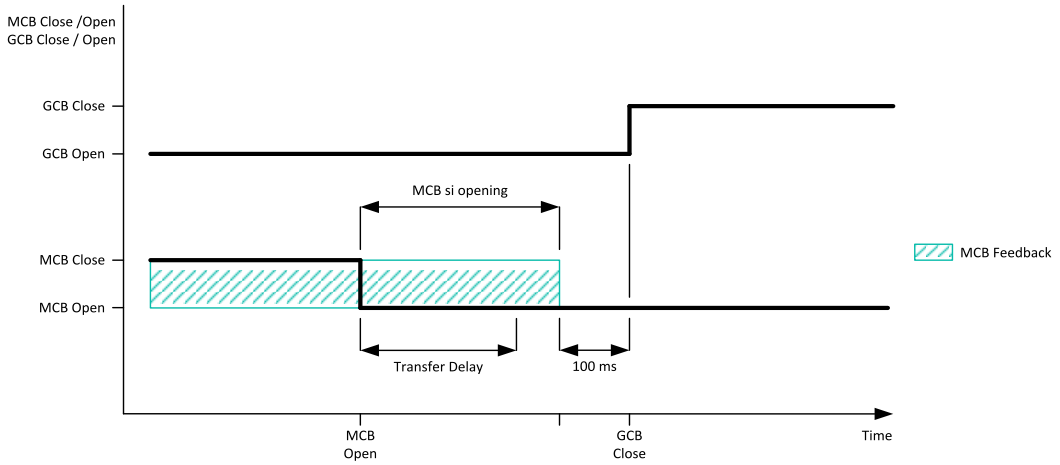


Image 8.25 Transfer Delay 1

If some delay between **MCB FEEDBACK (PAGE 490)** deactivation and closing of **GCB CLOSE/OPEN (PAGE 518)** output is required, then the Transfer Delay must be set to sum of "MCB opening" + "Delay" time.

Delay used in dual operation function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

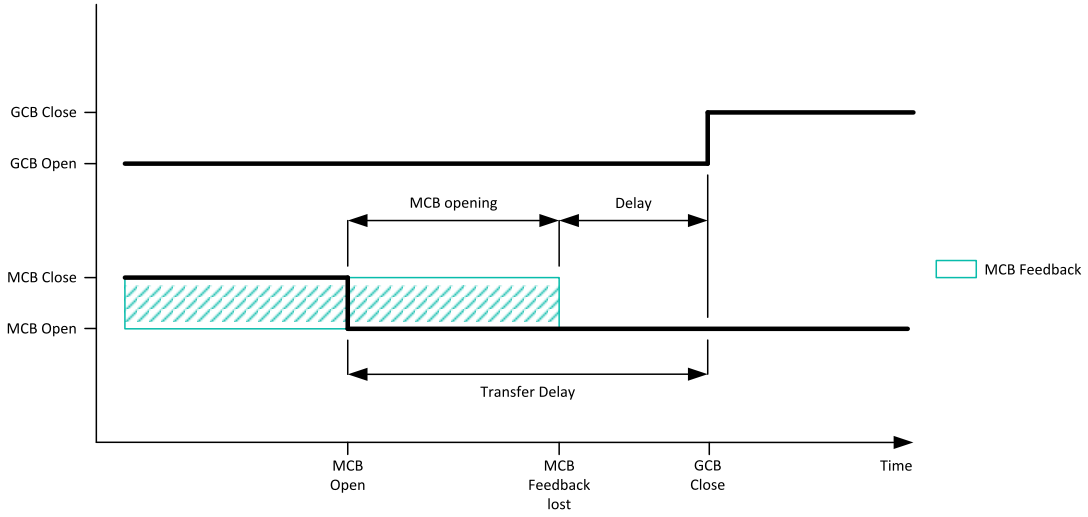


Image 8.26 Transfer Delay 2

This delay is also used in dual operation function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

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Group: Load Management

Subgroup: Load Shedding

Load Shedding Active

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	Disabled / Gen only [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11001	**Related applications**	AMF, MRS
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.
Gen only	The function is active when **Breaker State (page 449)** = IsOper. › 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 GCB were opened -> Gen-set started and GCB closed).

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Load Shedding Level

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	Load Reconnection Level .. 200 [%] of **Nominal Power (page 210)**		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	8884	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 293)** 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 294)** time.

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Load Shedding Delay

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8887	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 293)** is enabled		
Description			
This setpoint is used to proceeds the next Load shedding stage. When Gen-set load exceeds **Load Shedding Level (page 293)** for more than this delay's time, the controller proceeds to the next Load shedding stage – the next binary output Load Shedding Stage 1-2 is active.			

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Subgroup: Load Reconnection Settings

Load Reconnection Level

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	0 .. **Load Shedding Level (page 293)** [%]		
Default value	20 %	**Alternative config**	NO
Step	1 %		
Comm object	8890	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 293)** 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 295)**.			

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Load Reconnection Delay

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8893	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 293)** is enabled		
Description			
This setpoint is used to proceeds the lower Load shedding stage. When Gen-set load drops under **Load Reconnection Level (page 294)** for more than this delay time, the binary output for higher stage is opened. Automatic load reconnection works only when **Auto Load Reconnection (page 295)** = Enabled.			

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Auto Load Reconnection

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	9649	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 293)** is enabled		
Description			

Switch between manual and automatic reconnection of shedded load..

Disabled	Rising edge on binary input **MANUAL LOAD RECONNECTION (PAGE 489)** resets controller to the lower stage, but only if the load is under the **Load Reconnection Level (page 294)**. **Load Reconnection Delay (page 295)** is not taken into account in this case.
Enabled	Load reconnection is automatic depend on setpoints **Load Reconnection Level (page 294)** and **Load Reconnection Delay (page 295)**. Binary input **MANUAL LOAD RECONNECTION (PAGE 489)** has no function.

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Subgroup: Dummy Load

Dummy Load Active

Setpoint group	Load Management	**Related FW**	1.4.0
Range [units]	GenOnly / Disable [-]		
Default value	Disabled	**Alternative config**	YES
Step	[-]		
Comm object	11776	**Related applications**	AMF, MRS
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 Management	**Related FW**	1.4.0
Range [units]	0.0 .. **Dummy Load Off (page 297)** [%]		
Default value	20 %	**Alternative config**	YES
Step	0.1 %		
Comm object	11772	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 296)** 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 Management	**Related FW**	1.4.0
Range [units]	0.0 .. 600.0 [s]		
Default value	15 s	**Alternative config**	YES
Step	0.1 s		
Comm object	14506	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 296)** 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 Management	**Related FW**	1.4.0
Range [units]	**Dummy Load On (page 296)** .. 200.0 [%]		
Default value	50 %	**Alternative config**	YES
Step	0.1 %		
Comm object	11773	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 296)** 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 Management	**Related FW**	1.4.0
Range [units]	0.0 .. 600. [s]		
Default value	15 s	**Alternative config**	YES
Step	0.1 s		
Comm object	14508	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 296)** is not set to disabled		
Description			
This setpoint determines delay after which additional Dummy Load Stage will be deactivated.			

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Group: Analog Switches

Subgroup: Analog Switches 1

AIN Switch01 On

Setpoint group	Analog Switches	**Related FW**	1.4.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11407	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 503)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 503)** on. The value is measured from **AIN SWITCH 01 (PAGE 546)** analog input.



Image 8.27 General analog input 1 switch

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AIN Switch01 Off

Setpoint group	Analog Switches	**Related FW**	1.4.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11410	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 503)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 503)** off. The value is measured from **AIN SWITCH 01 (PAGE 546)** analog input.

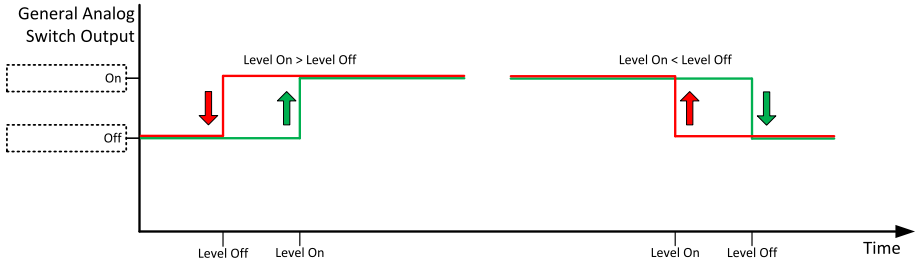


Image 8.28 General analog input 1 switch

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Subgroup: Analog Switches 2

AIN Switch02 On

Setpoint group	Analog Switches	**Related FW**	1.4.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11408	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 503)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH02 (PAGE 503)** on. The value is measured from **AIN SWITCH 02 (PAGE 546)** analog input.

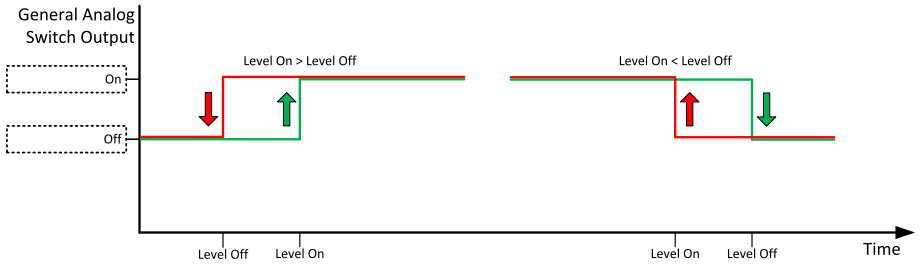


Image 8.29 General analog input 2 switch

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AIN Switch02 Off

Setpoint group	Analog Switches	**Related FW**	1.4.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11411	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 503)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH02 (PAGE 503)** off. The value is measured from **AIN SWITCH 02 (PAGE 546)** analog input.

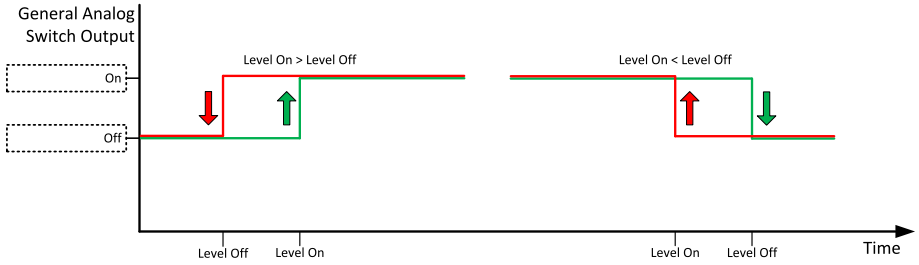


Image 8.30 General analog input 2 switch

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Group: Scheduler

Subgroup: Time & Date

Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	HH:MM:SS [-]		
Default value	00:00:00	**Alternative config**	NO
Step	[-]		
Comm object	24554	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Real time clock adjustment.

Note: *RTC has backup battery.*

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Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	DD/MM/YYYY [-]		
Default value	1.1.2015	**Alternative config**	NO
Step	[-]		
Comm object	24553	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Actual date adjustment.			

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Time Stamp Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	0 .. 240 [min]		
Default value	60 min	**Alternative config**	NO
Step	1 min		
Comm object	8979	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	- [AUTO / MANUAL / DISABLED]		
Default value	AUTO	**Alternative config**	NO
Step	[-]		
Comm object	20250	**Related applications**	AMF, MRS
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 304)**. 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 304)**.
DISABLED	**Time Mode (page 304)** is fixedly set to STD and the function does not perform any changes of RTC time.

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DST Period Rule

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	AUSTRALIA, CHILE, EUROPE, MEXICO, NEW ZEALAND, PARAGUAY, US/CANADA [-]		
Default value	AUSTRALIA	**Alternative config**	NO
Step	[-]		
Comm object	20251	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if **DST Switching Mode (page 303)** = 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 Mode

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	- [STD / DST]		
Default value	STD	**Alternative config**	NO
Step	[-]		
Comm object	20249	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if **DST Switching Mode (page 303)** = MANUAL		
Description			

In manual **DST Switching Mode (page 303)** this input is used to adjust the actual time mode. In any other **DST Switching Mode (page 303)** this input is not taken into account.

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Subgroup: Timer 1

Timer 1 Function

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Disable / Manual On / No Func / TEST / Test OnLd / MFail Blk / Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	Disable	**Alternative config**	NO
Step	[-]		
Comm object	15358	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		

Description

It is possible to choose from following timer functions. Binary output **EXERCISE TIMER 1 (PAGE 514)** 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 305)** is configured for OFF mode and **Timer 2 Function (page 313)** 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 494)** 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 495)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 496)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 492)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 488)** binary input.

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Timer 1 Setup

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10969	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 1 are:

- **Timer 1 Function (page 305)**
- **Timer 1 Repetition (page 307)**
- **Timer 1 First Occur. Date (page 306)**
- **Timer 1 First Occur. Time (page 307)**
- **Timer 1 Duration (page 307)**
- **Timer 1 Repeated (page 308)**
- **Timer 1 Repeat Day (page 308)**
- **Timer 1 Day (page 309)**
- **Timer 1 Repeated Day In Week (page 309)**
- **Timer 1 Repeat Day In Month (page 309)**
- **Timer 1 Repeat Week In Month (page 310)**
- **Timer 1 Refresh Period (page 311)**
- **Timer 1 Weekends (page 312)**

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Timer 1 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			

Date of first occurrence of **Timer 1 Function (page 305)**.

back to List of setpoints

Timer 1 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			
Time of first occurrence of **Timer 1 Function (page 305)**.			

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Timer 1 Duration

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			
Timer 1 Function (page 305) duration time.			

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Timer 1 Repetition

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			

Defines repetition of **Timer 1 Function (page 305)**.

Off	**Timer 1 Function (page 305)** will not be activated.
Once	**Timer 1 Function (page 305)** will be activated only one time.
Repeated	**Timer 1 Function (page 305)** will be repeatedly activated.

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Timer 1 Repeated

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			

Repeated interval of **Timer 1 Function (page 305)**.

Daily	**Timer 1 Function (page 305)** is repeated every day.
Weekly	**Timer 1 Function (page 305)** is repeated every week in chosen days.
Monthly	**Timer 1 Function (page 305)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 1 Function (page 305)** is repeated in adjusted period.

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Timer 1 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 1 Function (page 305)**.

Repeated Day	Chose one day in month when **Timer 1 Function (page 305)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 1 Function (page 305)** will be activated.

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Timer 1 Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
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**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
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**	1.4.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			
Use this setpoint to chose the day in month when the **Timer 1 Function (page 305)** will be activated.			

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Timer 1 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			
This setpoint adjust the week of month in which the **Timer 1 Function (page 305)** will be activated.			

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Timer 1 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			

Refresh period of **Timer 1 Function (page 305)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 1 Repeated (page 308)**.

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 305)**, the **Timer 1 Function (page 305)** 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 305)**, the **Timer 1 Function (page 305)** will be activated in selected days adjusted by **Timer 1 Day (page 309)**.
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 305)**, the **Timer 1 Function (page 305)** will be activated in selected day of month adjusted by **Timer 1 Repeat Day In Month (page 309)** or in selected days of week of month adjusted by **Timer 1 Day (page 309)** and **Timer 1 Repeat Week In Month (page 310)**.
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 305)**, the **Timer 1 Function (page 305)** will be activated.

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Timer 1 Weekends

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 305)**		
Description			

Behavior of **Timer 1 Function (page 305)** on weekends.

Including	**Timer 1 Function (page 305)** counter is running on the weekends and **Timer 1 Function (page 305)** can be active.
Skip	**Timer 1 Function (page 305)** counter is running on the weekends but **Timer 1 Function (page 305)** isn't active.
Postpone	**Timer 1 Function (page 305)** counter isn't running on the weekends and **Timer 1 Function (page 305)** 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**	1.4.0
Range [units]	Disable / Manual On / No Func / TEST / Test OnLd / MFail Blk / Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	No Func	**Alternative config**	NO
Step	[-]		
Comm object	15359	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Note: *It is possible to choose from following Timer functions. Binary output* ***EXERCISE TIMER 2 (PAGE 514)*** *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 305)** is configured for OFF mode and **Timer 2 Function (page 313)** 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 494)** 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 495)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 496)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 492)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 488)** binary input.

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Timer 2 Setup

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10970	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 2 are:

- **Timer 2 Function (page 313)**
- **Timer 2 Repetition (page 315)**
- **Timer 2 First Occur. Date (page 314)**
- **Timer 2 First Occur. Time (page 315)**
- **Timer 2 Duration (page 315)**
- **Timer 2 Repeated (page 316)**
- **Timer 2 Repeat Day (page 316)**
- **Timer 2 Day (page 317)**
- **Timer 2 Repeated Day In Week (page 317)**
- **Timer 2 Repeat Day In Month (page 317)**
- **Timer 2 Repeat Week In Month (page 318)**
- **Timer 2 Refresh Period (page 319)**
- **Timer 2 Weekends (page 320)**

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Timer 2 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			

Date of first occurrence of**Timer 2 Function (page 313)**.

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Timer 2 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			
Time of first occurrence of **Timer 2 Function (page 313)**.			

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Timer 2 Duration

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			
Timer 2 Function (page 313) duration time.			

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Timer 2 Repetition

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			

Defines repetition of **Timer 2 Function (page 313)**.

Off	**Timer 2 Function (page 313)** will not be activated.
Once	**Timer 2 Function (page 313)** will be activated only one time.
Repeated	**Timer 2 Function (page 313)** will be repeatedly activated.

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Timer 2 Repeated

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			

Repeated interval of **Timer 2 Function (page 313)**.

Daily	**Timer 2 Function (page 313)** is repeated every day.
Weekly	**Timer 2 Function (page 313)** is repeated every week in chosen days.
Monthly	**Timer 2 Function (page 313)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 2 Function (page 313)** is repeated in adjusted period.

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Timer 2 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 2 Function (page 313)**.

Repeated Day	Chose one day in month when **Timer 2 Function (page 313)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 2 Function (page 313)** will be activated.

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Timer 2 Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			
Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button.			

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Timer 2 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
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**	1.4.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			
Use this setpoint to chose the day in month when the **Timer 2 Function (page 313)** will be activated.			

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Timer 2 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			
This setpoint adjust the week of month in which the **Timer 2 Function (page 313)** will be activated.			

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Timer 2 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			

Refresh period of **Timer 2 Function (page 313)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 2 Repeated (page 316)**.

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 313)**, the **Timer 2 Function (page 313)** 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 313)**, the **Timer 2 Function (page 313)** will be activated in selected days adjusted by **Timer 2 Day (page 317)**.
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 313)**, the **Timer 2 Function (page 313)** will be activated in selected day of month adjusted by **Timer 2 Repeat Day In Month (page 317)** or in selected days of week of month adjusted by **Timer 2 Day (page 317)** and **Timer 2 Repeat Week In Month (page 318)**.
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 313)**, the **Timer 2 Function (page 313)** will be activated.

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Timer 2 Weekends

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 313)**		
Description			

Behavior of **Timer 2 Function (page 313)** on weekends.

Including	**Timer 2 Function (page 313)** counter is running on the weekends and **Timer 2 Function (page 313)** can be active.
Skip	**Timer 2 Function (page 313)** counter is running on the weekends but **Timer 2 Function (page 313)** isn't active.
Postpone	**Timer 2 Function (page 313)** counter isn't running on the weekends and **Timer 2 Function (page 313)** 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**	1.4.0
Range [units]	Disable / Manual On / No Func / TEST / Test OnLd / MFail Blk / Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	No Func	**Alternative config**	NO
Step	[-]		
Comm object	15360	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		

Description

It is possible to choose from following Timer functions. Binary output **EXERCISE TIMER 3 (PAGE 514)** 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 321)** is configured for OFF mode and **Timer 3 Function (page 321)** 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 494)** 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 495)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 496)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 492)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 488)** binary input.

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Timer 3 Setup

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10971	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 3 are:

- **Timer 3 Function (page 321)**
- **Timer 3 Repetition (page 323)**
- **Timer 3 First Occur. Date (page 322)**
- **Timer 3 Duration (page 323)**
- **Timer 3 Repeated (page 324)**
- **Timer 3 Repeat Day (page 324)**
- **Timer 3 Day (page 325)**
- **Timer 3 Repeated Day In Week (page 325)**
- **Timer 3 Repeat Day In Month (page 325)**
- **Timer 3 Repeat Week In Month (page 326)**
- **Timer 3 Refresh Period (page 327)**
- **Timer 3 Weekends (page 328)**

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Timer 3 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			

Date of first occurrence of**Timer 3 Function (page 321)**.

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Timer 3 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			
Time of first occurrence of **Timer 3 Function (page 321)**.			

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Timer 3 Duration

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			
Timer 3 Function (page 321) duration time.			

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Timer 3 Repetition

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			

Defines repetition of **Timer 3 Function (page 321)**.

Off	**Timer 3 Function (page 321)** will not be activated.
Once	**Timer 3 Function (page 321)** will be activated only one time.
Repeated	**Timer 3 Function (page 321)** will be repeatedly activated.

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Timer 3 Repeated

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			

Repeated interval of **Timer 3 Function (page 321)**.

Daily	**Timer 3 Function (page 321)** is repeated every day.
Weekly	**Timer 3 Function (page 321)** is repeated every week in chosen days.
Monthly	**Timer 3 Function (page 321)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 3 Function (page 321)** is repeated in adjusted period.

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Timer 3 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 3 Function (page 321)**.

Repeated Day	Chose one day in month when **Timer 3 Function (page 321)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 3 Function (page 321)** will be activated.

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Timer 3 Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
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**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
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**	1.4.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			
Use this setpoint to chose the day in month when the **Timer 3 Function (page 321)** will be activated.			

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Timer 3 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			
This setpoint adjust the week of month in which the **Timer 3 Function (page 321)** will be activated.			

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Timer 3 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			

Refresh period of **Timer 3 Function (page 321)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 3 Repeated (page 324)**.

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 321)**, the **Timer 3 Function (page 321)** 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 321)**, the **Timer 3 Function (page 321)** will be activated in selected days adjusted by **Timer 3 Day (page 325)**.
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 321)**, the **Timer 3 Function (page 321)** will be activated in selected day of month adjusted by **Timer 3 Repeat Day In Month (page 325)** or in selected days of week of month adjusted by **Timer 3 Day (page 325)** and **Timer 3 Repeat Week In Month (page 326)**.
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 321)**, the **Timer 3 Function (page 321)** will be activated.

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Timer 3 Weekends

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 321)**		
Description			

Behavior of **Timer 3 Function (page 321)** on weekends.

Including	**Timer 3 Function (page 321)** counter is running on the weekends and **Timer 3 Function (page 321)** can be active.
Skip	**Timer 3 Function (page 321)** counter is running on the weekends but **Timer 3 Function (page 321)** isn't active.
Postpone	**Timer 3 Function (page 321)** counter isn't running on the weekends and **Timer 3 Function (page 321)** 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**	1.4.0
Range [units]	Disable / Manual On / No Func / TEST / Test OnLd / MFail Blk / Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	No Func	**Alternative config**	NO
Step	[-]		
Comm object	15361	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		

Description

It is possible to choose from following Timer functions. Binary output **EXERCISE TIMER 4 (PAGE 514)** 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 329)** is configured for OFF mode and **Timer 4 Function (page 329)** 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 494)** 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 495)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 496)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 492)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 488)** binary input.

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Timer 4 Setup

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10973	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 4 are:

- **Timer 4 Function (page 329)**
- **Timer 4 Repetition (page 331)**
- **Timer 4 First Occur. Date (page 330)**
- **Timer 4 First Occur. Time (page 331)**
- **Timer 4 Duration (page 331)**
- **Timer 4 Repeated (page 332)**
- **Timer 4 Repeat Day (page 332)**
- **Timer 4 Day (page 333)**
- **Timer 4 Repeated Day In Week (page 333)**
- **Timer 4 Repeat Day In Month (page 333)**
- **Timer 4 Repeat Week In Month (page 334)**
- **Timer 4 Refresh Period (page 335)**
- **Timer 4 Weekends (page 336)**

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Timer 4 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			

Date of first occurrence of**Timer 4 Function (page 329)**.

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Timer 4 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			
Time of first occurrence of **Timer 4 Function (page 329)**.			

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Timer 4 Duration

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			
Timer 4 Function (page 329) duration time.			

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Timer 4 Repetition

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			

Defines repetition of **Timer 4 Function (page 329)**.

Off	**Timer 4 Function (page 329)** will not be activated.
Once	**Timer 4 Function (page 329)** will be activated only one time.
Repeated	**Timer 4 Function (page 329)** will be repeatedly activated.

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Timer 4 Repeated

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			

Repeated interval of **Timer 4 Function (page 329)**.

Daily	**Timer 4 Function (page 329)** is repeated every day.
Weekly	**Timer 4 Function (page 329)** is repeated every week in chosen days.
Monthly	**Timer 4 Function (page 329)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 4 Function (page 329)** is repeated in adjusted period.

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Timer 4 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 4 Function (page 329)**.

Repeated Day	Chose one day in month when **Timer 4 Function (page 329)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 4 Function (page 329)** will be activated.

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Timer 4 Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
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**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
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**	1.4.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			
Use this setpoint to chose the day in month when the **Timer 4 Function (page 329)** will be activated.			

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Timer 4 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			
This setpoint adjust the week of month in which the **Timer 4 Function (page 329)** will be activated.			

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Timer 4 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			

Refresh period of **Timer 4 Function (page 329)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 4 Repeated (page 332)**.

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 329)**, the **Timer 4 Function (page 329)** 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 329)**, the **Timer 4 Function (page 329)** will be activated in selected days adjusted by **Timer 4 Day (page 333)**.
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 329)**, the **Timer 4 Function (page 329)** will be activated in selected day of month adjusted by **Timer 4 Repeat Day In Month (page 333)** or in selected days of week of month adjusted by **Timer 4 Day (page 333)** and **Timer 4 Repeat Week In Month (page 334)**.
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 329)**, the **Timer 4 Function (page 329)** will be activated.

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Timer 4 Weekends

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 329)**		
Description			

Behavior of **Timer 4 Function (page 329)** on weekends.

Including	**Timer 4 Function (page 329)** counter is running on the weekends and **Timer 4 Function (page 329)** can be active.
Skip	**Timer 4 Function (page 329)** counter is running on the weekends but **Timer 4 Function (page 329)** isn't active.
Postpone	**Timer 4 Function (page 329)** counter isn't running on the weekends and **Timer 4 Function (page 329)** 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**	1.4.0
Range [units]	Disable / Manual On / No Func / TEST / Test OnLd / MFail Blk/ Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	Disable	**Alternative config**	YES
Step	[-]		
Comm object	15362	**Related applications**	AMF, MRS
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 338)**.

Once the Timer is activated the LBO **EXERCISE TIMER 5 (PAGE 515)** 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 494)** 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 495)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 496)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 492)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 488)** binary input.

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Timer 5 Setup

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	N/A [-]		
Default value	N/A [-]	**Alternative config**	NO
Step	N/A [-]		
Comm object	10974	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if **Timer 5 Function (page 337)** != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 5. See **Exercise timers (page 139)** for step by step manual.			

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Timer 5 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			
Date of first occurrence of **Timer 5 Function (page 337)**.			

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Timer 5 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			
Time of first occurrence of **Timer 5 Function (page 337)**.			

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Timer 5 Duration

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			
Timer 5 Function (page 337) duration time.			

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Timer 5 Repetition

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			

Defines repetition of **Timer 5 Function (page 337)**.

Off	**Timer 5 Function (page 337)** will not be activated.
Once	**Timer 5 Function (page 337)** will be activated only one time.
Repeated	**Timer 5 Function (page 337)** will be repeatedly activated.

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Timer 5 Repeated

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			

Repeated interval of **Timer 5 Function (page 337)**.

Daily	**Timer 5 Function (page 337)** is repeated every day.
Weekly	**Timer 5 Function (page 337)** is repeated every week in chosen days.
Monthly	**Timer 5 Function (page 337)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 5 Function (page 337)** is repeated in adjusted period.

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Timer 5 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 5 Function (page 337)**.

Repeated Day	Chose one day in month when **Timer 5 Function (page 337)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 5 Function (page 337)** will be activated.

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Timer 5 Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
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**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
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**	1.4.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			
Use this setpoint to chose the day in month when the **Timer 5 Function (page 337)** will be activated.			

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Timer 5 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			
This setpoint adjust the week of month in which the **Timer 5 Function (page 337)** will be activated.			

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Timer 5 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			

Refresh period of **Timer 5 Function (page 337)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 4 Repeated (page 332)**.

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 337)**, the **Timer 5 Function (page 337)** 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 337)**, the **Timer 5 Function (page 337)** will be activated in selected days adjusted by **Timer 5 Day (page 341)**.
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 337)**, the **Timer 5 Function (page 337)** will be activated in selected day of month adjusted by **Timer 5 Repeat Day In Month (page 341)** or in selected days of week of month adjusted by **Timer 5 Day (page 341)** and **Timer 5 Repeat Week In Month (page 342)**.
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 337)**, the **Timer 5 Function (page 337)** will be activated.

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Timer 5 Weekends

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 337)**		
Description			

Behavior of **Timer 5 Function (page 337)** on weekends.

Including	**Timer 5 Function (page 337)** counter is running on the weekends and **Timer 5 Function (page 337)** can be active.
Skip	**Timer 5 Function (page 337)** counter is running on the weekends but **Timer 5 Function (page 337)** isn't active.
Postpone	**Timer 5 Function (page 337)** counter isn't running on the weekends and **Timer 5 Function (page 337)** 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**	1.4.0
Range [units]	Disable / Manual On / No Func / TEST / Test OnLd / MFail Blk/ Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	Disable	**Alternative config**	YES
Step	[-]		
Comm object	15363	**Related applications**	AMF, MRS
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 346)**.

Once the Timer is activated the LBO **EXERCISE TIMER 6 (PAGE 515)** 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 494)** 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 495)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 496)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 492)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 488)** binary input.

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Timer 6 Setup

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	N/A [-]		
Default value	N/A [-]	**Alternative config**	NO
Step	N/A [-]		
Comm object	10975	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if **Timer 6 Function (page 345)** != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 6. See **Exercise timers (page 139)** for step by step manual.			

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Timer 6 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			
Date of first occurrence of**Timer 6 Function (page 345)**.			

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Timer 6 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			
Time of first occurrence of **Timer 6 Function (page 345)**.			

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Timer 6 Duration

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			
Timer 6 Function (page 345) duration time.			

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Timer 6 Repetition

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			

Defines repetition of **Timer 6 Function (page 345)**.

Off	**Timer 6 Function (page 345)** will not be activated.
Once	**Timer 6 Function (page 345)** will be activated only one time.
Repeated	**Timer 6 Function (page 345)** will be repeatedly activated.

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Timer 6 Repeated

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			

Repeated interval of **Timer 6 Function (page 345)**.

Daily	**Timer 6 Function (page 345)** is repeated every day.
Weekly	**Timer 6 Function (page 345)** is repeated every week in chosen days.
Monthly	**Timer 6 Function (page 345)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 6 Function (page 345)** is repeated in adjusted period.

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Timer 6 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 6 Function (page 345)**.

Repeated Day	Chose one day in month when **Timer 6 Function (page 345)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 6 Function (page 345)** will be activated.

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Timer 6 Day

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
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**	1.4.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
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**	1.4.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			
Use this setpoint to chose the day in month when the **Timer 6 Function (page 345)** will be activated.			

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Timer 6 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			
This setpoint adjust the week of month in which the **Timer 6 Function (page 345)** will be activated.			

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Timer 6 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			

Refresh period of **Timer 6 Function (page 345)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 6 Repeated (page 348)**.

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 345)**, the **Timer 6 Function (page 345)** 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 345)**, the **Timer 6 Function (page 345)** will be activated in selected days adjusted by **Timer 6 Day (page 349)**.
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 345)**, the **Timer 6 Function (page 345)** will be activated in selected day of month adjusted by **Timer 6 Repeat Day In Month (page 349)** or in selected days of week of month adjusted by **Timer 6 Day (page 349)** and **Timer 6 Repeat Week In Month (page 350)**.
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 345)**, the **Timer 6 Function (page 345)** will be activated.

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Timer 6 Weekends

Setpoint group	Scheduler	**Related FW**	1.4.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 345)**		
Description			

Behavior of **Timer 6 Function (page 345)** on weekends.

Including	**Timer 6 Function (page 345)** counter is running on the weekends and **Timer 6 Function (page 345)** can be active.
Skip	**Timer 6 Function (page 345)** counter is running on the weekends but **Timer 6 Function (page 345)** isn't active.
Postpone	**Timer 6 Function (page 345)** counter isn't running on the weekends and **Timer 6 Function (page 345)** 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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Group: Geo-Fencing

Subgroup: Geo Fencing

Geo-Fencing

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	Disabled / Enabled / LBI Enable [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11681	**Related applications**	AMF, MRS
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 355)** and **Fence 2 Protection (page 357)** are disabled.
Enabled	**Fence 1 Protection (page 355)** and **Fence 2 Protection (page 357)** are enabled.
LBI Enable	**Fence 1 Protection (page 355)** and **Fence 2 Protection (page 357)** are enabled only when logical binary input .**GEO-FENCING ENABLE (PAGE 488)** is active.

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Subgroup: Position

Home Latitude

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	-90,0000..90,0000 [°]		
Default value	0,0000 °	**Alternative config**	NO
Step	0,0001 °		
Comm object	14606	**Related applications**	AMF, MRS
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 354)** are used for counting **Fence 1 Radius (page 356)** and **Fence 2 Radius (page 358)**.*

Note: *This value can be also obtained automatically via logical binary input **GEO HOME POSITION (PAGE 487)**. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.*

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Home Longitude

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	-180,0000..180,0000 [°]		
Default value	0,0000 °	**Alternative config**	NO
Step	0,0001 °		
Comm object	14607	**Related applications**	AMF, MRS
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 353)*** *are used for counting* ***Fence 1 Radius (page 356)*** *and* ***Fence 2 Radius (page 358)****.*

Note: *This value can be also obtained automatically via logical binary input* ***GEO HOME POSITION (PAGE 487)****. 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**	1.4.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	**Alternative config**	NO
Step	[-]		
Comm object	14610	**Related applications**	AMF, MRS
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 356)**. Delay for protection is adjusted by setpoint **Fence 1 Delay (page 356)**.

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 356)**.
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 356)**.
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 356)**.
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 356)**.

Note: *Protection is activated also when GPS signal is lost for **Fence 1 Delay (page 356)**.*

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Fence 1 Radius

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	**Alternative config**	NO
Step	0,1 km		
Comm object	11677	**Related applications**	AMF, MRS
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 355)** is activated after **Fence 1 Delay (page 356)**. ***Note:*** *The center of this circle area is defined by "Home" position – setpoints* ***Home Longitude (page 354)*** *and* ***Home Latitude (page 353)****.*			

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Fence 1 Delay

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	0..3600 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	11682	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for **Fence 1 Protection (page 355)**.			

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Subgroup: Fence 2

Fence 2 Protection

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	**Alternative config**	NO
Step	[-]		
Comm object	14611	**Related applications**	AMF, MRS
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 358)**. Delay for protection is adjusted by setpoint **Fence 2 Delay (page 358)**.

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 358)**.
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 358)**.
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 358)**.
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 358)**.

Note: *Protection is activated also when GPS signal is lost for **Fence 2 Delay (page 358)**.*

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Fence 2 Radius

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	**Alternative config**	NO
Step	0,1 km		
Comm object	14608	**Related applications**	AMF, MRS
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 357)** is activated after **Fence 2 Delay (page 358)**. ***Note:*** *The center of this circle area is defined by "Home" position - setpoints* ***Home Longitude (page 354)*** *and* ***Home Latitude (page 353)****.*			

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Fence 2 Delay

Setpoint group	Geo-Fencing	**Related FW**	1.4.0
Range [units]	0..3600 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	14609	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for **Fence 2 Protection (page 357)**.			

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Group: Plug-In Modules

Subgroup: Slot A

Slot A

Setpoint group	Plug-In Modules	**Related FW**	1.4.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24280	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		

Description
This setpoint enable or disable module in slot A.

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Group: CM-RS232-485

Subgroup: COM1 Setting

COM1 Mode

Setpoint group	CM-RS232-485	**Related FW**	1.4.0
Range [units]	Direct / MODBUS / DualSlave / Dual Master [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24522	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Communication protocol switch for the COM1 channel.

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.
DualSlave	Dual operation protocol – slave function
DualMaster	Dual operation protocol – master function

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COM1 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.4.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24341	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)**		
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**	1.4.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24477	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 359)**		
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**	1.4.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	**Alternative config**	NO
Step	[-]		
Comm object	23867	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Direct / MODBUS / DualSlave / Dual Master [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24451	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Communication protocol switch for the COM2 channel.

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.
DualSlave	Dual operation protocol – slave function
DualMaster	Dual operation protocol – master function

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COM2 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.4.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24340	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM2 Mode (page 361)**		
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**	1.4.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24420	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM2 Mode (page 361)**		
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**	1.4.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	**Alternative config**	NO
Step	[-]		
Comm object	23866	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	24315	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	2G / 3G / 4G / Automatic [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	24132	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	internet	**Alternative config**	NO
Step	[-]		
Comm object	24363	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	[-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	23978	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		

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**	1.4.0
Range [units]	[-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	23977	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	[-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	23976	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		

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**	1.4.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	23988	**Related applications**	AMF, MRS
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 363)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS IP Address 1 (page 367)** and **DNS IP Address 2 (page 368)** 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**	1.4.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	24314	**Related applications**	AMF, MRS
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 367)** 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 367)** 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**	1.4.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	23986	**Related applications**	AMF, MRS
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 367)** 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 367)** 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**	1.4.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	23959	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Disabled/ Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	23968	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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 389)**.

> **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**	1.4.0
Range [units]	[-]		
Default value	global.airgate.link	**Alternative config**	NO
Step	[-]		
Comm object	24364	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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.

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Airgate Port

Setpoint group	CM-4G-GPS	**Related FW**	1.4.0
Range [units]	1 .. 65535 [-]		
Default value	54440	**Alternative config**	NO
Step	1		
Comm object	24091	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	23961	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	23960	**Related applications**	AMF, MRS
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-Ethernet CM-4G-GPS	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	24098	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	global.airgate.link:9925	**Alternative config**	NO
Step	[-]		
Comm object	23962	**Related applications**	AMF, MRS
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 "global.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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	23884	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	23883	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	23882	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	**Alternative config**	NO
Step	[-]		
Comm object	23965	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	AMF, MRS
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.

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	AMF, MRS
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.			

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Email Address 3

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	AMF, MRS
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.			

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Email Address 4

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	AMF, MRS
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.			

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Subgroup: Message Settings

E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.4.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	AMF, MRS
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.			

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Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	AMF, MRS
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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Telephone Number 1

Setpoint group	CM-4G-GPS	**Related FW**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24296	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24295	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24143	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24142	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	23975	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	23964	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	[-]		
Default value	pool.ntp.org	**Alternative config**	NO
Step	[-]		
Comm object	23963	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	23974	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	AMF, MRS
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.*

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Group: CM-Ethernet

Subgroup: TCP/IP Settings

IP Address Mode

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	MANUAL / AUTOMATIC / DISABLED [-]		
Default value	AUTOMATIC	**Alternative config**	NO
Step	[-]		
Comm object	23939	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 15 characters [-]		
Default value	192.168.1.254	**Alternative config**	NO
Step	[-]		
Comm object	23950	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 384)**		
Description			

The setpoint is used to set the address when you are in static mode .

If **IP Address Mode (page 384)** 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 384)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.

If **IP Address Mode (page 384)** 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**	1.4.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	**Alternative config**	NO
Step	[-]		
Comm object	23949	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 384)**		
Description			

The setpoint is used to select the method how the Subnet Mask is adjusted.

If **IP Address Mode (page 384)** 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 384)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 384)** is DISABLED Ethernet terminal is disabled.

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Gateway IP

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	**Alternative config**	NO
Step	[-]		
Comm object	23948	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 384)**		
Description			

The setpoint is used to select the method how the Gateway IP is adjusted.

If **IP Address Mode (page 384)** 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 384)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 384)** 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**	1.4.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	23921	**Related applications**	AMF, MRS
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 384)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS IP Address 1 (page 387)** and **DNS IP Address 2 (page 387)** 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**	1.4.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	23947	**Related applications**	AMF, MRS
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 384)** 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 384)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server. If **IP Address Mode (page 384)** is DISABLED Ethernet terminal is disabled.			

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DNS IP Address 2

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	23946	**Related applications**	AMF, MRS
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 384)** 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 384)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server. If **IP Address Mode (page 384)** is DISABLED Ethernet terminal is disabled.			

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IP Firewall

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	23920	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	23935	**Related applications**	AMF, MRS
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 389)**. Also the standard TCP/IP is enabled.

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AirGate Address

Setpoint group	CM-4G-GPS; CM-Ethernet	**Related FW**	1.4.0
Range [units]	[-]		
Default value	global.airgate.link	**Alternative config**	NO
Step	[-]		
Comm object	24364	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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.			

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AirGate Port

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Alternative config**	NO
Step	1		
Comm object	23919	**Related applications**	AMF, MRS
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

Direct Connection

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	23917	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	23918	**Related applications**	AMF, MRS
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-Ethernet CM-4G-GPS	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	24098	**Related applications**	AMF, MRS
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: MODBUS Settings

MODBUS Server

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	DISABLED / ENABLED [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	23937	**Related applications**	AMF, MRS
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	Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	24097	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	23936	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable SNMP Agent.			

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SNMP Trap Format

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	v1Trap / v2Notif / v2Inform [-]		
Default value	v1Trap	**Alternative config**	NO
Step	[-]		
Comm object	23922	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24095	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

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SNMP Traps IP Address 2

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24094	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	public	**Alternative config**	NO
Step	[-]		
Comm object	23941	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **SNMP Agent (page 392)**		
Description			
SNMP Community String only for reading.			

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SNMP WR Community String

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	0..31 characters [-]		
Default value	private	**Alternative config**	NO
Step	[-]		
Comm object	23940	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **SNMP Agent (page 392)**		
Description			
SNMP Community String for writing and reading.			

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Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	global.airgate.link:9925	**Alternative config**	NO
Step	[-]		
Comm object	23942	**Related applications**	AMF, MRS
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 "global.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-Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	23881	**Related applications**	AMF, MRS
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	CM-Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	23880	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

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SMTP User Password

Setpoint group	CM-Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	23879	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	**Alternative config**	NO
Step	[-]		
Comm object	23938	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
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**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	AMF, MRS
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.

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	AMF, MRS
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.			

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Email Address 3

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	AMF, MRS
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.			

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Email Address 4

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	1.4.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	AMF, MRS
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.			

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Subgroup: Messages Settings

BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	AMF, MRS
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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E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.4.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	AMF, MRS
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.			

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Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	AMF, MRS
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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Wrn Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.4.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	23934	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	[-]		
Default value	pool.ntp.org	**Alternative config**	NO
Step	[-]		
Comm object	23933	**Related applications**	AMF, MRS
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**	1.4.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	AMF, MRS
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.*

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Group: EM-BIO8-EFCP

Subgroup: EFCP Settings

Earth Fault Current Protection

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.4.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	11631	**Related applications**	AMF, MRS
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 403)**, **Earth Fault CT Ratio (page 403)**, **Earth Fault Delay (page 403)** and **Earth Fault Sd (page 404)**.

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Earth Fault Delay

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.4.0
Range [units]	0.03 .. 5.00 [s]		
Default value	0.10 s	**Alternative config**	NO
Step	0.01 s		
Comm object	11633	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for Earth Fault Current protection.			

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Earth Fault CT Input Range

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.4.0
Range [units]	1 [A] / 5 [A]		
Default value	5 A	**Alternative config**	NO
Step	[-]		
Comm object	14340	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
There are 2 physical inputs for **Earth Fault Current Protection (page 402)**. Value of this setpoint has to be set on value of physical input which is presently in use.			

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Earth Fault CT Ratio

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.4.0
Range [units]	1 .. 2000 [1/(1or5) A]		
Default value	500 1/(1or5)A	**Alternative config**	NO
Step	1 A/ 1A; 1 A/5 A		
Comm object	14339	**Related applications**	AMF, MRS
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 403)*** *which have to be set before this setpoint.*			

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Earth Fault Sd

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.4.0
Range [units]	0.03 .. 200.00 [A]		
Default value	0.30 A	**Alternative config**	NO
Step	0.01 [A]		
Comm object	11632	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Limit value for Earth Fault Current protection.			

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Group: Alternate Config

Subgroup: Configuration 1

Nominal RPM 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	100 .. 4000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	9915	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM revolutions per minute). ***Note:*** *This value is used when any other alternate configuration is not active.*			

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Nominal Frequency 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	30 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	9913	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Nominal Voltage Ph-N 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12052	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**.		
Description			
Nominal system voltage (phase to neutral). ***Note:*** *This value is used when any other alternate configuration is not active.*			

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Nominal Voltage Ph-Ph 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12055	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection Type 1 (page 406)**.		
Description			
Nominal system voltage (phase to phase). ***Note:*** *This value is used when any other alternate configuration is not active.*			

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Nominal Current 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12049	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.

Note: *This value is used when any other alternate configuration is not active.*

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Connection Type 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12058	**Related applications**	AMF, MRS
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 Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
Autodetect	

High Leg Delta	L1 >=100 V; L1 <=140 V L2 >=140 V L3 >=100 V; L3 <=140 V
3Ph Low Y	L1 <=160 V L2 <=160 V L3 <=160 V
3Ph High Y	L1 >160 V L2 >160 V L3 >160 V
SplPhL1L3	L1 >=100 V L2 <= 20 V L3 >=100 V
SplPhL1L2	L1 >=100 V L2 >= 100 V L3 <= 20 V
Mono Phase	L1 >=100 V L2 <= 20 V L3 <= 20 V
Voltage Autodetect shutdown	

Note: *This value is used when any other alternate configuration is not active.*

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ECU Speed Adjustment 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	14337	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			

Enables to adjust engine speed in ECU via CAN bus. Nominal speed corresponds to 50%. This setpoint should be used only for Volvo Penta and Scania engines. It has no effect on other engine brands.

Note: *This value is used when any other alternate configuration is not active.*

back to List of setpoints

Nominal Power 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	12046	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint **Connection type (page 213)** is adjusted to Monophase or SplitphaseL1L2 or SplitphaseL1L3 or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

Note: *This value is used when any other alternate configuration is not active.*

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Nominal Power Split Phase 1

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	15771	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 213)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint **Connection type (page 213)** is adjusted to Autodetect and Autodetect detects connection type as Monophase or SplitphaseL1L2 or SplitphaseL1L3.*

Note: *This value is used when any other alternate configuration is not active.*

back to List of setpoints

Subgroup: Configuration 2

Nominal RPM 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	100 .. 4000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	9916	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Nominal engine speed (RPM - revolutions per minute).

Note: *This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 473)** is active.*

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Nominal Frequency 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	30 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	9914	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*			

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Nominal Voltage Ph-N 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12053	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 411)**.		
Description			
Nominal system voltage (phase to neutral). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*			

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Nominal Voltage Ph-Ph 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12056	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 411)**.		
Description			
Nominal system voltage (phase to phase). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*			

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Nominal Current 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 10000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12050	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2*** *(****PAGE 473****) is active.*

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Connection type 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12059	**Related applications**	AMF, MRS
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

<table>
<tr><td></td><td>Corner-Grounded Delta
Split Phase Delta
Three phase voltage measurement L1,L2,L3 with 120° phase shift
No neutral is available 3x CT (Current Transformer)</td></tr>
<tr><td>3Ph4Wire</td><td>Grounded Star (Grounded Wye) connection – 3PY
Three phase voltage measurement L1,L2,L3 with 120° phase shift
3x CT (Current Transformer)</td></tr>
<tr><td>High Leg D</td><td>High Leg Delta connection
Three phase voltage measurement L1,L2,L3
3x CT (Current Transformer)</td></tr>
<tr><td>Autodetect</td><td><table>
<tr><td>High Leg Delta</td><td>L1 >=100 V; L1 <=140 V
L2 >=140 V
L3 >=100 V; L3 <=140 V</td></tr>
<tr><td>3Ph Low Y</td><td>L1 <=160 V
L2 <=160 V
L3 <=160 V</td></tr>
<tr><td>3Ph High Y</td><td>L1 >160 V
L2 >160 V
L3 >160 V</td></tr>
<tr><td>SplPhL1L3</td><td>L1 >=100 V
L2 <= 20 V
L3 >=100 V</td></tr>
<tr><td>SplPhL1L2</td><td>L1 >=100 V
L2 >= 100 V
L3 <= 20 V</td></tr>
<tr><td>Mono Phase</td><td>L1 >=100 V
L2 <= 20 V
L3 <= 20 V</td></tr>
<tr><td colspan="2">Voltage Autodetect shutdown</td></tr>
</table></td></tr>
</table>

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*

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ECU Speed Adjustment 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	14338	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			

Enables to adjust engine speed in ECU via CAN bus. Nominal speed corresponds to 50%. This setpoint should be used only for Volvo Penta and Scania engines. It has no effect on other engine brands.

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*

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Nominal Power 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	12047	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint* ***Connection type 2 (page 411)*** *is adjusted to Monophase or SplitphaseL1L2 or SplitphaseL1L3 or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*

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Nominal Power Split Phase 2

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	15772	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 411)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint* ***Connection type 2 (page 411)*** *is adjusted to Autodetect and Autodetect detects connection type as Monophase or SplitphaseL1L2 or SplitphaseL1L3.*

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 473)*** *is active.*

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Subgroup: Configuration 3

Nominal RPM 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	100 .. 4 000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	15196	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Nominal engine speed (RPM - revolutions per minute).

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*

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Nominal Frequency 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	30 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	15197	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*			

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Nominal Voltage Ph-N 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	80 .. 20 000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12054	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 3 (page 416)**.		
Description			
Nominal system voltage (phase to neutral). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*			

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Nominal Voltage Ph-Ph 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	80 .. 40 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12057	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 3 (page 416)**.		
Description			
Nominal system voltage (phase to phase). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*			

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Nominal Current 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12051	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*

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Connection type 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12060	**Related applications**	AMF, MRS
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

<table>
<tr><td></td><td>Corner-Grounded Delta
Split Phase Delta
Three phase voltage measurement L1,L2,L3 with 120° phase shift
No neutral is available 3x CT (Current Transformer)</td></tr>
<tr><td>3Ph4Wire</td><td>Grounded Star (Grounded Wye) connection – 3PY
Three phase voltage measurement L1,L2,L3 with 120° phase shift
3x CT (Current Transformer)</td></tr>
<tr><td>High Leg D</td><td>High Leg Delta connection
Three phase voltage measurement L1,L2,L3
3x CT (Current Transformer)</td></tr>
<tr><td>Autodetect</td><td><table>
<tr><td>High Leg Delta</td><td>L1 >=100 V; L1 <=140 V
L2 >=140 V
L3 >=100 V; L3 <=140 V</td></tr>
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L2 <=160 V
L3 <=160 V</td></tr>
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L2 >160 V
L3 >160 V</td></tr>
<tr><td>SplPhL1L3</td><td>L1 >=100 V
L2 <= 20 V
L3 >=100 V</td></tr>
<tr><td>SplPhL1L2</td><td>L1 >=100 V
L2 >= 100 V
L3 <= 20 V</td></tr>
<tr><td>Mono Phase</td><td>L1 >=100 V
L2 <= 20 V
L3 <= 20 V</td></tr>
<tr><td colspan="2">Voltage Autodetect shutdown</td></tr>
</table></td></tr>
</table>

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*

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ECU Speed Adjustment 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	15199	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			

Enables to adjust engine speed in ECU via CAN bus. Nominal speed corresponds to 50%. This setpoint should be used only for Volvo Penta and Scania engines. It has no effect on other engine brands.

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*

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Nominal Power 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	12048	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 263)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint* ***Connection type 3 (page 416)*** *is adjusted to Monophase or SplitphaseL1L2 or SplitphaseL1L3 or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*

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Nominal Power Split Phase 3

Setpoint group	Alternate Config	**Related FW**	1.4.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	15773	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 3 (page 416)**		
Description			
Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 263)** protection is based on this setpoint. ***Note:*** *This setpoint is used when setpoint* ***Connection type 3 (page 416)*** *is adjusted to Autodetect and Autodetect detects connection type as Monophase or SplitphaseL1L2 or SplitphaseL1L3.* ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 473)*** *is active.*			

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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 420)**.

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.

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Group: Engine

RPM

Value group	Engine	**Related FW**	1.4.0
Units	RPM		
Comm object	10123	**Related applications**	AMF, MRS
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 Frequency Select

Value group	Engine	**Related FW**	1.4.0
Units	-		
Comm object	12926	**Related applications**	AMF, MRS
Description			

Shows selected frequency of ECU. The value is calculated from setpoint **Nominal Frequency (page 219)**

- If is **Nominal Frequency (page 219)** 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 219)** 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**	1.4.0
Units	Depends on ECU value		
Comm object	10153	**Related applications**	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10154	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10155	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10156	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10157	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10158	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10159	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10160	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10161	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10162	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10163	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10164	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10165	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10166	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10167	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10168	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10169	Related applications	AMF, MRS
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**	1.4.0
Units	Depends on ECU value		
Comm object	10170	**Related applications**	AMF, MRS
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**	1.4.0
Units	Depends on ECU value		
Comm object	10171	**Related applications**	AMF, MRS
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**	1.4.0
Units	Depends on ECU value		
Comm object	10172	**Related applications**	AMF, MRS
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 21

Value group	Engine	**Related FW**	1.4.0
Units	Depends on ECU value		
Comm object	10172	**Related applications**	AMF, MRS
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 22

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 23

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 24

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 25

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 26

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 27

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 28

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 29

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 30

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 31

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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 32

Value group	Engine	Related FW	1.4.0
Units	Depends on ECU value		
Comm object	10172	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10173	Related applications	AMF, MRS
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	1.4.0
Units	Depends on ECU value		
Comm object	10174	Related applications	AMF, MRS
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	Related FW	1.4.0
Units	%		
Comm object	10137	Related applications	AMF, MRS
Description			

This value contains the speed control signal expressed 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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Requested RPM

Value group	Engine	Related FW	1.4.0
Units	RPM		
Comm object	10006	Related applications	AMF, MRS
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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DPF Soot Load

Value group	Engine	Related FW	1.4.0
Units	%		
Comm object	12484	Related applications	AMF, MRS
Description			
Indicates the soot load percentage of diesel particulate filter (DPF).			

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DPF Ash Load

Value group	Engine	Related FW	1.4.0
Units	%		
Comm object	12483	Related applications	AMF, MRS
Description			
Indicates the ash load percentage of diesel particulate filter (DPF).			

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DEF Level

Value group	Engine	Related FW	1.4.0
Units	%		
Comm object	14522	Related applications	AMF, MRS
Description			
The level of diesel exhaust fluid tank.			

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Group: Generator

Earth Fault Current

Value group	Generator	Related FW	1.4.0
Units	A		
Comm object	14325	Related applications	AMF, MRS
Description			
Measured value of fault for evaluation of earth fault protection.			

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Generator Frequency

Value group	Generator	Related FW	1.4.0
Units	Hz		
Comm object	8210	Related applications	AMF, MRS
Description			
Frequency of generator.			

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Generator Voltage L1-L2

Value group	Generator	Related FW	1.4.0
Units	V		
Comm object	9628	Related applications	AMF, MRS
Description			
Generator phase to phase voltage between L1 and L2 phases.			

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Generator Voltage L1-N

Value group	Generator	**Related FW**	1.4.0
Units	V		
Comm object	8192	**Related applications**	AMF, MRS
Description			
Generator voltage on phase 1.			

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Generator Voltage L2-L3

Value group	Generator	**Related FW**	1.4.0
Units	V		
Comm object	9629	**Related applications**	AMF, MRS
Description			
Generator phase to phase voltage between L2 and L3 phases.			

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Generator Voltage L2-N

Value group	Generator	**Related FW**	1.4.0
Units	V		
Comm object	8193	**Related applications**	AMF, MRS
Description			
Generator voltage on phase 2.			

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Generator Voltage L3-L1

Value group	Generator	**Related FW**	1.4.0
Units	V		
Comm object	9630	**Related applications**	AMF, MRS
Description			
Generator phase to phase voltage between L3 and L1 phases.			

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Generator Voltage L3-N

Value group	Generator	**Related FW**	1.4.0
Units	V		
Comm object	8194	**Related applications**	AMF, MRS
Description			
Generator voltage on phase 3.			

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Nominal Current

Value group	Generator	Related FW	1.4.0
Units	A		
Comm object	9978	Related applications	AMF, MRS
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 213)*** *= Autodetect.*			

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Nominal Power

Value group	Generator	Related FW	1.4.0
Units	V		
Comm object	9018	Related applications	AMF, MRS
Description			
Generator nominal power. ***Note:*** *Visible only when* ***Connection type (page 213)*** *= Autodetect.*			

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Nominal Voltage

Value group	Generator	Related FW	1.4.0
Units	V		
Comm object	9917	Related applications	AMF, MRS
Description			
Generator nominal voltage. ***Note:*** *Visible only when* ***Connection type (page 213)*** *= Autodetect.*			

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Group: Load

Load P

Value group	Load	Related FW	1.4.0
Units	kW		
Comm object	8202	Related applications	AMF, MRS
Description			
Load active power.			

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Load P L1

Value group	Load	Related FW	1.4.0
Units	kW		
Comm object	8524	Related applications	AMF, MRS
Description			
Load active power in phase L1.			

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Load P L2

Value group	Load	Related FW	1.4.0
Units	kW		
Comm object	8525	Related applications	AMF, MRS
Description			
Load active power in phase L2.			

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Load P L3

Value group	Load	Related FW	1.4.0
Units	kW		
Comm object	8526	Related applications	AMF, MRS
Description			
Load active power in phase L3.			

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Load Q

Value group	Load	Related FW	1.4.0
Units	kVAr		
Comm object	8203	Related applications	AMF, MRS
Description			
Load reactive power.			

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Load Q L1

Value group	Load	Related FW	1.4.0
Units	kVAr		
Comm object	8527	Related applications	AMF, MRS
Description			
Load reactive power in phase L1.			

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Load Q L2

Value group	Load	Related FW	1.4.0
Units	kVAr		
Comm object	8528	Related applications	AMF, MRS
Description			
Load reactive power in phase L2.			

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Load Q L3

Value group	Load	Related FW	1.4.0
Units	kVAr		
Comm object	8529	Related applications	AMF, MRS
Description			
Load reactive power in phase L3.			

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Load S

Value group	Load	Related FW	1.4.0
Units	kVA		
Comm object	8565	Related applications	AMF, MRS
Description			
Load apparent power.			

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Load S L1

Value group	Load	Related FW	1.4.0
Units	kVA		
Comm object	8530	Related applications	AMF, MRS
Description			
Load apparent power L1.			

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Load S L2

Value group	Load	Related FW	1.4.0
Units	kVA		
Comm object	8531	Related applications	AMF, MRS
Description			
Load apparent power L2.			

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Load S L3

Value group	Load	Related FW	1.4.0
Units	kVA		
Comm object	8532	Related applications	AMF, MRS
Description			
Load apparent power L3.			

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Load Power Factor

Load	Load	Related FW	1.4.0
Units	[-]		
Comm object	8204	Related applications	AMF, MRS
Description			
Load power factor.			

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Load Power Factor L1

Load	Load	Related FW	1.4.0
Units	[-]		
Comm object	8533	Related applications	AMF, MRS
Description			
Load power factor on phase L1.			

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Load Power Factor L2

Load	Load	Related FW	1.4.0
Units	[-]		
Comm object	8534	Related applications	AMF, MRS
Description			
Load power factor on phase L2.			

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Load Power Factor L3

Load	Load	Related FW	1.4.0
Units	[-]		
Comm object	8535	Related applications	AMF, MRS
Description			
Load power factor on phase L3.			

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Load Character

Value group	Load	Related FW	1.4.0
Units	[-]		
Comm object	8395	Related applications	AMF, MRS
Description			
Character of the load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Load Character L1

Value group	Load	Related FW	1.4.0
Units	[-]		
Comm object	8626	Related applications	AMF, MRS
Description			
Character of the load on phase L1. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Load Character L2

Value group	Load	Related FW	1.4.0
Units	[-]		
Comm object	8627	Related applications	AMF, MRS
Description			
Character of the load on phase L2. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Load Character L3

Value group	Load	Related FW	1.4.0
Units	[-]		
Comm object	8628	Related applications	AMF, MRS
Description			
Character of the load on phase L3. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Load Current L1

Value group	Generator	**Related FW**	1.4.0
Units	A		
Comm object	8198	**Related applications**	AMF, MRS
Description			
Current phase L1 of Load.			

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Load Load Current L2

Value group	Generator	**Related FW**	1.4.0
Units	A		
Comm object	8199	**Related applications**	AMF, MRS
Description			
Current phase L2 of Load.			

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Load Current L3

Value group	Generator	**Related FW**	1.4.0
Units	A		
Comm object	8200	**Related applications**	AMF, MRS
Description			
Current phase L3 of Load.			

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Group: Mains

Mains Frequency

Value group	Mains	**Related FW**	1.4.0
Units	Hz		
Comm object	8211	**Related applications**	AMF
Description			
Frequency of Mains.			

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Mains Voltage L1-N

Value group	Mains	**Related FW**	1.4.0
Units	V		
Comm object	8195	**Related applications**	AMF
Description			
Mains voltage on phase 1.			

back to List of values

Mains Voltage L2-N

Value group	Mains	Related FW	1.4.0
Units	V		
Comm object	8196	Related applications	AMF
Description			
Mains voltage on phase 2.			

back to List of values

Mains Voltage L3-N

Value group	Mains	Related FW	1.4.0
Units	V		
Comm object	8197	Related applications	AMF
Description			
Mains voltage on phase 3.			

back to List of values

Mains Voltage L1-L2

Value group	Mains	Related FW	1.4.0
Units	V		
Comm object	9631	Related applications	AMF
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	1.4.0
Units	V		
Comm object	9632	Related applications	AMF
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	1.4.0
Units	V		
Comm object	9633	Related applications	AMF
Description			
Mains phase to phase voltage between L3 and L1 phases.			

back to List of values

Group: Dual operation

Master Running Hours

Value group	Dual operation	**Related FW**	1.4.0
Units			
Comm object	16044	**Related applications**	AMF, MRS
Description			
This is actual value of running hours of Master controller used in dual operation function (**Running Hours (page 448) + Running Hours Base (page 289)**).			

back to List of values

Running Hours To Swap

Value group	Dual operation	**Related FW**	1.4.0
Units			
Comm object	16046	**Related applications**	AMF, MRS
Description			
This value shows how long it will take until the swap between gen-sets will be made.			

back to List of values

Slave Running Hours

Value group	Dual operation	**Related FW**	1.4.0
Units			
Comm object	16045	**Related applications**	AMF, MRS
Description			
This is actual value of running hours of Slave controller used in dual operation function (**Running Hours (page 448) + Running Hours Base (page 289)**).			

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Group: Controller I/O

Battery Volts

Value group	Controller I/O	**Related FW**	1.4.0
Units	V		
Comm object	8213	**Related applications**	AMF, MRS
Description			
Controller supply voltage.			

back to List of values

D+

Value group	Controller I/O	Related FW	1.4.0
Units	V		
Comm object	10603	Related applications	AMF, MRS
Description			
D+ terminal voltage.			

back to List of values

Analog Input 1

Value group	Controller I/O	Related FW	1.4.0
Units	Configurable		
Comm object	9151	Related applications	AMF, MRS
Description			
This is the value of the analog input 1 of the controller.			

back to List of values

Analog Input 2

Value group	Controller I/O	Related FW	1.4.0
Units	Configurable		
Comm object	9152	Related applications	AMF, MRS
Description			
This is the value of the analog input 2 of the controller.			

back to List of values

Analog Input 3

Value group	Controller I/O	Related FW	1.4.0
Units	Configurable		
Comm object	9153	Related applications	AMF, MRS
Description			
This is the value of the analog input 3 of the controller.			

back to List of values

Binary Inputs

Value group	Controller I/O	Related FW	1.4.0
Units	[-]		
Comm object	8235	Related applications	AMF, MRS
Description			
State of the binary inputs of the controller.			

back to List of values

E-Stop

Value group	Controller I/O	Related FW	1.4.0
Units	%		
Comm object	15780	Related applications	AMF, MRS
Description			
Shows number of E-STOP input – the same principle of visualization like binary inputs. Principle of value (principle of normally close binary input): › 1 – E-STOP has voltage – state is OK › 0 – E-STOP has no voltage – protection is active			

back to List of values

Binary Outputs

Value group	Controller I/O	Related FW	1.4.0
Units	[-]		
Comm object	8239	Related applications	AMF, MRS
Description			
State of the binary outputs of the controller.			

back to List of values

Group: Statistics

Genset kWh

Value group	Statistics	Related FW	1.4.0
Units	kWh		
Comm object	8205	Related applications	AMF, MRS
Description			
Counter of Gen-set active power.			

back to List of values

Genset kVArh

Value group	Statistics	Related FW	1.4.0
Units	kVArh		
Comm object	8539	Related applications	AMF, MRS
Description			
Counter of Gen-set reactive power.			

back to List of values

Conditioned Running Hours 1

Value group	Statistics	Related FW	1.4.0
Units	[h]		
Comm object	20292	Related applications	AMF, MRS
Description			
This value contains counted hours of running the engine while LBI CONDITIONED RUNNING HOURS 1 (PAGE 478) is active. ***Note:*** *The engine has to be also running although it is not required to be excited.*			

back to List of values

Conditioned Running Hours 2

Value group	Statistics	Related FW	1.4.0
Units	[h]		
Comm object	20293	Related applications	AMF, MRS
Description			
This value contains counted hours of running the engine while LBI CONDITIONED RUNNING HOURS 2 (PAGE 478) is active. ***Note:*** *The engine has to be also running although it is not required to be excited.*			

back to List of values

Mains kWh

Value group	Statistics	Related FW	1.4.0
Units	kWh		
Comm object	11025	Related applications	AMF
Description			
Counter of mains active power .			

back to List of values

Mains kVArh

Value group	Statistics	Related FW	1.4.0
Units	kVArh		
Comm object	11026	Related applications	AMF
Description			
Counter of mains reactive power.			

back to List of values

Maintenance Timer 1 RunHours

Value group	Statistics	Related FW	1.4.0
Units	hours		
Comm object	11616	Related applications	AMF, MRS
Description			
Countdown until next maintenance 1. Statistic value for **Maintenance Timer 1 RunHours (page 259)**.			

back to List of values

Maintenance Timer 1 Interval

Value group	Statistics	Related FW	1.4.0
Units	days		
Comm object	16387	Related applications	AMF, MRS
Description			
Countdown until next maintenance 1. Statistic value for **Maintenance Timer 1 Interval (page 259)**.			

back to List of values

Maintenance Timer 2 RunHours

Value group	Statistics	Related FW	1.4.0
Units	hours		
Comm object	11617	Related applications	AMF, MRS
Description			
Countdown until next maintenance 2. Statistic value for **Maintenance Timer 2 RunHours (page 260)**.			

back to List of values

Maintenance Timer 2 Interval

Value group	Statistics	Related FW	1.4.0
Units	days		
Comm object	16388	Related applications	AMF, MRS
Description			
Countdown until next maintenance 2. Statistic value for **Maintenance Timer 2 Interval (page 261)**.			

back to List of values

Maintenance Timer 3 RunHours

Value group	Statistics	Related FW	1.4.0
Units	hours		
Comm object	11618	Related applications	AMF, MRS
Description			
Countdown until next maintenance 3. Statistic value for **Maintenance Timer 3 RunHours (page 262)**.			

back to List of values

Maintenance Timer 3 Interval

Value group	Statistics	Related FW	1.4.0
Units	days		
Comm object	16389	Related applications	AMF, MRS
Description			
Countdown until next maintenance 3. Statistic value for **Maintenance Timer 3 Interval (page 262)**.			

back to List of values

Num E-Stops

Value group	Statistics	Related FW	1.4.0
Units	[-]		
Comm object	11195	Related applications	AMF, MRS
Description			
Emergency stop alarms counter. ***Note:*** *This value counts only in case that Gen-set was stopped due to E-Stop or Emergency Stop.*			

back to List of values

Shutdowns

Value group	Statistics	Related FW	1.4.0
Units	[-]		
Comm object	11196	Related applications	AMF, MRS
Description			
Shutdown alarms counter. This counter counts all occurrences of a shutdown alarm, not only real shutdowns of the Gen-set, i.e. the counter is increased by 2 if two shutdown alarms appear simultaneously.			

back to List of values

Total Fuel Consumption

Value group	Statistics	Related FW	1.4.0
Units	L		
Comm object	9040	Related applications	AMF, MRS
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 253)** setpoint)

Note: *The accuracy of Total Fuel Consumption depends on the precision of ECU values or precision of **Fuel Tank Volume (page 253)** and fuel level sensor.*

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Time Till Empty 1

Value group	Statistics	Related FW	1.4.0
Units	days		
Comm object	13770	Related applications	AMF, MRS
Description			

Assessment in days when the fuel tank will be empty.

Note: *This value is based on setpoint **Fuel Tank Volume (page 253)** 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	1.4.0
Units	hours		
Comm object	13771	Related applications	AMF, MRS
Description			

Assessment in hours when the fuel tank will be empty.

Note: *This value is based on setpoint **Fuel Tank Volume (page 253)** and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.*

back to List of values

Time Till Empty 3

Value group	Statistics	Related FW	1.4.0
Units	minutes		
Comm object	13772	Related applications	AMF, MRS
Description			
Assessment in minutes when the fuel tank will be empty. ***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 253)*** *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	1.4.0
Units	[-]		
Comm object	8207	Related applications	AMF, MRS
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

Running Hours

Value group	Statistics	Related FW	1.4.0
Units	hours		
Comm object	8206	Related applications	AMF, MRS
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	1.4.0
Units	[-]		
Comm object	14446	Related applications	AMF, MRS
Description			
This Value mirrors the active application in the controller. **Example:** AMF or MRS.			

back to List of values

Controller Mode

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	9887	Related applications	AMF, MRS
Description			
The value contains actual controller mode.			

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Application

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	8480	Related applications	AMF, MRS
Description			
The value contains actual application in controller. **Example:** AMF25, AMF20, AMF9, AMF8 or MRS16.			

back to List of values

Breaker State

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	9245	Related applications	AMF, MRS
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	Info	Related FW	1.4.0
Units	[-]		
Comm object	12944	Related applications	AMF, MRS
Description			
The text of this value represents the connection type which is adjusted in setpoint **Connection type (page 213)**.			

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Engine State

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	9244	Related applications	AMF, MRS
Description			
The value contains actual "engine state" message which is shown on the main screen of the controller.			

back to List of values

FW Branch

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	8707	Related applications	AMF, MRS
Description			
The value contains actual branch of firmware in controller.			

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FW Version

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	24339	Related applications	AMF, MRS
Description			
Major and minor firmware version number.			

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HW Version

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object		Related applications	AMF, MRS
Description			
Major and minor hardware version number.			

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ID String

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	24501	Related applications	AMF, MRS
Description			
Name of controller which is used in InteliConfig in command bar.			

back to List of values

Load Shedding Status

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	9591	Related applications	AMF, MRS
Description			
The value contains actual "load shedding stage". The Value can get the values of the range 0 to 2, where 0 means no load shedding stage is active and 1, 2 means that the corresponding load shedding stage is active.			

back to List of values

SPI Module A

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	14447	Related applications	AMF, MRS
Description			
The name of plug-in module which is inserted in slot A.			

back to List of values

Timer Text

Value group	Info	Related FW	1.4.0
Units	[-]		
Comm object	10040	Related applications	AMF, MRS
Description			
The value contains the "Current process timer" text which is shown on the main screen of the controller.			

back to List of values

Timer Value

Value group	Info	Related FW	1.4.0
Units	[HH:MM:SS]		
Comm object	14147	Related applications	AMF, MRS
Description			
The value contains the "Current process timer" value which is shown on the main screen of the controller.			

back to List of values

Group: Log Bout

Log Bout 1

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9143	Related applications	AMF, MRS
Description			
State of binary outputs.			

back to List of values

Log Bout 2

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9144	Related applications	AMF, MRS
Description			
State of binary outputs.			

back to List of values

Log Bout 3

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9145	Related applications	AMF, MRS
Description			
State of binary outputs.			

back to List of values

Log Bout 4

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9146	Related applications	AMF, MRS
Description			
State of binary outputs.			

back to List of values

Log Bout 5

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9147	Related applications	AMF, MRS
Description			
State of binary outputs.			

back to List of values

Log Bout 6

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9148	Related applications	AMF, MRS
Description			
State of binary outputs.			

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Log Bout 7

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9149	Related applications	AMF, MRS
Description			
State of binary outputs.			

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Log Bout 8

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	9150	Related applications	AMF, MRS
Description			
State of binary outputs.			

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Log Bout 9

Value group	Log Bout	Related FW	1.4.0
Units	[-]		
Comm object	11896	Related applications	AMF, MRS
Description			
State of binary outputs.			

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Group: Fixed Protection States

Fixed Protections States 1

Value group	Fixed Protection States	Related FW	1.4.0
Units	[-]		
Comm object	20744	Related applications	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

back to List of values

Fixed Protections States 2

Value group	Fixed Protection States	Related FW	1.4.0
Units	[-]		
Comm object	20745	Related applications	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

back to List of values

Fixed Protections States 3

Value group	Fixed Protection States	**Related FW**	1.4.0
Units	[-]		
Comm object	20746	**Related applications**	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

back to List of values

Fixed Protections States 4

Value group	Fixed Protection States	**Related FW**	1.4.0
Units	[-]		
Comm object	20747	**Related applications**	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

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Fixed Protections States 5

Value group	Fixed Protection States	**Related FW**	1.4.0
Units	[-]		
Comm object	20748	**Related applications**	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

back to List of values

Group: User Protection States

User Protections States 1

Value group	User Protection States	**Related FW**	1.4.0
Units	[-]		
Comm object	20759	**Related applications**	AMF, MRS
Description			
Values of LBO User Protections State.			

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Group: CM-4G-GPS

Signal Strength

Value group	CM-4G-GPS	**Related FW**	1.4.0
Units	%		
Comm object	24302	**Related applications**	AMF, MRS
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**	1.4.0
Units	[-]		
Comm object	24290	**Related applications**	AMF, MRS
Description			

The text of this value represents the status of the GSM modem.

Code	Description
Not availab	Not available
Available	Available
Attached	Attached

back to List of values

Last Email Result

Value group	CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24307	Related applications	AMF, MRS
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**	1.4.0
Units	[-]		
Comm object	24147	**Related applications**	AMF, MRS
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**	1.4.0
Units	[-]		
Comm object	24146	**Related applications**	AMF, MRS
Description			
The type of data connection.			

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GPS Status

Value group	CM-4G-GPS	**Related FW**	1.4.0
Units	[-]		
Comm object	23973	**Related applications**	AMF, MRS
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**	1.4.0
Units	[-]		
Comm object	24268	**Related applications**	AMF, MRS
Description			
Actual GPS latitude. Positions on north hemisphere have positive value, position on south hemisphere have negative value.			

back to List of values

Longitude

Value group	CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24267	Related applications	AMF, MRS
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	1.4.0
Units	[-]		
Comm object	24265	Related applications	AMF, MRS
Description			
Number of available satellites for GPS location.			

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Speed

Value group	CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24227	Related applications	AMF, MRS
Description			
Actual speed of the controller calculated from the GPS coordinates.			

back to List of values

HomePosDist

Value group	CM-4G-GPS	Related FW	1.4.0
Units	km		
Comm object	11680	Related applications	AMF, MRS
Description			
Actual distance from home position. Home position is adjusted via setpoints **Home Latitude (page 353)** and **Home Longitude (page 354)** or by binary input **GEO HOME POSITION (PAGE 487)**.			

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AirGate Status

Value group	CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24308	Related applications	AMF, MRS
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-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24309	Related applications	AMF, MRS
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	1.4.0
Units	[-]		
Comm object	24087	Related applications	AMF, MRS
Description			
IP address of AirGate 2 node to which the module is currently attached.			

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Current IP Address

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24184	Related applications	AMF, MRS
Description			
Current IP address of the controller.			

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Primary DNS

Value group	CM-Ethernet CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24181	Related applications	AMF, MRS
Description			
Current domain name server.			

back to List of values

Secondary DNS

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24100	Related applications	AMF, MRS
Description			
Backup domain name server.			

back to List of values

Modem Status

Value group	CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24288	Related applications	AMF, MRS
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

Setpoint group	CM-4G-GPS	**Related FW**	1.4.0
Range [units]	1 .. 65535 [-]		
Default value	54440	**Alternative config**	NO
Step	1		
Comm object	24149	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 363)**		
Description			
This value shows FW version of modem on CM2-4G-GPS plug-in card.			

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Group: CM-Ethernet

ETH Interface Status

Value group	CM-Ethernet	**Related FW**	1.4.0
Units	[-]		
Comm object	24180	**Related applications**	AMF, MRS
Description			
Current status of ethernet communication.			

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Current IP Address

Value group	CM-Ethernet	**Related FW**	1.4.0
Units	[-]		
Comm object	24184	**Related applications**	AMF, MRS
Description			
Current IP address of the controller.			

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Current Subnet Mask

Value group	CM-Ethernet	**Related FW**	1.4.0
Units	[-]		
Comm object	24183	**Related applications**	AMF, MRS
Description			
Current subnet mask.			

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Current Gateway

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24182	Related applications	AMF, MRS
Description			
Current gateway address.			

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Primary DNS

Value group	CM-Ethernet CM-4G-GPS	Related FW	1.4.0
Units	[-]		
Comm object	24181	Related applications	AMF, MRS
Description			
Current domain name server.			

back to List of values

Secondary DNS

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24100	Related applications	AMF, MRS
Description			
Backup domain name server.			

back to List of values

AirGate ID

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24345	Related applications	AMF, MRS
Description			
Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.			

back to List of values

AirGate Servicing Node

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24087	Related applications	AMF, MRS
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	1.4.0
Units	[-]		
Comm object	24344	**Related applications**	AMF, MRS
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	1.4.0
Units	[-]		
Comm object	24332	Related applications	AMF, MRS
Description			

Result of last email, which was sent by controller.

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
8	HELO command was refused.
9	EHLO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
20	QUIT command was refused.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
27	Email address can’t be read.
30	SMTP server address translation error (from DNS server).
31	Error reading email content data (24327).

back to List of values

MAC Address

Value group	CM-Ethernet	Related FW	1.4.0
Units	[-]		
Comm object	24333	Related applications	AMF, MRS
Description			

Current MAC address of the controller ethernet interface.

back to List of values

Ethernet PHY Mode

Value group	CM-Ethernet	**Related FW**	1.4.0
Units	[-]		
Comm object	24088	**Related applications**	AMF, MRS
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: Date/Time

Date

Value group	Date/Time	**Related FW**	1.4.0
Units	DD.MM.YYYY		
Comm object	24553	**Related applications**	AMF, MRS
Description			
Shows setup date.			

back to List of values

Time

Value group	Date/Time	**Related FW**	1.4.0
Units	HH:MM:SS		
Comm object	24554	**Related applications**	AMF, MRS
Description			
Shows setup time.			

back to List of values

Time Mode

Value group	Date/Time	**Related FW**	1.4.0
Units	HH:MM:SS		
Comm object	20252	**Related applications**	AMF, MRS
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

Group: Plug-In I/O

EM BIO A

Value group	Plug-In I/O	**Related FW**	1.4.0
Units	[-]		
Comm object	14291	**Related applications**	AMF, MRS
Description			
Binary inputs from extension module in slot A.			

back to List of values

Group: PLC

PLC-BOUT 1

Value group	PLC	**Related FW**	1.4.0
Units	[-]		
Comm object	10424	**Related applications**	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 2

Value group	PLC	**Related FW**	1.4.0
Units	[-]		
Comm object	10425	**Related applications**	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 3

Value group	PLC	**Related FW**	1.4.0
Units	[-]		
Comm object	10426	**Related applications**	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 4

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10427	Related applications	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 5

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10428	Related applications	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 6

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10429	Related applications	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 7

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10430	Related applications	AMF, MRS
Description			
State of binary outputs of PLC.			

back to List of values

PLC Resource 1

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10504	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 2

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10505	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 3

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10506	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 4

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10507	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 5

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10508	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 6

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10509	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 7

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10510	Related applications	AMF, MRS
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 8

Value group	PLC	Related FW	1.4.0
Units	[-]		
Comm object	10511	Related applications	AMF, MRS
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

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LBI: C 478
LBI: D 479
LBI: E 480
LBI: F 484
LBI: G 486
LBI: H 488
LBI: I 488
LBI: M 488
LBI: N 490
LBI: O 491
LBI: P 491
LBI: R 492
LBI: S 496
LBI: T 499

For a full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 472)**.

Logical binary inputs alphabetically

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Alternate Config 2 473
Alternate Config 3 473
AMF Start Block 473
Application AMF 474
Application MRS 474
ATT DEF Level Lamp Blink 474
ATT DEF Level Lamp Fast Blink 474
ATT DEF Level Lamp Solid 474
ATT DPF Lamp Blink 475
ATT DPF Lamp Fast Blink 475
ATT DPF Lamp Solid 475
ATT Force Regen 475
ATT HEST Lamp Blink 475
ATT HEST Lamp Fast Blink 476
ATT HEST Lamp Solid 476
ATT Inhibit Regen 476
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Horn Reset Button 488
Idle Speed 488
Mains Fail Block 488
Manual Load Reconnection 489
MCB Button 489
MCB Disable 489
MCB Feedback 490
Neutral Position 490
Oil Pressure 491
Prestart Bypass 491
Protection Force Disable 492
Rem TEST On Load 492
Remote AUTO 493
Remote Ctrl Lock 493
Remote MAN 493
Remote OFF 494
Remote Start/Stop 495
Remote TEST 496
Sd Override 496
Start Blocking 496
Start Button 497
Stop Button 497
Switch To AUT 497
Switch To MAN 498
Switch To OFF 498
Total Emergency Stop 499

back to Controller objects

LBI: A

Access Lock

Related FW	1.4.0	**Related applications**	AMF, MRS
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

Alternate Config 2

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	859		
Description			
This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Config group are switched to the second set (setpoints with number 2).			

back to Logical binary inputs alphabetically

Alternate Config 3

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	860		
Description			
This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Config group are switched to the third set (setpoints with number 3).			

back to Logical binary inputs alphabetically

AMF Start Block

Related FW	1.4.0	**Related applications**	AMF, MRS
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 AMF

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1008		
Description			
LBI is used to select AMF mode. It has higher priority than the setpoint **Default Application Select (page 221)**.			

back to Logical binary inputs alphabetically

Application MRS

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1009		
Description			
LBI is used to select MRS mode. It has higher priority than the setpoint **Default Application Select (page 221)**.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Blink

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1076		
Description			
When this LBI is active, there is active alarm **Wrn ATT DEF Level Lamp (page 573)** in alarmlist and DEF Level Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Fast Blink

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1077		
Description			
When this LBI is active, there is active alarm **Wrn ATT DEF Level Lamp (page 573)** in alarmlist and ATT DEF Level Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Solid

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1075		
Description			
When this LBI is active, there is active alarm **Wrn ATT DEF Level Lamp (page 573)** 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	1.4.0	**Related applications**	AMF, MRS
Comm object	1067		
Description			
When this LBI is active, there is active alarm **Wrn ATT DPF Lamp (page 572)** in alarmlist and ECU Filter Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT DPF Lamp Fast Blink

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1068		
Description			
When this LBI is active, there is active alarm **Wrn ATT DPF Lamp (page 572)** in alarmlist and ATT Filter Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT DPF Lamp Solid

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1066		
Description			
When this LBI is active, there is active alarm **Wrn ATT DPF Lamp (page 572)** in alarmlist and ATT DPF Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Force Regen

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	680		
Description			
Aftertreatment Regeneration Force Switch › User manually activates regeneration function › Push-button control – function activated by pulse (signals longer than 5 seconds will be carried as long as the input is active)			

back to Logical binary inputs alphabetically

ATT HEST Lamp Blink

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1070		
Description			
When this LBI is active, there is active alarm **Wrn ATT HEST Lamp (page 573)** in alarmlist and ECU HEST Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT HEST Lamp Fast Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1071		
Description			
When this LBI is active, there is active alarm Wrn ATT HEST Lamp (page 573) in alarmlist and ATT HEST Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT HEST Lamp Solid

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1069		
Description			
When this LBI is active, there is active alarm Wrn ATT HEST Lamp (page 573) in alarmlist and ATT HEST Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Inhibit Regen

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	679		
Description			
Aftertreatment Regeneration Inhibit Switch › User blocks automatic regeneration function › 2 state switch control – function activated by still signal			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1079		
Description			
When this LBI is active, there is active alarm Wrn ATT Inhibited Lamp (page 573) in alarmlist and Inhibited Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Fast Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1080		
Description			
When this LBI is active, there is active alarm Wrn ATT Inhibited Lamp (page 573) in alarmlist and Inhibited Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Solid

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1078		
Description			
When this LBI is active, there is active alarm **Wrn ATT Inhibited Lamp (page 573)** in alarmlist and ATT Inhibited Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Interlock

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	956		
Description			

ATT Regeneration Interlock

- User manually allows the regeneration (not same as Regen Force)
- 2-state switch control – function activated by still signal
- Interlock activates Regeneration State after set of conditions is met, only after that the signal is activated

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1073		
Description			
When this LBI is active, there is active alarm **Wrn ATT SCR Error Lamp (page 573)** in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Fast Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1074		
Description			
When this LBI is active, there is active alarm **Wrn ATT SCR Error Lamp (page 573)** in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Solid

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1072		
Description			
When this LBI is active, there is active alarm **Wrn ATT SCR Error Lamp (page 573)** in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

LBI: C

Conditioned Running Hours 1

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1094		
Description			
This LBI enables incrementation of statistic value **CONDITIONED RUNNING HOURS 1 (PAGE 444)**.			

back to Logical binary inputs alphabetically

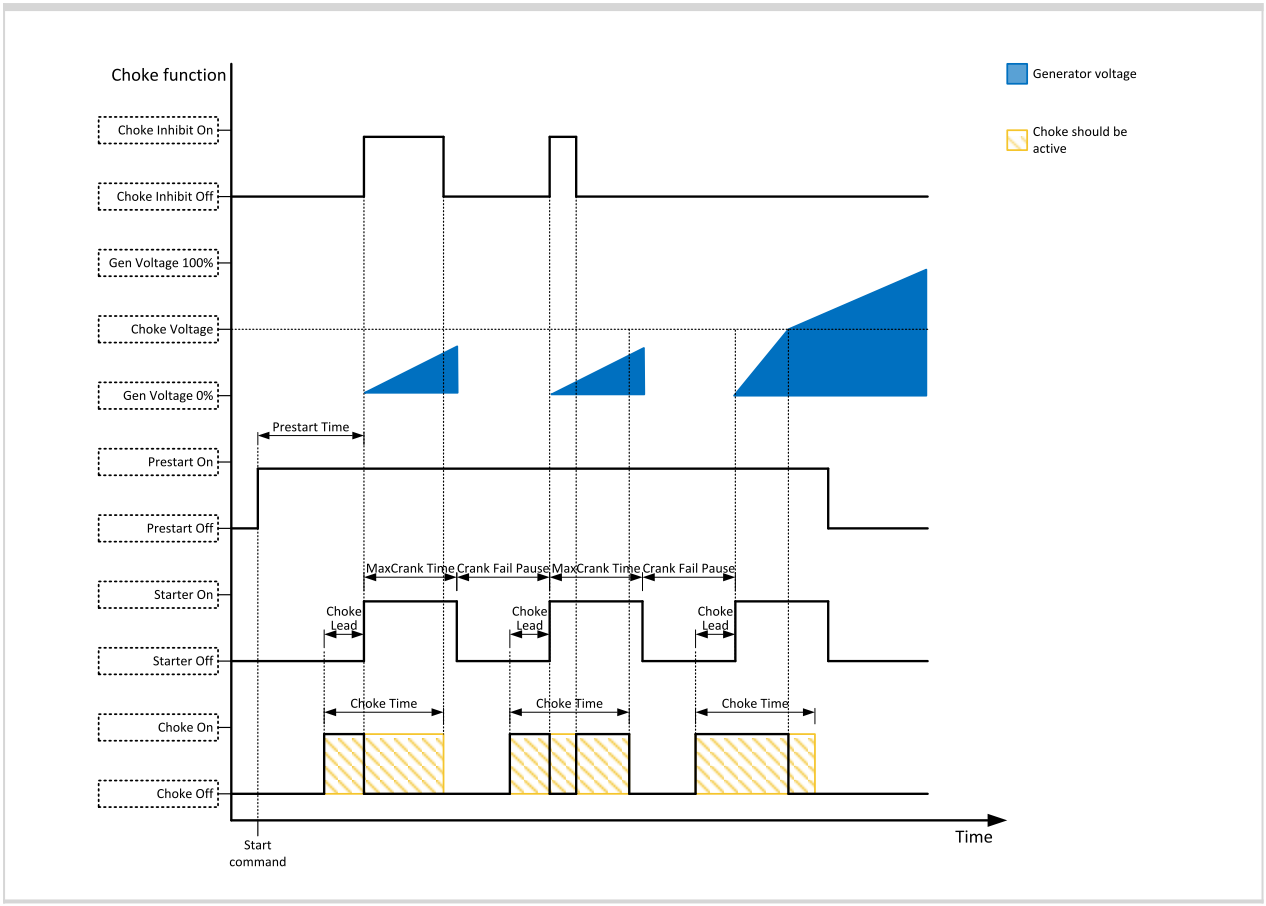
Conditioned Running Hours 2

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1095		
Description			
This LBI enables incrementation of statistic value **CONDITIONED RUNNING HOURS 2 (PAGE 444)**.			

back to Logical binary inputs alphabetically

Choke Inhibit

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	946		
Description			
Logical binary input CHOKE INHIBIT prevent Choke functionality when logical binary output **CHOKE (PAGE 509)** is activated. If CHOKE INHIBIT is activated when CHOKE LBO is active, CHOKE LBO is deactivated immediately and vice versa if LBI CHOKE INHIBIT is deactivated and LBO CHOKE should be active then is activated.			



back to Logical binary inputs alphabetically

LBI: D

Dark Mode*

Related FW	1.4.0	**Related applications**	AMF, MRS
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.			

back to Logical binary inputs alphabetically

Dual Swap Gen-sets

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	947		
Description			
This LBI enables or disables swapping of gen-sets on load in dual operation. This LBI has higher priority then setpoint **Swap Gen-sets (page 289)**. This LBI is accepted only in Master controller.			

back to Logical binary inputs alphabetically

Dual Top Priority

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	954		
Description			
This LBI defines, which gen-set has higher priority in dual operation mode. If this LBI is active on one gen-set, this gen-set is used in dual operation function (running hours values are not used to decide, which gen-set should start). Setpoint **Swap Gen-sets (page 289)** or LBI **DUAL SWAP GEN-SETS (PAGE 479)** has higher priority than this LBI. > **Example:** Engine 1 is running. LBI Top Priority is activated on engine 2. If swapping of gen-sets is disabled, nothing happens. If swapping of gen-sets is enabled, engine 2 is started and engine 1 is stopped. ***Note:*** *If this LBI is active on both gen-sets, the behavior is not changed. Decision is based on running hours values.*			

back to Logical binary inputs alphabetically

LBI: E

ECU Communication Fail Block

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	141		
Description			
Activation of this binary input blocks all protections (including user protections) for every single configured ECU.			

back to Logical binary inputs alphabetically

ECU Communication Fail Block 1

Related FW	1.4.0	Related applications	AMF, MRS
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 571)** is deactivated while this LBI is active.			

back to Logical binary inputs alphabetically

ECU Communication Fail Block 2

Related FW	1.4.0	Related applications	AMF, MRS
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 571)** is deactivated while this LBI is active.			

back to Logical binary inputs alphabetically

ECU Key Switch

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	951		
Description			
This binary input is used to switch on **ECU Power Relay (page 512)**, 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 512)** is active too. When this binary input is inactive, function of **ECU Power Relay (page 512)** is not affected.			

back to Logical binary inputs alphabetically

ECU Red Lamp Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1061		
Description			
When this LBI is active, there is active alarm **Wrn ECU Red Lamp (page 572)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ECU Red Lamp Fast Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1062		
Description			
When this LBI is active, there is active alarm **Wrn ECU Red Lamp (page 572)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ECU Red Lamp Solid

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1060		
Description			
When this LBI is active, there is active alarm **Wrn ECU Red Lamp (page 572)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ECU Speed Down

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	164		
Description			
This binary input is used to set the setpoint **ECU Speed Adjustment (page 258)** by binary inputs. When the LBI is activated the setpoint is decreased by 2 %.			

back to Logical binary inputs alphabetically

ECU Speed Up

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	165		
Description			
This binary input is used to set the setpoint **ECU Speed Adjustment (page 258)** by binary inputs. When the LBI is activated the setpoint is increase by 2%.			

back to Logical binary inputs alphabetically

ECU Wait To Start Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1064		
Description			
When this LBI is active, there is active alarm **Wrn ECU Wait To Start (page 572)** in alarmlist and ECU Wait To Start Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ECU Wait To Start Fast Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1065		
Description			
When this LBI is active, there is active alarm **Wrn ECU Wait To Start (page 572)** in alarmlist and ECU Wait To Start Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ECU Wait To Start Solid

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1063		
Description			
When this LBI is active, there is active alarm **Wrn ECU Wait To Start (page 572)** in alarmlist and ECU Wait to Start Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ECU Yellow Lamp Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1058		
Description			
When this LBI is active, there is active alarm **Wrn ECU Yellow Lamp (page 572)** in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ECU Yellow Lamp Fast Blink

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1059		
Description			
When this LBI is active, there is active alarm Wrn ECU Yellow Lamp (page 572) in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ECU Yellow Lamp Solid

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1057		
Description			
When this LBI is active, there is active alarm Wrn ECU Yellow Lamp (page 572) in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

Emergency MAN

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	45		
Description			

This input is designed to allow the Gen-set system or breakers to be controlled externally, not by the controller. This feature can be useful in case of some failure, which disables the Gen-set or breakers to be controlled by the controller, but the Gen-set itself is operational.

The controller behaves in the following way:

- Shows the text EmergMan in the engine status on the main screen.
- Stops all functions regarding the Gen-set or breaker control, deactivates all outputs related to it.
- Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.
- When the input is deactivated, the controller takes control according to the situation in the moment of deactivation, i.e. the Gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated.

back to Logical binary inputs alphabetically

Emergency Stop

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	40		
Description			

The shutdown procedure will start immediately when this input is activated.

> ***Note:*** *In case of controller hardware or software fail, safe stop of the engine doesn't have to be ensured. To back-up the Emergency Stop function it is recommended to connect separate circuit for disconnection of Fuel Solenoid and Starter signals.*

For more detail see chapter Recommended wiring.

back to Logical binary inputs alphabetically

External Mains Fail Relay

Related FW	1.4.0	Related applications	AMF, MRS
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 506)** is active, Gen-set is started when controller is in the AUT mode etc.)
- Controller displays alarm **ALI External Mains Fail (page 563)**

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 563)** automatically disappears

Note: *This input can by used for Mains fail simulation*

back to Logical binary inputs alphabetically

LBI: F

Fault Reset Button

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	191		
Description			

Binary input has the same function as Fault Reset button  on the InteliLite 4 front panel.

back to Logical binary inputs alphabetically

Force Idle

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	604		

Description

This logical binary input can force engine to idle speed in MAN or AUTO mode.

> ***Note:*** *This binary input has no influence on engine cooling speed.*

> **IMPORTANT: GCB has to be open**

Activation of LBI:

Following procedure is executed:

- Alarm **AHI Manual Idle (page 562)** is activated
- LBO **IDLE/NOMINAL (PAGE 525)** is switched to idle state and value **Requested RPM (page 431)** goes to **Idle RPM (page 232)** value
- Underfrequency protection and undervoltage protection are not evaluated
- Controller is in Manual Idle state until deactivation of this LBI

Deactivation of LBI

- Controller goes to MinStab state
- **AHI Manual Idle (page 562)** is not present in alarm list
- LBO **IDLE/NOMINAL (PAGE 525)** is switched to nominal state and value**Requested RPM (page 431)** goes to nominal value
- Controller goes to Running state

back to Logical binary inputs alphabetically

Fuel Pump On/Off

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	694		

Description

This binary input is used for manual control of binary output **FUEL PUMP (PAGE 516)**. 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 485) is configured then binary output FUEL PUMP (PAGE 516) is control by this binary input.**

> **IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 547) for proper function of this binary input.**

back to Logical binary inputs alphabetically

LBI: G

GCB Button

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	193		
Description			
Binary input has the same function as the GCB button I/O on the InteliLite 4 front panel. It is evaluated in MAN mode only.			

back to Logical binary inputs alphabetically

GCB Disable

Related FW	1.4.0	**Related applications**	AMF, MRS
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.			

back to Logical binary inputs alphabetically

GCB Feedback

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	63		
Description			

Use this input for indication whether the generator circuit breaker is open or closed.

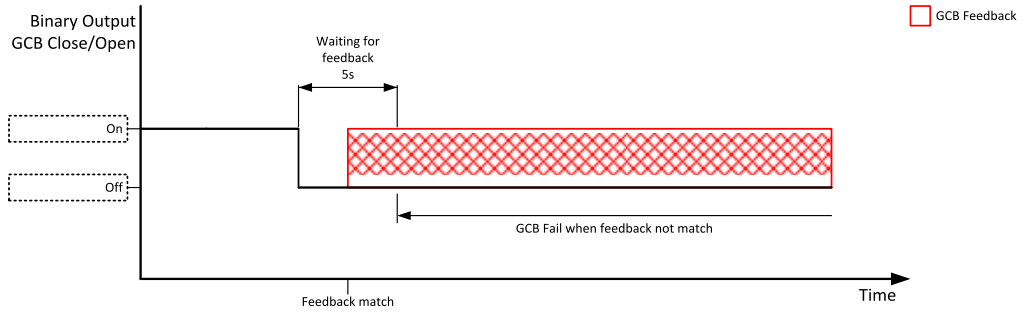


Image 8.31 GCB Feedback 1

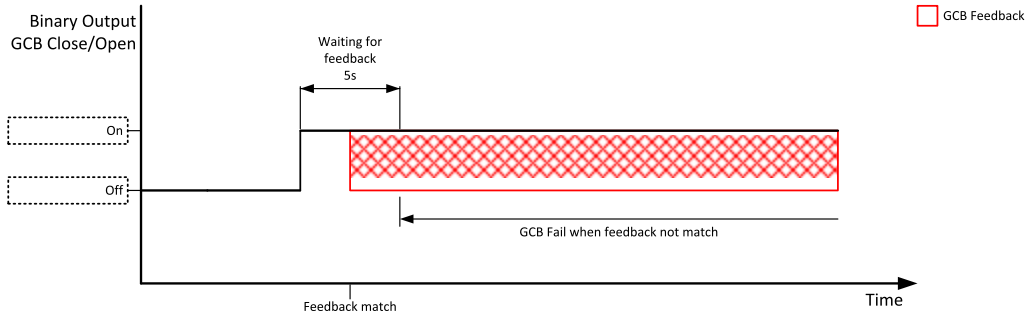


Image 8.32 GCB Feedback 2

Note: *InteliLite 4 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

back to Logical binary inputs alphabetically

Geo Home Position

Related FW	1.4.0	Related applications	AMF, MRS
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 353)** and **Home Longitude (page 354)** are adjusted automatically from actual coordinates from GPS signal.

Note: *Input has to be activated for at least 2 seconds.*

back to Logical binary inputs alphabetically

Geo-Fencing Enable

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	218		
Description			
This binary input enables or disables **Fence 1 Protection (page 355)** and **Fence 2 Protection (page 357)** if **Group: Geo-Fencing (page 353)** is adjusted to value "LBI Enable".			

back to Logical binary inputs alphabetically

LBI: H

Horn Reset Button

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	192		
Description			
Binary input has the same function as Horn reset button on the InteliLite 4 front panel.			

back to Logical binary inputs alphabetically

LBI: I

Idle Speed

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	624		
Description			
This binary input changes cooling speed from nominal to idle.			

back to Logical binary inputs alphabetically

LBI: M

Mains Fail Block

Related FW	1.4.0	**Related applications**	AMF, MRS
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 274)** is started and when it elapses GCB is opened, Gen-set goes to cooling procedure and stops. When GCB is opened after **Transfer Delay (page 290)** the MCB is closed. ***Note:*** *This input simulates healthy Mains.*			

back to Logical binary inputs alphabetically

Manual Load Reconnection

Related FW	1.4.0	**Related applications**	AMF, MRS
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 294)**. This works only if automatic reconnection is disabled, i.e. the setpoint **Auto Load Reconnection (page 295)** = Disabled.			

back to Logical binary inputs alphabetically

MCB Button

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	194		
Description			
This binary input has the same function as MCB button I/O on the InteliLite 4 front panel. It is evaluated in MAN mode only.			

back to Logical binary inputs alphabetically

MCB Disable

Related FW	1.4.0	**Related applications**	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
Comm object	65		
Description			

Use this input for indication whether the mains circuit breaker is open or closed.

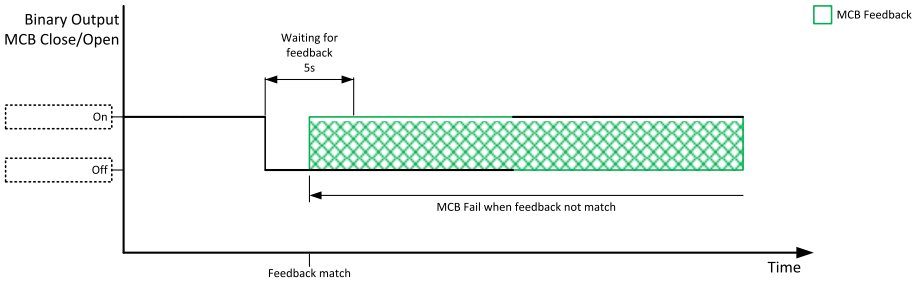


Image 8.33 MCB Feedback 1

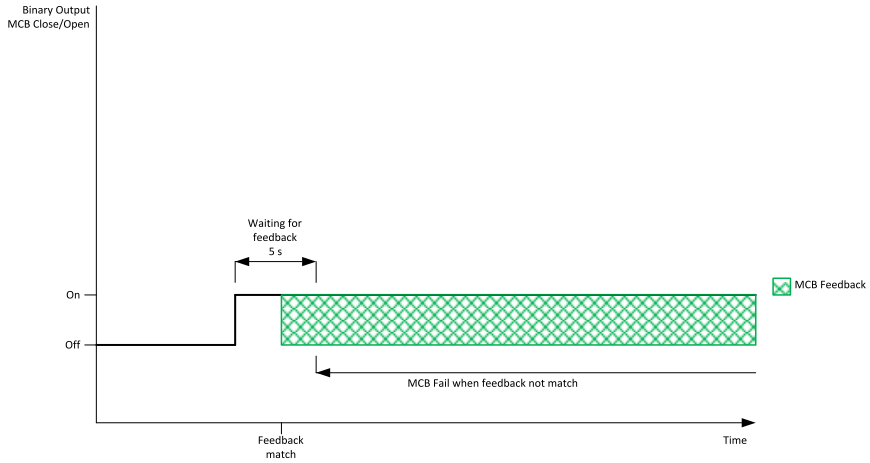


Image 8.34 MCB Feedback 2

Note: *InteliLite 4 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

back to Logical binary inputs alphabetically

LBI: N

Neutral Position

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1090		
Description			

In MAN mode this input switches a three position ATS switch to its neutral position – it activates the binary outputs **NEUTRAL CLOSE/OPEN (PAGE 533)** and **NEUTRAL ON COIL (PAGE 534)**. MCB and GCB are switched to off.

back to Logical binary inputs alphabetically

LBI: O

Oil Pressure

Related FW	1.4.0	Related applications	AMF, MRS
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

LBI: P

Prestart Bypass

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	42		
Description			

While this LBI is active, Gen-set skips prestart phase.

back to Logical binary inputs alphabetically

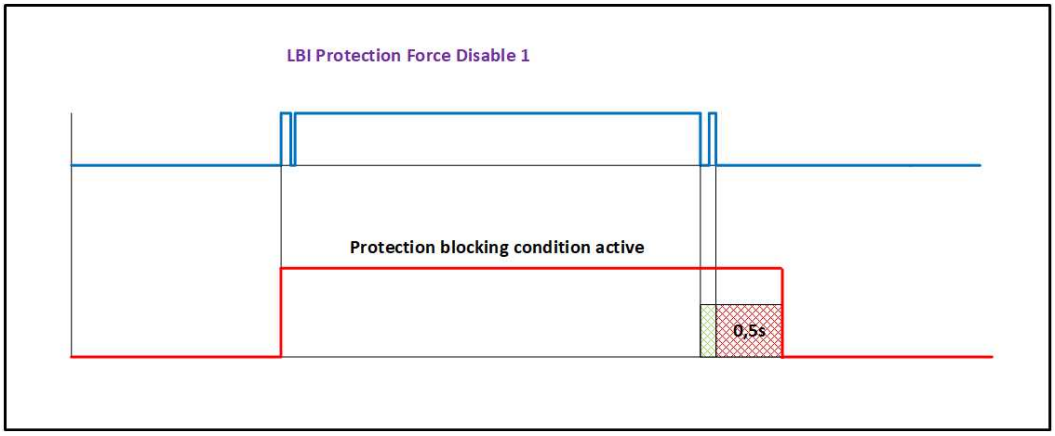
Protection Force Disable

Related FW	1.4.0	Related applications	AMF, MRS
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

LBI: R

Rem TEST On Load

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	61		
Description			

Closing of the GCB in MRS or transferring of the load from the mains to Gen-set in AMF.

Application	TEST	Remote TEST On Load
MRS	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 495)**. **Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions.
AMF	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. **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).

back to Logical binary inputs alphabetically

Remote AUTO

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	620		
Description			

The controller is switched to the AUTO mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode.

This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Remote Ctrl Lock

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	4		
Description			

If the input is active, the controller will not accept any actions regarding the system control – e.g. writing of commands and setpoint changes via remote communication interfaces.

back to Logical binary inputs alphabetically

Remote MAN

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	618		
Description			

The controller is switched to the MAN mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode.

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Remote OFF

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	617		
Description			
The controller is switched to the OFF mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode. Remote control priority: › Remote OFF (Highest priority) › Remote TEST › Remote MAN › Remote AUTO (Lowest Priority)			

back to Logical binary inputs alphabetically

Remote Start/Stop

Related FW	1.4.0	Related applications	AMF, MRS
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* ***Transfer Delay (page 290)*** *the GCB breaker is closed. Once the mains is OK, the* ***Mains Return Delay (page 274)*** *elapses and the GCB breaker is opened. Then after* ***Transfer Delay (page 290)*** *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.*

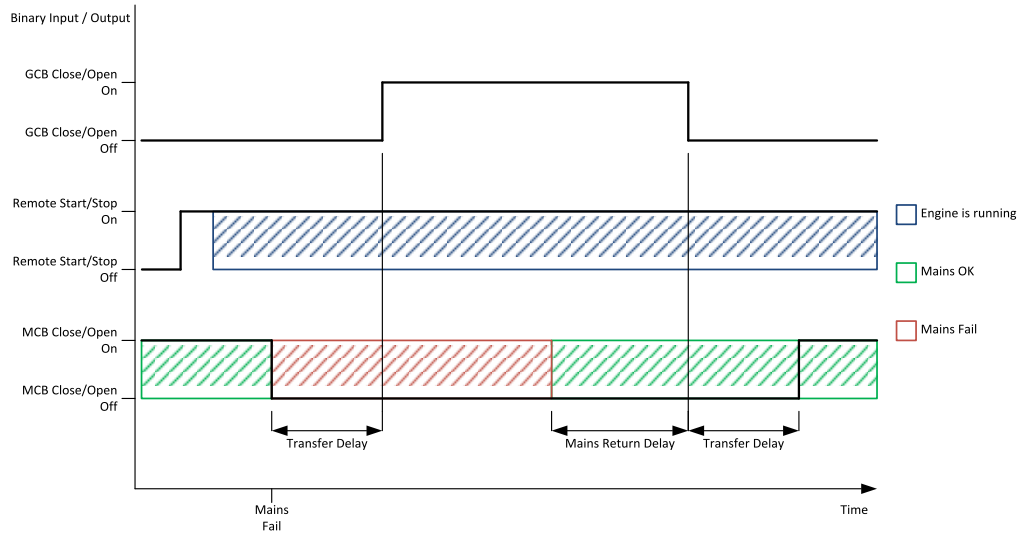


Image 8.35 Remote Start/Stop

Taken action in AMF application (AUTO Mode)	
Active	› Start the Gen-set and stay running with opened GCB if Mains OK. › Go to Island if Mains fails (due to AMF function). › If Mains is not OK the AMF function starts the Gen-set to Island anyway.
Inactive	› Stop the Gen-set if Mains is OK › If Mains not OK the Gen-set stays running due to AMF function anyway.

Taken action in MRS application (AUTO Mode)	
Active	› Starts the Gen-set – No delay › Close GCB
Inactive	› Open GCB › Stop the Gen-set – No delay

back to Logical binary inputs alphabetically

Remote TEST

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	621		
Description			
The controller is switched to the TEST mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode. Remote control priority: › Remote OFF (Highest priority) › Remote TEST › Remote MAN › Remote AUTO (Lowest Priority)			

back to Logical binary inputs alphabetically

LBI: S

Sd Override

Related FW	1.4.0	Related applications	AMF, MRS
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 496) is indicated in the alarm list if Sd Override mode is active to inform the operator that the engine is not protected.* **IMPORTANT: MISUSE OF THIS INPUT CAN CAUSE DAMAGE TO THE GEN-SET!** ***Note:*** *User protection Sd Override is not blocked*			

back to Logical binary inputs alphabetically

Start Blocking

Related FW	1.4.0	Related applications	AMF, MRS
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 536)** is not active.			

back to Logical binary inputs alphabetically

Start Button

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	189		
Description			
Binary input has the same function as Start Button on the InteliLite 4 front panel. It is evaluated in MAN mode only.			

back to Logical binary inputs alphabetically

Stop Button

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	190		
Description			
Binary input has the same function as Stop Button on the InteliLite 4 front panel. It is evaluated in MAN Mode only.			

back to Logical binary inputs alphabetically

Switch To AUT

Related FW	1.4.0	Related applications	AMF, MRS
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 498)** 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	1.4.0	Related applications	AMF, MRS
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 497)** 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	1.4.0	Related applications	AMF, MRS
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 497)** 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

LBI: T

Total Emergency Stop

Related FW	1.4.0	Related applications	AMF, MRS
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

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 503
LBO: C 509
LBO: D 510
LBO: E 511
LBO: F 515
LBO: G 518
LBO: H 524
LBO: I 525
LBO: L 527
LBO: M 528
LBO: N 533
LBO: P 534
LBO: R 536
LBO: S 538
LBO: V 542

For a full list of Logical binary inputs go to the chapter **Logical binary outputs alphabetically (page 501)**.

Logical binary outputs alphabetically

AIN Switch01 503
AIN Switch02 503
Air Valves 504
AL Common BOC 504
AL Common Sd 504
AL Common Wrn 505
AL Gen Freq Wrn 505
AL Gen Frequency 505
AL Gen Voltage 505
AL Gen Voltage Wrn 505
AL Mains Fail 506
AL Mains Frequency 506
AL Mains Voltage 506
AL Maintenance 1 506
AL Maintenance 2 506
AL Maintenance 3 507
AL Gen Overcurrent 507
Alarm 507
ATT DEF Level Lamp 507
ATT DPF Lamp 507
ATT HEST Lamp 508
ATT Inhibited Lamp 508
ATT Interlock Status 508
ATT SCR Error Lamp 508
ATT Regen ACK Lamp 508
ATT PCD Lamp 509
Choke 509
Cooling 509
Cooling Pump 509
Common Alarm Active Level 1 510
Common Alarm Active Level 2 510
Common Alarm Level 1 510
Common Alarm Level 2 510
Dual Operation OK 510
Dummy Load Stage 1 510
Dummy Load Stage 2 511
ECU Comm OK 511
ECU Comm Error 512
ECU Power Relay 512
ECU Red Lamp 513
ECU Run Stop 513
ECU Wait To Start 513
ECU Yellow Lamp 513
Electrical Alarm 513
Exercise Timer 1 514
Exercise Timer 2 514
Exercise Timer 3 514
Exercise Timer 4 514
FltRes Button Echo 515
FltRes Button State 515
Frequency Select 516
Fuel Pump 516
Fuel Solenoid 516
GCB Button Echo 518
GCB Button State 518
GCB Close/Open 518
GCB OFF Coil 519
GCB ON Coil 520
GCB UV Coil 520
Gen-set Active 521
Generator Healthy 522
Glow Plugs 522
Heartbeat 524
History Record Indication 524
Horn 524
HornRes Button Echo 524
HornRes Button State 525
Idle/Nominal 525
Ignition 525
Ignition On 526
Initialized 527
Load Shedding Stage 1 527
Load Shedding Stage 2 527
Mains Healthy 528
Manual Ready 528
MCB Button Echo 528
MCB Button State 528
MCB Close/Open 529
MCB OFF Coil 530
MCB ON Coil 531
MCB UV Coil 532
Mode AUTO 533
Mode MAN 533
Mode OFF 533
Mode TEST 533
Neutral Close/Open 533
Neutral ON Coil 534
Not In AUTO 534
Not Used 534
Peripheral Module Comm Fail 534
Prestart 534
Ready 536
Ready To AMF 536
Ready To Load 537
RegenerationNeeded 537
Running 537
Sd Override 538
Start Button Echo 538
Start Button State 538
Starter 539
Stop Button Echo 539
Stop Button State 540
Stop Pulse 540
Stop Solenoid 540
Supplying Load 542
Ventilation 542
Ventilation Off Pulse 542
Ventilation On Pulse 542

back to Controller objects

LBO: A

AIN Switch01

Related FW	1.4.0	**Related applications**	AMF, MRS
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 298)** and **AIN Switch01 Off (page 299)**. The value is measured from **AIN SWITCH 01 (PAGE 546)** analog input.

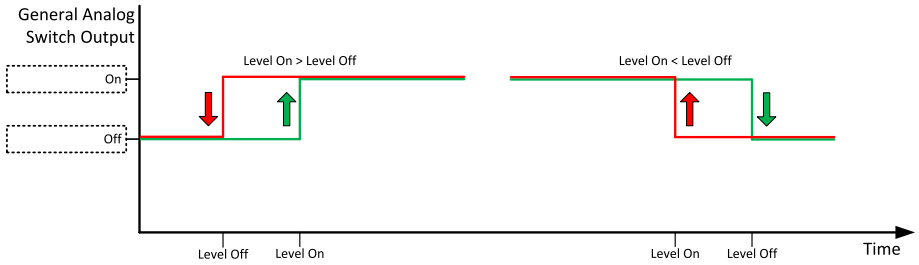


Image 8.36 General analog input 1 switch

back to Logical binary outputs alphabetically

AIN Switch02

Related FW	1.4.0	**Related applications**	AMF, MRS
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 300)** and **AIN Switch02 Off (page 301)**. The value is measured from **AIN SWITCH 02 (PAGE 546)** analog input.

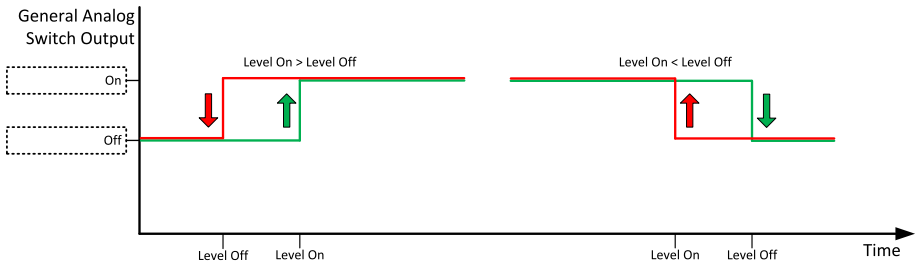


Image 8.37 General analog input 2 switch

back to Logical binary outputs alphabetically

Air Valves

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1247		
Description			

This output is activated together with binary output **PRESTART (PAGE 534)** and opens after the engine is stopped or in case that engine is not ready.

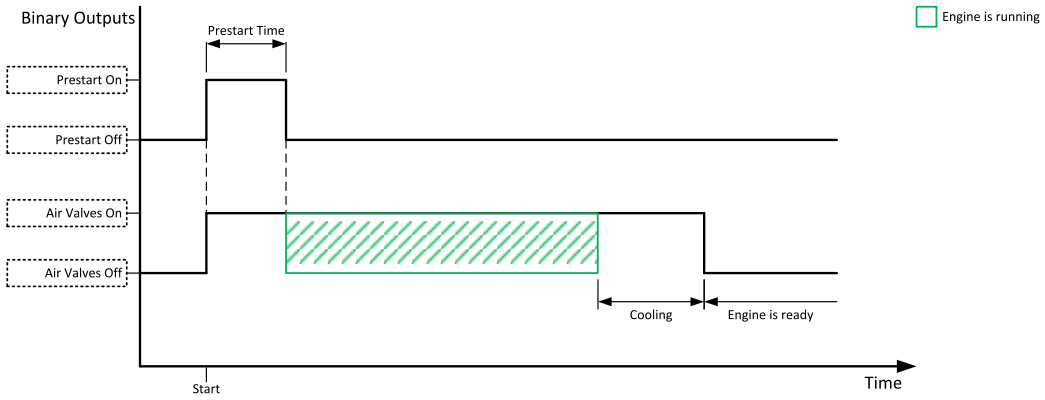


Image 8.38 Air Valves

back to Logical binary outputs alphabetically

AL Common BOC

Related FW	1.4.0	Related applications	AMF, MRS
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 Sd

Related FW	1.4.0	Related applications	AMF, MRS
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 Wrn

Related FW	1.4.0	Related applications	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
Comm object	1267		
Description			
This output is active generator frequency warning alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Gen Frequency

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1266		
Description			
This output is active when at least one generator frequency alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Gen Voltage

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1263		
Description			
This output is active when at least one generator voltage alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Gen Voltage Wrn

Related FW	1.4.0	Related applications	AMF, MRS
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 Mains Fail

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	197		
Description			
This output is active when at least one mains frequency BOC or SD Alarm is present in alarmlist or in case of Mains undervoltage and Mains underfrequency (doesn't appear in the alarm list).			

back to Logical binary outputs alphabetically

AL Mains Frequency

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1271		
Description			
This output is active when at least one mains frequency BOC or Sd alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Mains Voltage

Related FW	1.4.0	Related applications	AMF, MRS
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.			

back to Logical binary outputs alphabetically

AL Maintenance 1

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2211		
Description			
Alarm is active when **Wrn Maintenance Timer 1 RunHours (page 578)** or **BOC Maintenance Timer 1 RunHours (page 616)** or **Wrn Maintenance Timer 1 Interval (page 579)** or **BOC Maintenance Timer 1 Interval (page 616)** is active.			

back to Logical binary outputs alphabetically

AL Maintenance 2

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2212		
Description			
Alarm is active when **Wrn Maintenance Timer 2 RunHours (page 579)** or **BOC Maintenance Timer 2 RunHours (page 616)** or **Wrn Maintenance Timer 2 Interval (page 579)** or **BOC Maintenance Timer 2 Interval (page 617)** is active.			

back to Logical binary outputs alphabetically

AL Maintenance 3

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2213		
Description			
Alarm is active when Wrn Maintenance Timer 3 RunHours (page 579) or BOC Maintenance Timer 3 RunHours (page 617) or Wrn Maintenance Timer 3 Interval (page 580) or BOC Maintenance Timer 3 Interval (page 617) is active.			

back to Logical binary outputs alphabetically

AL Gen Overcurrent

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	109		
Description			
This output is active when the BOC Overcurrent IDMT (page 616) or BOC Short Circuit (page 615) alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

Alarm

Related FW	1.4.0	Related applications	AMF, MRS
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

ATT DEF Level Lamp

Related FW	1.4.0	Related applications	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
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	1.4.0	**Related applications**	AMF, MRS
Comm object	1373		
Description			
This output is closed if ECU send signal HEST Lamp. If ECU stop send HEST LAMP signal binary input will be opened without no matter if alarms in alarmlist are confirmed or not.			

back to Logical binary outputs alphabetically

ATT Inhibited Lamp

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	2155		
Description			
This output is active when ATT Inhibited Lamp is active.			

back to Logical binary outputs alphabetically

ATT Interlock Status

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	2233		
Description			
This output is active when ATT Interlock Status is active.			

back to Logical binary outputs alphabetically

ATT SCR Error Lamp

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	2153		
Description			
This output is active when ATT SCR Error Lamp is active.			

back to Logical binary outputs alphabetically

ATT Regen ACK Lamp

Related FW	1.4.0	**Related applications**	AMF, MRS
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 PCD Lamp

Related FW	1.4.0	Related applications	AMF, MRS
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

LBO: C

Choke

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2091		
Description			
Logical binary output for choke valve control. Output CHOKE is activated every time when logical binary output STARTER (PAGE 539) is activated. Output is deactivated when one of these conditions is fulfilled: › Choke Time is elapsed › Generator voltage is higher than Choke Voltage › Logical binary input Choke Inhibit is activated Or when some of these situations during start occurs: › Any second level alarm › Emergency stop › Stop command › Cranking pause			

back to Logical binary outputs alphabetically

Cooling

Related FW	1.4.0	Related applications	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
Comm object	40		
Description			
This LBO is used for control of engine cooling. LBO is active when engine is running, when after cooling time is counting or when LBI Cooling Pump is active.			

back to Logical binary outputs alphabetically

Common Alarm Active Level 1

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	13		
Description			
This output is closed when there is at least one **Alarms level 1 (page 560)** in the alarmlis.			

back to Logical binary outputs alphabetically

Common Alarm Active Level 2

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	15		
Description			
This output is closed when there is at least one **Alarms level 2 (page 594)** in the alarmlis.			

back to Logical binary outputs alphabetically

Common Alarm Level 1

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	14		
Description			
This output is closed when there is at least one **unconfirmed Alarms level 1 (page 560)** in the alarmlist.			

back to Logical binary outputs alphabetically

Common Alarm Level 2

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	16		
Description			
This output is closed when there is at least one **unconfirmed Alarms level 2 (page 594)** in the alarmlist.			

back to Logical binary outputs alphabetically

LBO: D

Dual Operation OK

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2096		
Description			
This LBO is active when there is not **AHI Dual Operation Fail (page 575)** alarm in alarmlist.			

back to Logical binary outputs alphabetically

Dummy Load Stage 1

Related FW	1.4.0	Related applications	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
Comm object	1440		
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	1.4.0	Related applications	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
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 Comm OK

Related FW	1.4.0	Related applications	AMF, MRS
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 512)*** *is not configured, output is evaluated all the time. If* ***ECU POWER RELAY (PAGE 512)*** *is configured, output is evaluated only when engine is not stop (****ECU POWER RELAY (PAGE 512)*** *is active).*			

back to Logical binary outputs alphabetically

ECU Comm Error

Related FW	1.4.0	Related applications	AMF, MRS
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 512)*** *is not configured, output is evaluated all the time. If* ***ECU POWER RELAY (PAGE 512)*** *is configured, output is evaluated only when engine is not stop (****ECU POWER RELAY (PAGE 512)*** *is active).*

back to Logical binary outputs alphabetically

ECU Power Relay

Related FW	1.4.0	Related applications	AMF, MRS
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 534)** 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 516)**).

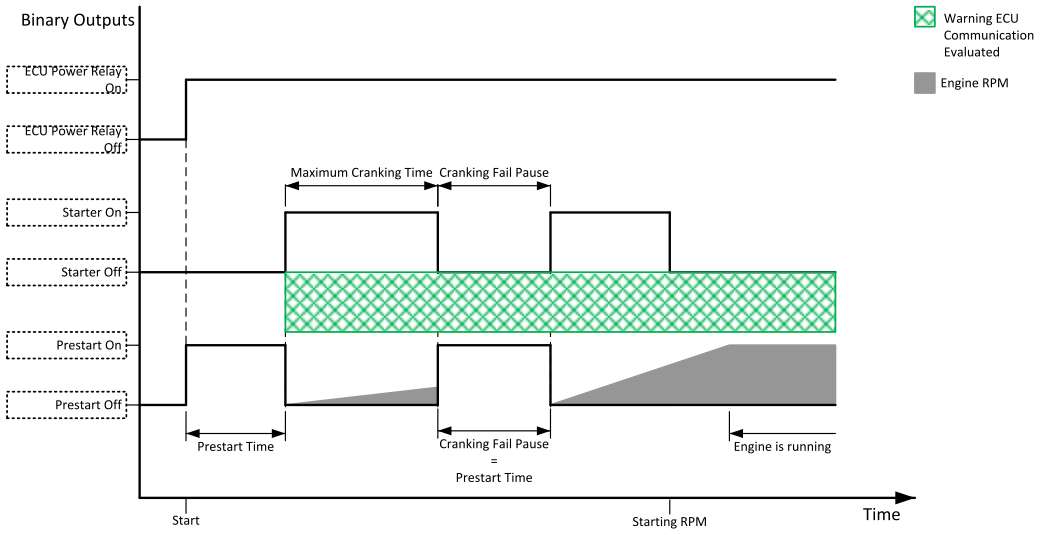


Image 8.39 ECU Power Relay

> **IMPORTANT: This LBO also affects evaluation of Sd ECU Communication Fail (page 599) or Wrn ECU Communication Fail (page 570) alarms. With configured LBO ECU Power Relay, these alarms are evaluated only when this LBO is active. Without configured LBO ECU Power Relay, these alarm are evaluated all the time.**

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ECU Red Lamp

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	350		
Description			
This output is active when the ECU sends an active “red lamp” flag, i.e. it has detected a critical malfunction and the engine should not be operated until a service check is performed. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.			

back to Logical binary outputs alphabetically

ECU Run Stop

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	958		
Description			
Signal for starting and stopping of ECU.			

back to Logical binary outputs alphabetically

ECU Wait To Start

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	959		
Description			
This output is active when ECU Wait To Start Lamp is active.			

back to Logical binary outputs alphabetically

ECU Yellow Lamp

Related FW	1.4.0	Related applications	AMF, MRS
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	1.4.0	Related applications	AMF, MRS
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

Exercise Timer 1

Related FW	1.4.0	Related applications	AMF, MRS
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 305)** 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 305)*** *has a higher priority than* ***Subgroup: Timer 2 (page 313)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 2

Related FW	1.4.0	Related applications	AMF, MRS
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 313)** 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 305)*** *has a higher priority than* ***Subgroup: Timer 2 (page 313)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 3

Related FW	1.4.0	Related applications	AMF, MRS
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 321)** 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 321)*** *has a higher priority than* ***Subgroup: Timer 3 (page 321)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 4

Related FW	1.4.0	Related applications	AMF, MRS
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 329)** 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 329)*** *has a higher priority than* ***Subgroup: Timer 4 (page 329)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 5

Related FW	1.4.0	Related applications	AMF, MRS
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 337)** 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	1.4.0	Related applications	AMF, MRS
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 345)** 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	1.4.0	Related applications	AMF, MRS
Comm object	592		
Description			
This output provides 1s pulse when: › Fault Reset button is pressed on the controller front facia or › Fault Reset button is pressed on any of external local/remote terminals or › Fault Reset command is received via communication line or › The input **FAULT RESET BUTTON (PAGE 484)** is activated.			

back to Logical binary outputs alphabetically

FltRes Button State

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2695		
Description			
LBO is active as long as it's button is pressed or it's LBI is active.			

back to Logical binary outputs alphabetically

Frequency Select

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1815		
Description			
The Frequency select output is active when Nominal Frequency (Frequency Settings) is equal to 50 Hz and is deactivated when Nominal Frequency (Frequency Settings) is equal to 60 Hz.			

back to Logical binary outputs alphabetically

Fuel Pump

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1253		
Description			
Output is activated when the value of Fuel Level lies under the value of setpoint **Fuel Pump On (page 254)** and is deactivated when value of **Fuel Pump Off (page 255)** is reached. This output also can be activated by binary input **FUEL PUMP ON/OFF (PAGE 485)**. In this case the binary output is active until the binary input **FUEL PUMP ON/OFF (PAGE 485)** is active or until the value of Fuel Level reaches 100 % or the time set by setpoint **Transfer Wrn Delay (page 256)** elapsed.			

back to Logical binary outputs alphabetically

Fuel Solenoid

Related FW	1.4.0	**Related applications**	AMF, MRS
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 228)** setpoint in Engine Settings group. **Diesel:** The output is activated before binary output **STARTER (PAGE 539)**.The lead time is adjusted by setpoint **Fuel Solenoid Lead (page 238)**.			

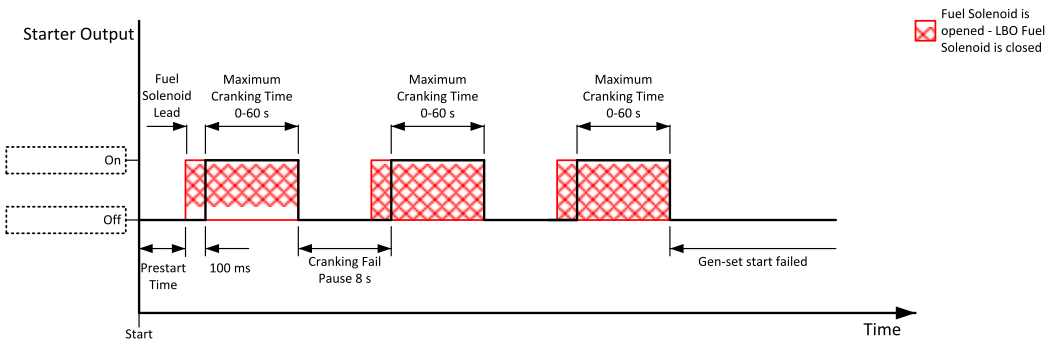


Image 8.40 Fuel Solenoid 1

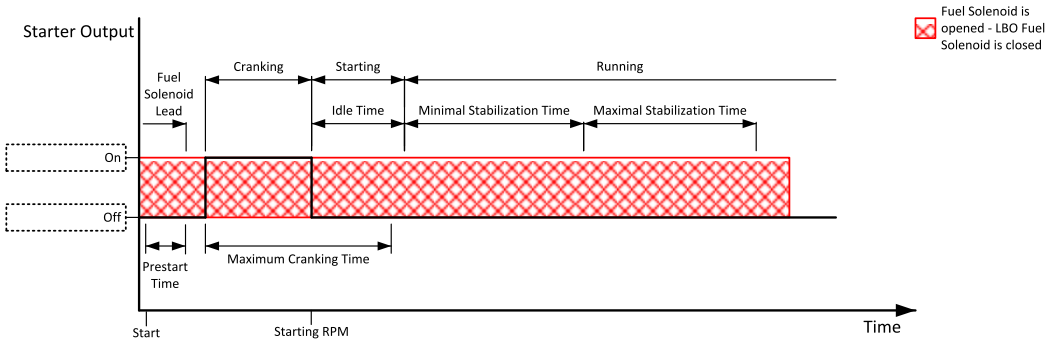


Image 8.41 Fuel Solenoid 2

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 525)** when engine RPM exceed 30 RPM (fix value).

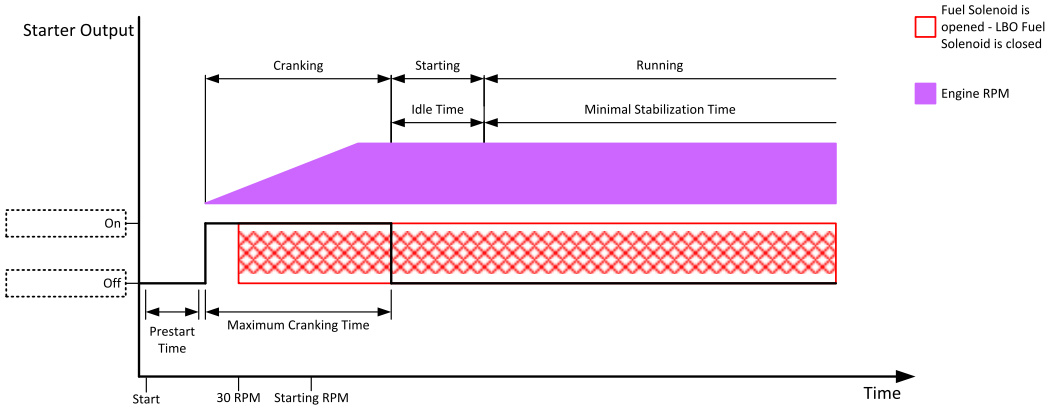


Image 8.42 Fuel Solenoid 3

The output is deactivated when:

- Emergency Stop comes
- Cooled Gen-set is stopped
- In pause between repeated starts

back to Logical binary outputs alphabetically

LBO: G

GCB Button Echo

Related FW	1.4.0	Related applications	AMF, MRS
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 Button State

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2698		
Description			

LBO is active as long as it's button is pressed or it's LBI is active.

back to Logical binary outputs alphabetically

GCB Close/Open

Related FW	1.4.0	Related applications	AMF, MRS
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: *InteliLite 4 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

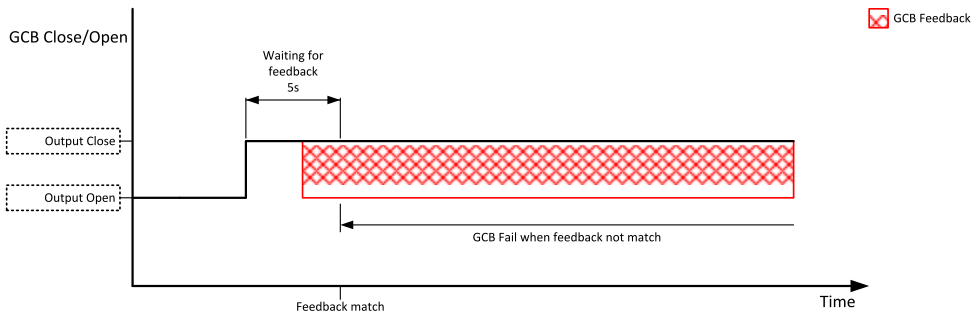


Image 8.43 GCB Close command

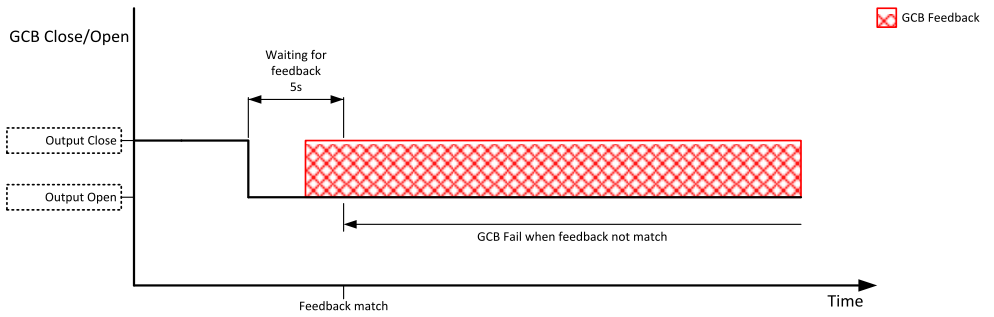


Image 8.44 GCB Open command

back to Logical binary outputs alphabetically

GCB OFF Coil

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	43		

Description

The output is intended for control of open coil of generator circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.

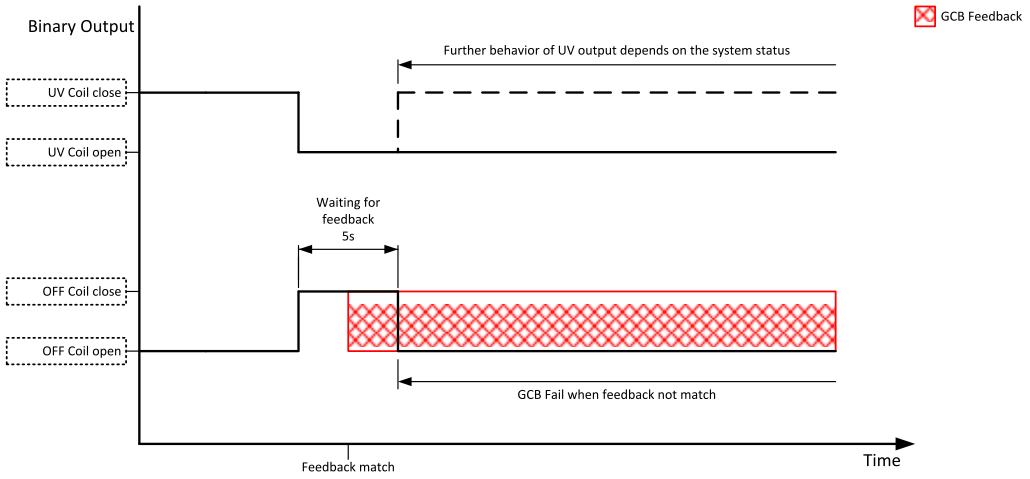


Image 8.45 GCB OFF Coil command

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GCB ON Coil

Related FW	1.4.0	Related applications	AMF, MRS
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.			

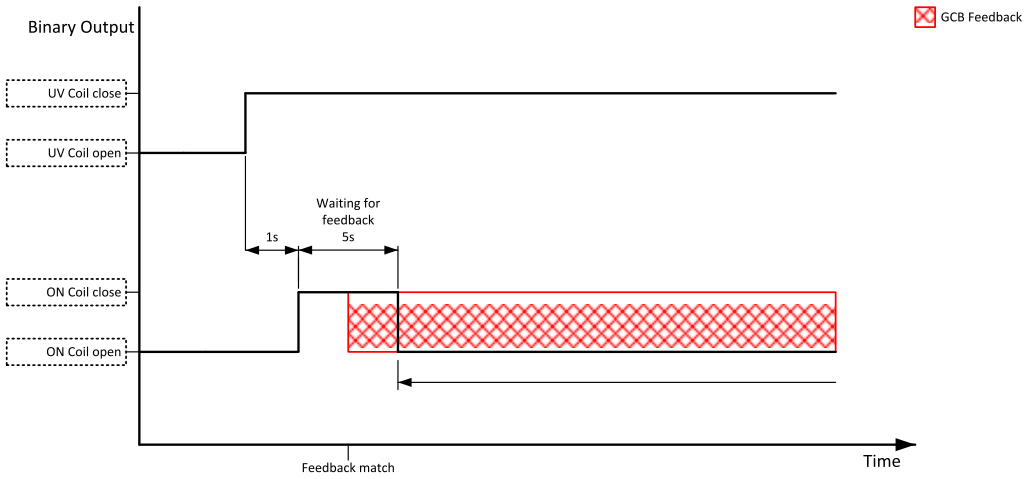


Image 8.46 GCB ON Coil close command

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GCB Status

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	84		
Description			
This output indicates the GCB position as it is internally considered by the controller.			

back to Logical binary outputs alphabetically

GCB UV Coil

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	44		
Description			
The output is intended for control of undervoltage coil of generator circuit breaker. The output is active the whole time when the generator is running. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.			

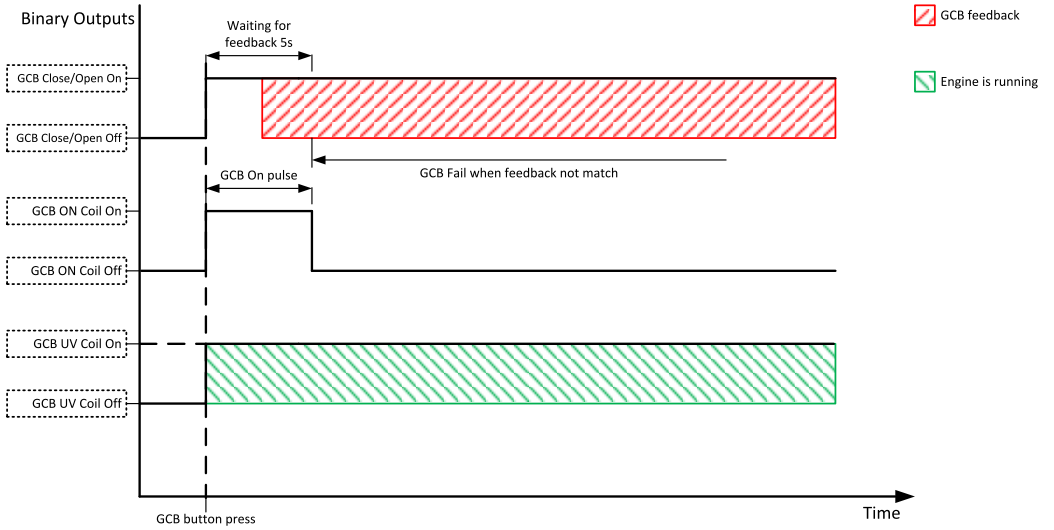


Image 8.47 GCB UV Coil close command

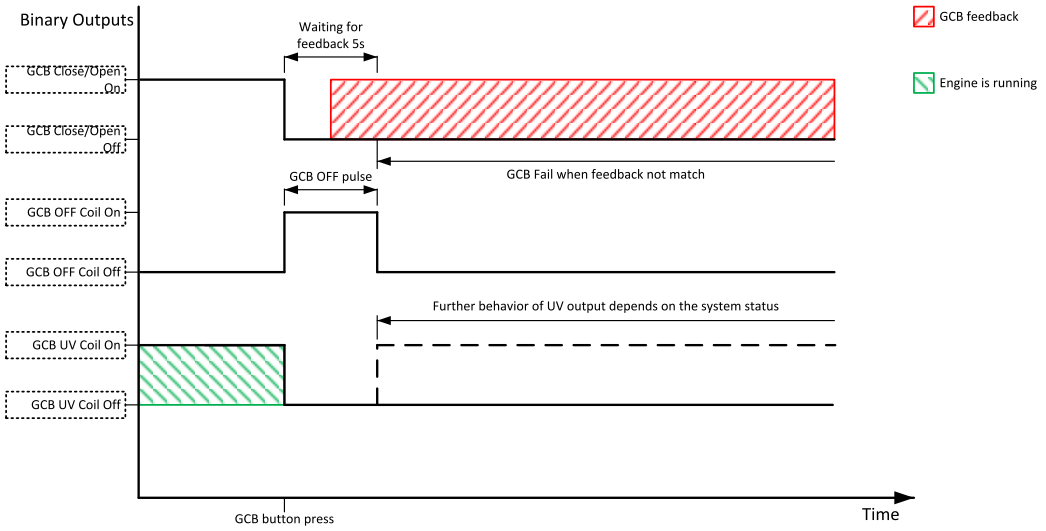


Image 8.48 GCB UV Coil open command

back to Logical binary outputs alphabetically

Gen-set Active

Related FW	1.4.0	**Related applications**	AMF, MRS
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

Generator Healthy

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	77		
Description			

This output is active when the generator voltage, frequency and voltage unbalance is within limits. It is deactivated:

- immediately when the voltage/frequency/voltage unbalance gets out of limits (when GCB is not closed)
  or
- with an appropriate delay after the voltage/frequency/voltage unbalance has got out of limits (when GCB is closed)

back to Logical binary outputs alphabetically

Glow Plugs

Related FW	1.4.0	Related applications	AMF, MRS
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 231)** before every starting attempt. The output is deactivated at the same time as the **STARTER (PAGE 539)** output is activated (100 ms after **PRESTART (PAGE 534)** output is deactivated).

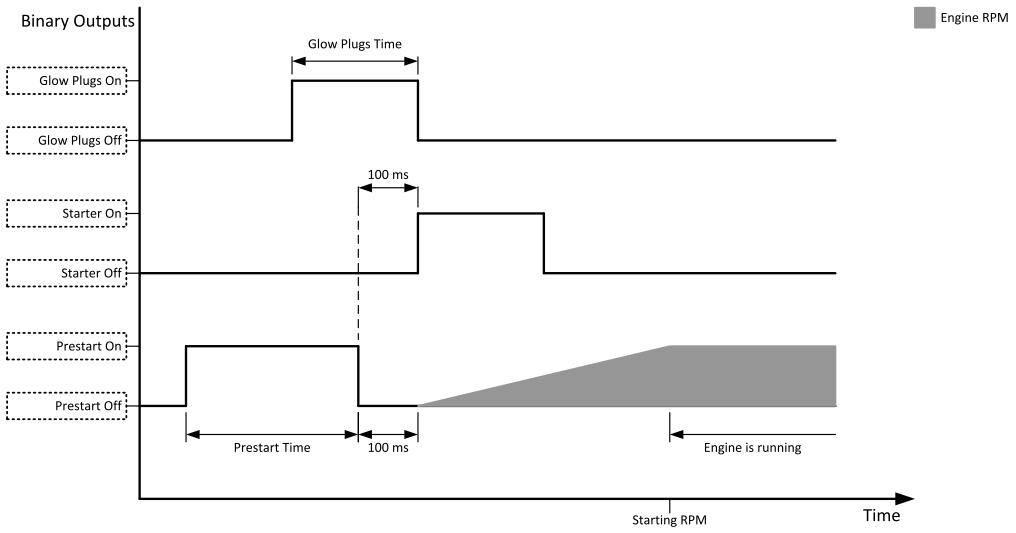


Image 8.49 Glow Plugs

When the **Glow Plugs Time (page 231)** is longer than **Cranking Fail Pause (page 229)** then the **Glow Plugs Time (page 231)** in **Cranking Fail Pause (page 229)** as long as **Cranking Fail Pause (page 229)**.

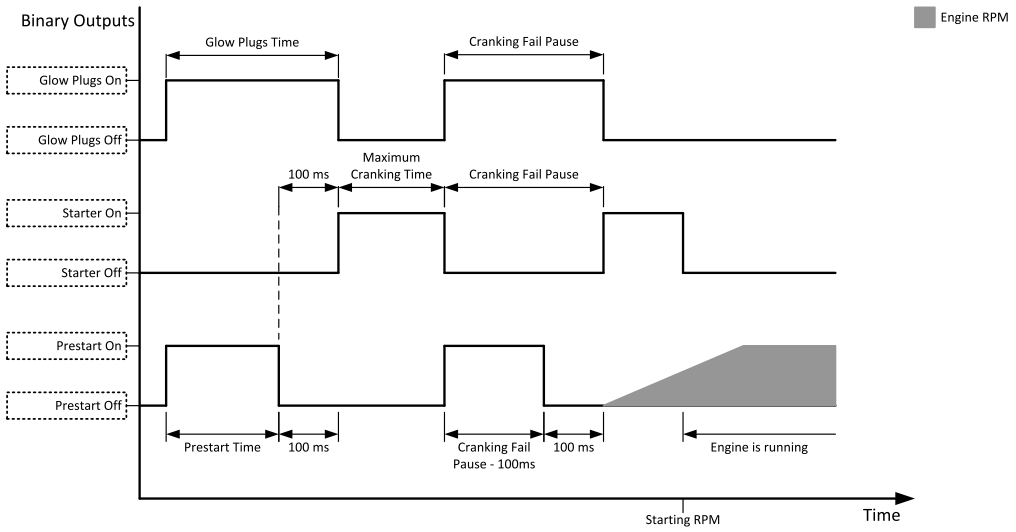


Image 8.50 Glow Plugs in Cranking Fail Pause 1

When the **Glow Plugs Time (page 231)** is shorter than **Cranking Fail Pause (page 229)** then the **Glow Plugs Time (page 231)** in **Cranking Fail Pause (page 229)** as long as the normal **Glow Plugs Time (page 231)**.

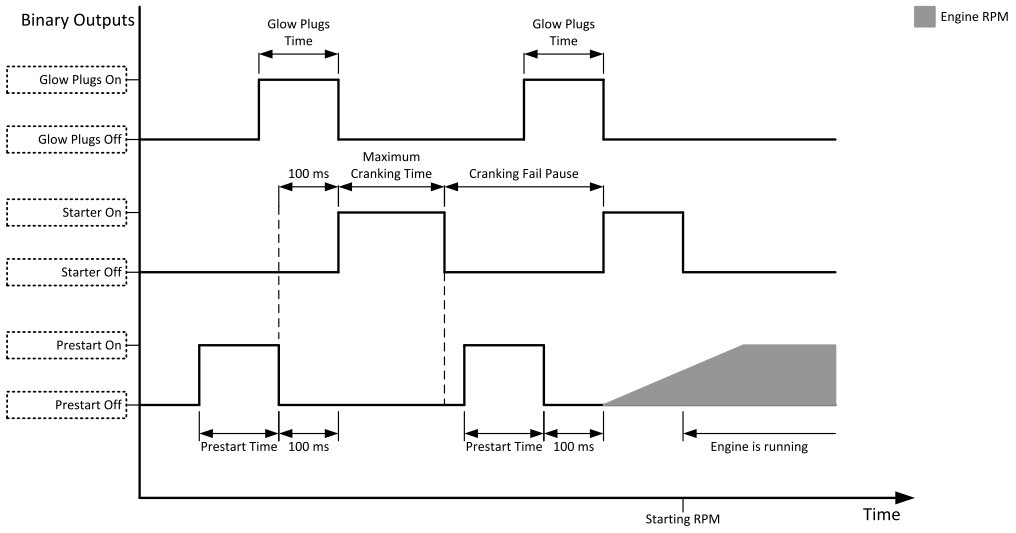


Image 8.51 Glow Plugs in Cranking Fail Pause 2

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LBO: H

Heartbeat

Related FW	1.4.0	**Related applications**	AMF, MRS
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	1.4.0	**Related applications**	AMF, MRS
Comm object	2762		
Description			
This LBO triggers 1s pulse when new history record is created in history log. ***Note:*** *When more history records are created at the same time, only one 1s pulse is created.*			

back to Logical binary outputs alphabetically

Horn

Related FW	1.4.0	**Related applications**	AMF, MRS
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 223)** has elapsed			

back to Logical binary outputs alphabetically

HornRes Button Echo

Related FW	1.4.0	**Related applications**	AMF, MRS
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

HornRes Button State

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2696		
Description			
LBO is active as long as it's button is pressed or it's LBI is active.			

back to Logical binary outputs alphabetically

LBO: I

Idle/Nominal

Related FW	1.4.0	Related applications	AMF, MRS
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 238)** elapses. The **Idle Time (page 238)** starts to countdown when **Starting RPM (page 230)** reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching **Starting RPM (page 230)**. A Start Fail protection occurs if the RPM drop below 2RPM during idle.

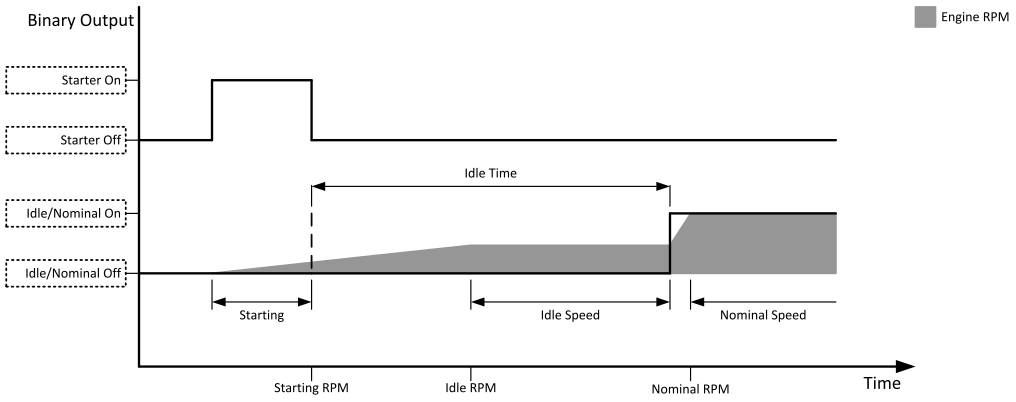


Image 8.52 Idle/Nominal

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

Ignition

Related FW	1.4.0	Related applications	AMF, MRS
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 516)** in the moment when the Gen-set reaches at least 30 RPM during cranking. The output is deactivated 500 ms after all **Additional running engine indications (page 118)** will be inactive. the output is deactivated when the Gen-set has to be stopped or in pause during repeated starts.

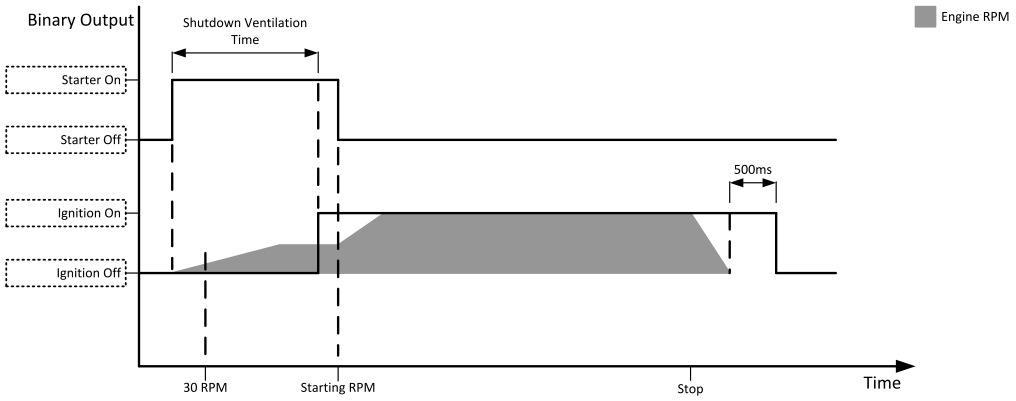


Image 8.53 Ignition 1

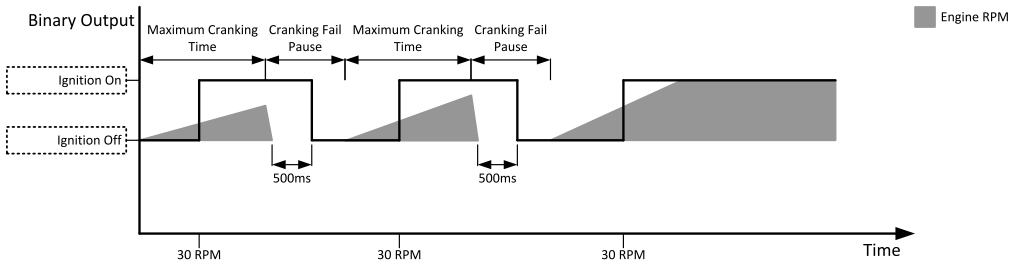


Image 8.54 Ignition 2

back to Logical binary outputs alphabetically

Ignition On

Related FW	1.4.0	**Related applications**	AMF, MRS
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 512)**. Ignition ON stays there from historical reasons.*

back to Logical binary outputs alphabetically

Initialized

Related FW	1.4.0	**Related applications**	AMF, MRS
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: L

Load Shedding Stage 1

Related FW	1.4.0	**Related applications**	AMF, MRS
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	1.4.0	**Related applications**	AMF, MRS
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

LBO: M

Mains Healthy

Related FW	1.4.0	Related applications	AMF, MRS
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 600)** in the alarmlist

Note: *Mains Healthy cannot be activated when there is active* ***ALI Mains Ph Rotation Opposite (page 591)*** *or* ***ALI Mains Ph L1 Inverted (page 591)***, ***ALI Mains Ph L2 Inverted (page 591)*** *or* ***ALI Mains Ph L3 Inverted (page 591)***.

back to Logical binary outputs alphabetically

Manual Ready

Related FW	1.4.0	Related applications	AMF, MRS
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 496)** is active (Output **READY (PAGE 536)** is active).

back to Logical binary outputs alphabetically

MCB Button Echo

Related FW	1.4.0	Related applications	AMF, MRS
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 Button State

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2697		
Description			

LBO is active as long as it's button is pressed or it's LBI is active.

back to Logical binary outputs alphabetically

MCB Close/Open

Related FW	1.4.0	Related applications	AMF, MRS
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:*** *InteliLite 4 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

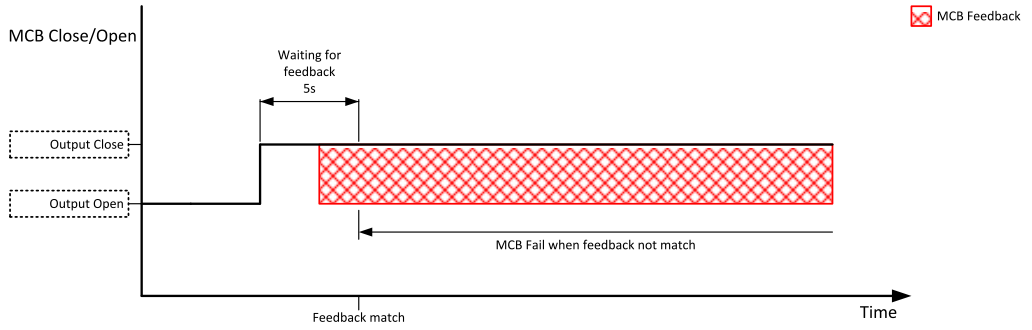


Image 8.55 MCB Close command

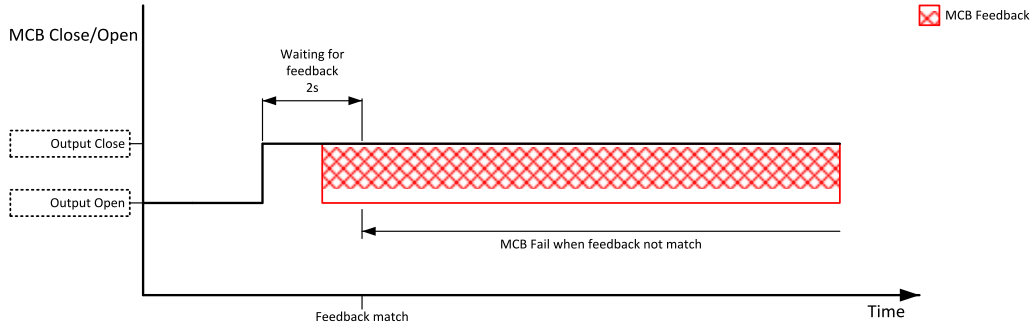


Image 8.56 MCB Close command

back to Logical binary outputs alphabetically

MCB OFF Coil

Related FW	1.4.0	Related applications	AMF, MRS
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.

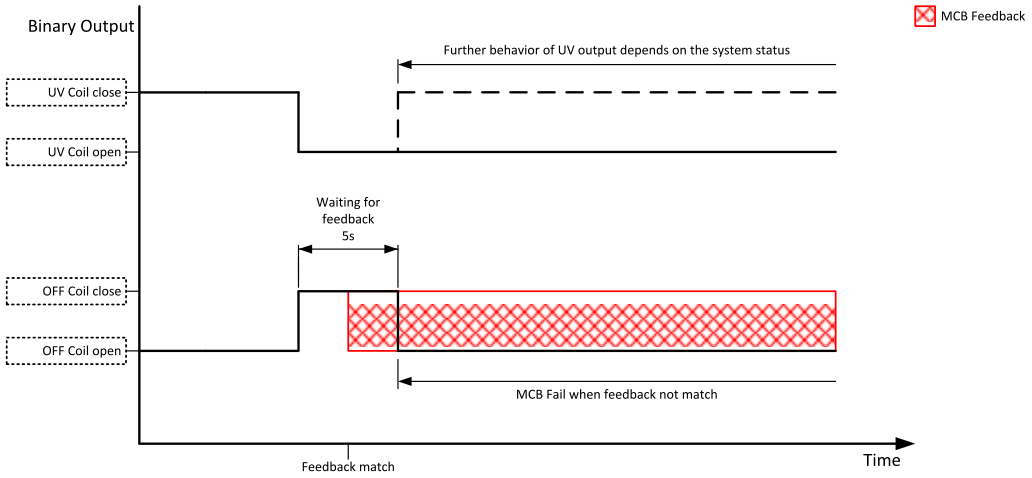


Image 8.57 MCB OFF Coil command

back to Logical binary outputs alphabetically

MCB ON Coil

Related FW	1.4.0	Related applications	AMF, MRS
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.			

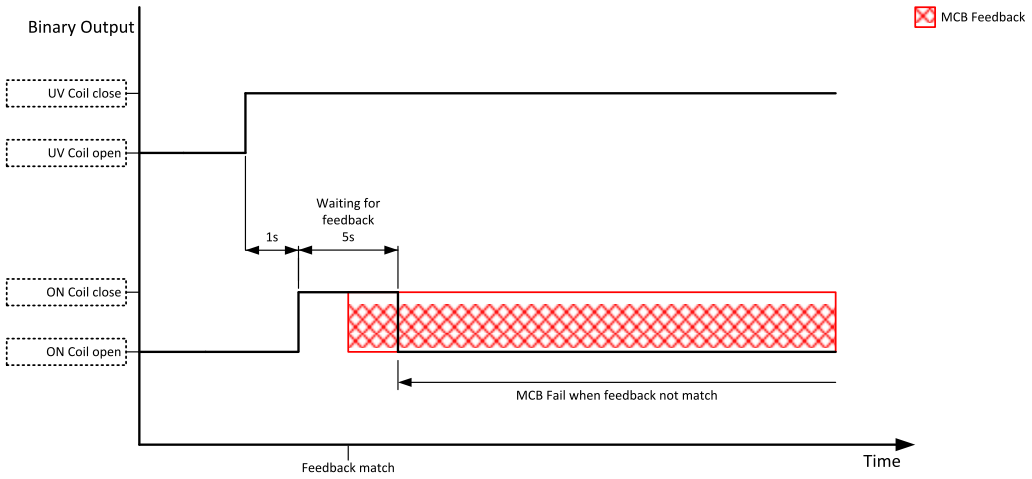


Image 8.58 MCB ON Coil close command

back to Logical binary outputs alphabetically

MCB Status

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	85		
Description			
This output indicates the MCB position as it is internally considered by the controller.			

back to Logical binary outputs alphabetically

MCB UV Coil

Related FW	1.4.0	Related applications	AMF, MRS
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.

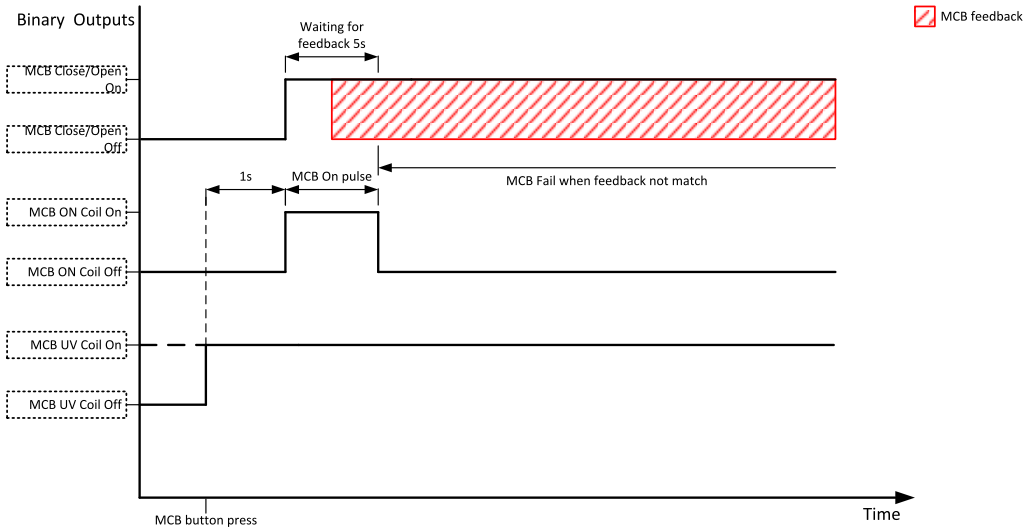


Image 8.59 MCB UV Coil close command

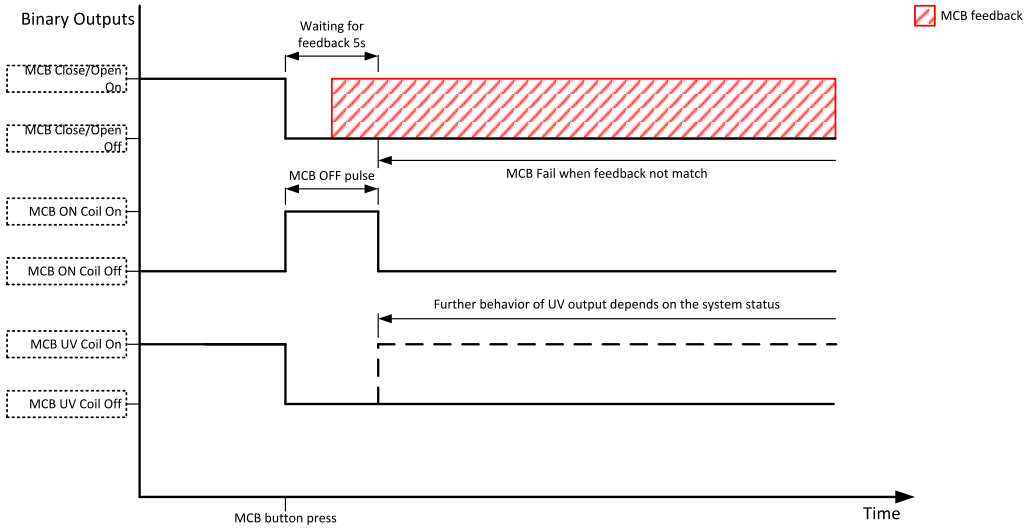


Image 8.60 MCB UV Coil open command

back to Logical binary outputs alphabetically

Mode AUTO

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	19		
Description			
This output is active whenever the controller is in AUTO mode.			

back to Logical binary outputs alphabetically

Mode MAN

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	18		
Description			
This output is active whenever the controller is in MAN mode.			

back to Logical binary outputs alphabetically

Mode OFF

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	17		
Description			
This output is active whenever the controller is in OFF mode.			

back to Logical binary outputs alphabetically

Mode TEST

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	20		
Description			
This output is active whenever the controller is in TEST mode.			

back to Logical binary outputs alphabetically

LBO: N

Neutral Close/Open

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	50		
Description			
The output controls the neutral position of the three positions ATS switch. The ATS switch must react within 5 seconds to a close or open command, otherwise an alarm is issued. ***Note:*** *InteliLite 4 controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*			

back to Logical binary outputs alphabetically

Neutral ON Coil

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	2591		
Description			
The output activates the neutral position coil of the three positions ATS switch. The pulse lasts for 5 seconds.			

back to Logical binary outputs alphabetically

Not In AUTO

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	1248		
Description			
This output is active when controller isn't in AUTO mode.			

back to Logical binary outputs alphabetically

Not Used

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	286		
Description			
Output has no function.			

back to Logical binary outputs alphabetically

LBO: P

Peripheral Module Comm Fail

Related FW	1.4.0	**Related applications**	AMF, MRS
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

Prestart

Related FW	1.4.0	**Related applications**	AMF, MRS
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 230)**. The output is deactivated 100 ms before the **STARTER (PAGE 539)** output is activated.

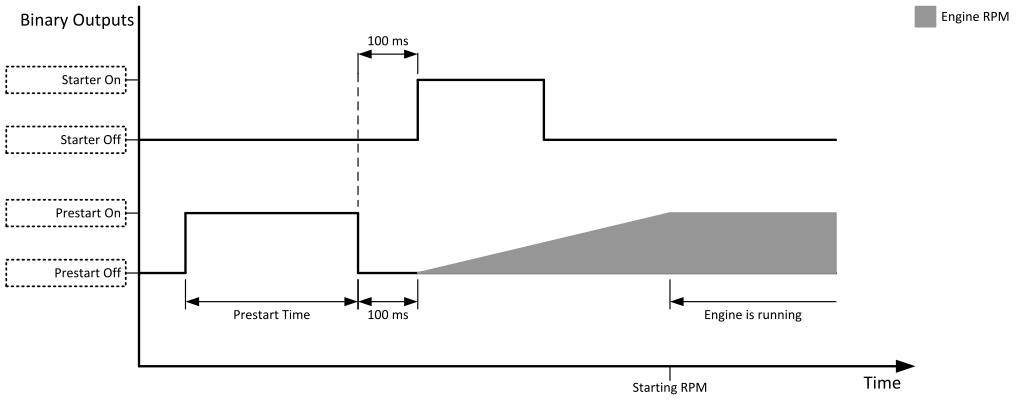


Image 8.61 Engine start

When the **Prestart Time (page 230)** is longer than **Cranking Fail Pause (page 229)** then the **Prestart Time (page 230)** in **Cranking Fail Pause (page 229)** is long as **Cranking Fail Pause (page 229)** minus 100 ms.

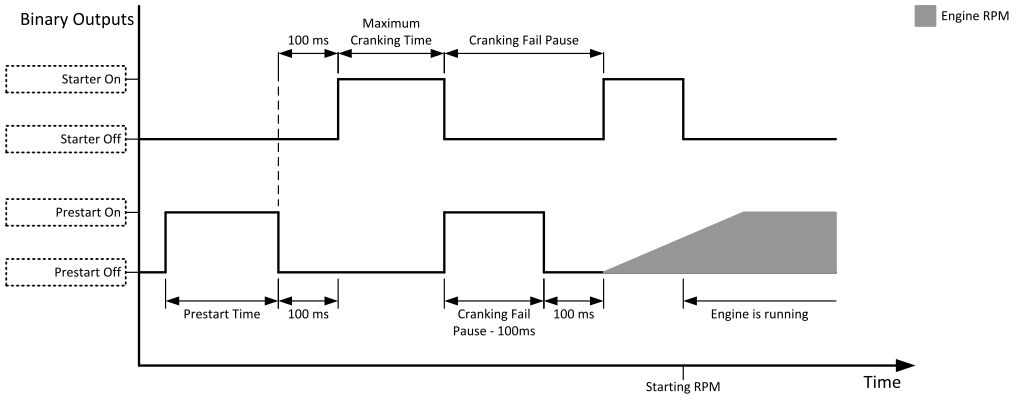


Image 8.62 Prestart in Cranking Fail Pause 1

When the **Prestart Time (page 230)** is shorter than **Cranking Fail Pause (page 229)** then the **Prestart Time (page 230)** in **Cranking Fail Pause (page 229)** is long as normal **Prestart Time (page 230)**.

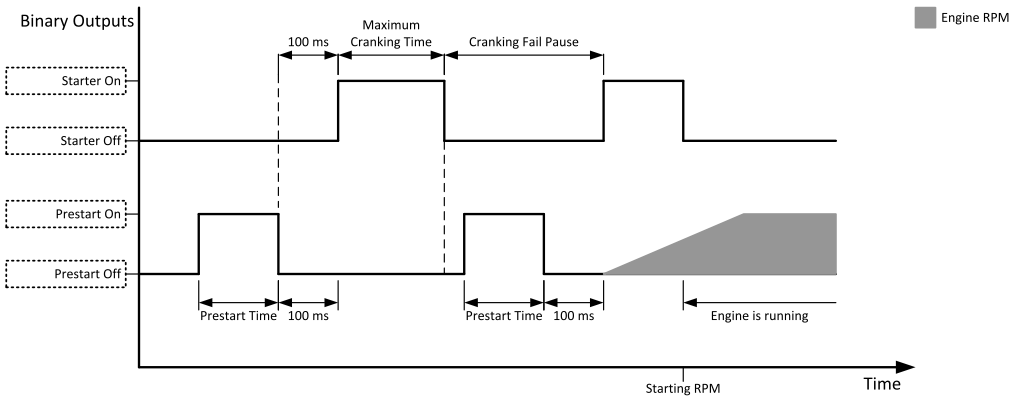


Image 8.63 Prestart in Cranking Fail Pause 2

back to Logical binary outputs alphabetically

LBO: R

Ready

Related FW	1.4.0	**Related applications**	AMF, MRS
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 496)** 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	1.4.0	**Related applications**	AMF, MRS
Comm object	324		
Description			

the output is active if the Gen-set is ready to start automatically and take the load if the mains fails, i.e.:

- the controller is in AMF operating mode
- the controller is in AUTO controller mode and
- no red alarm is present in the alarmlist
- when the red alarm is confirmed during Stop Valve and other requirements are fulfilled then the LBO is still inactive until the state ready

back to Logical binary outputs alphabetically

Ready To Load

Related FW	1.4.0	Related applications	AMF, MRS
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 240)** 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.			

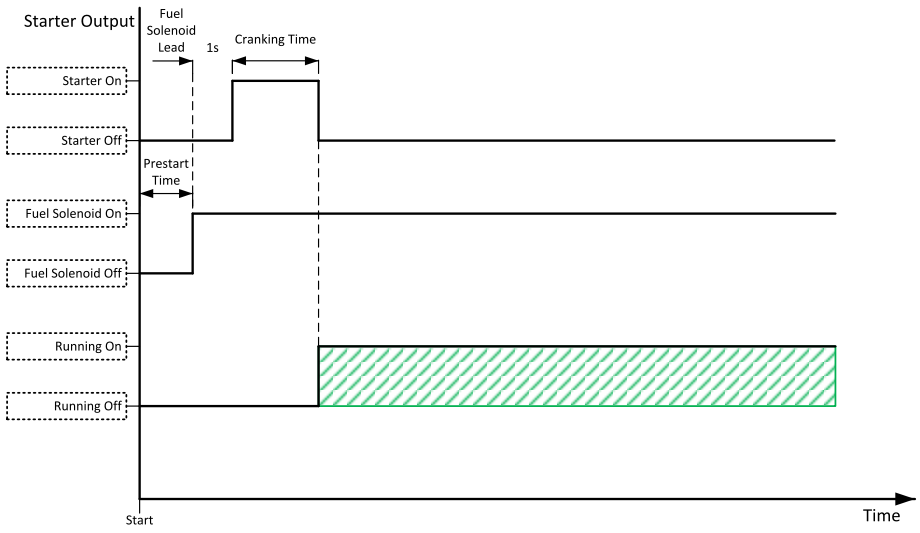
back to Logical binary outputs alphabetically

RegenerationNeeded

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	1372		
Description			
This output is active when DPF lamp from ECU is active.			

back to Logical binary outputs alphabetically

Running

Related FW	1.4.0	Related applications	AMF, MRS
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 516)** is active and **STARTER (PAGE 539)** and **PRESTART (PAGE 534)** are deactivated. The out remains active until engine stop and cooling period elapses.  Image 8.64 Running			

back to Logical binary outputs alphabetically

LBO: S

Sd Override

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	962		
Description			
The output is active if SD OVERRIDE (PAGE 496) input is active and open if SD OVERRIDE (PAGE 496) input is inactive. This output is usually used to send information about SD OVERRIDE (PAGE 496) input into ECU.			

back to Logical binary outputs alphabetically

Start Button Echo

Related FW	1.4.0	Related applications	AMF, MRS
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

Start Button State

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2693		
Description			
LBO is active as long as it's button is pressed or it's LBI is active.			

back to Logical binary outputs alphabetically

Starter

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	24		

Description

This output is dedicated for starter motor control. The number of cranking attempts is adjusted by setpoint **Cranking Attempts (page 229)** in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause (page 229)**.

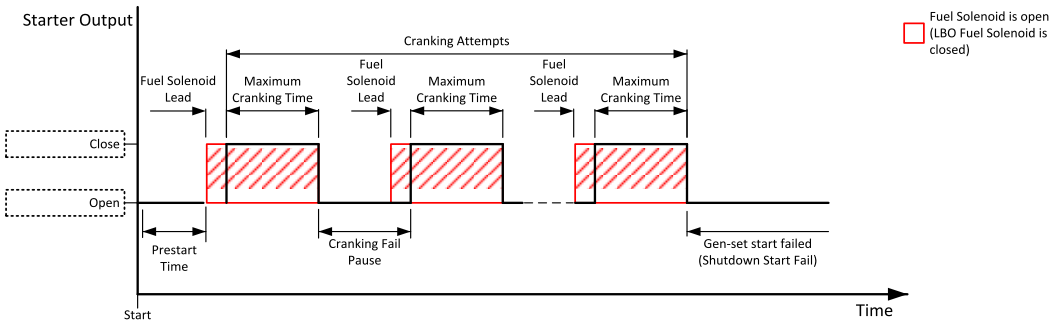


Image 8.65 Starter

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 246)**
- Oil pressure value is higher than **Starting Oil Pressure (page 231)**
- Generator voltage >25 % of **Nominal Voltage Ph-N (page 215)** or **Nominal Voltage Ph-Ph (page 215)** (any phase)

back to Logical binary outputs alphabetically

Stop Button Echo

Related FW	1.4.0	Related applications	AMF, MRS
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 Button State

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	2694		
Description			
LBO is active as long as it's button is pressed or it's LBI is active.			

back to Logical binary outputs alphabetically

Stop Pulse

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	25		
Description			
Output is active for 1 second after **STOP SOLENOID (PAGE 540)** output activation. This signal is sent to ECU in case of engine stop request.			

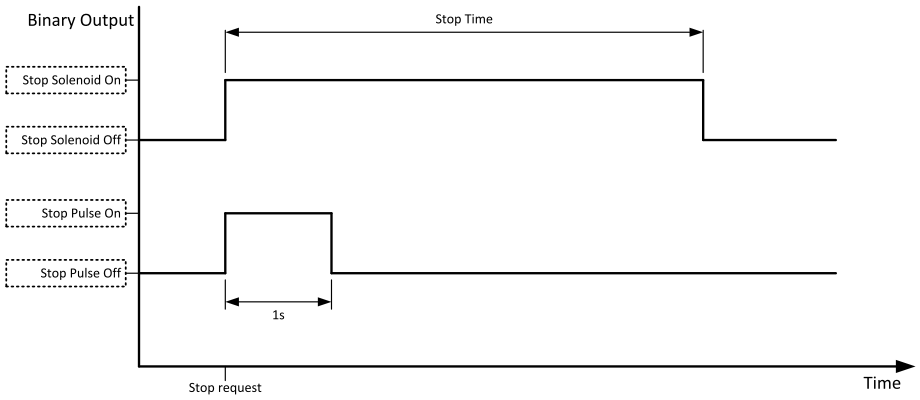


Image 8.66 Stop Pulse

back to Logical binary outputs alphabetically

Stop Solenoid

Related FW	1.4.0	Related applications	AMF, MRS
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.			

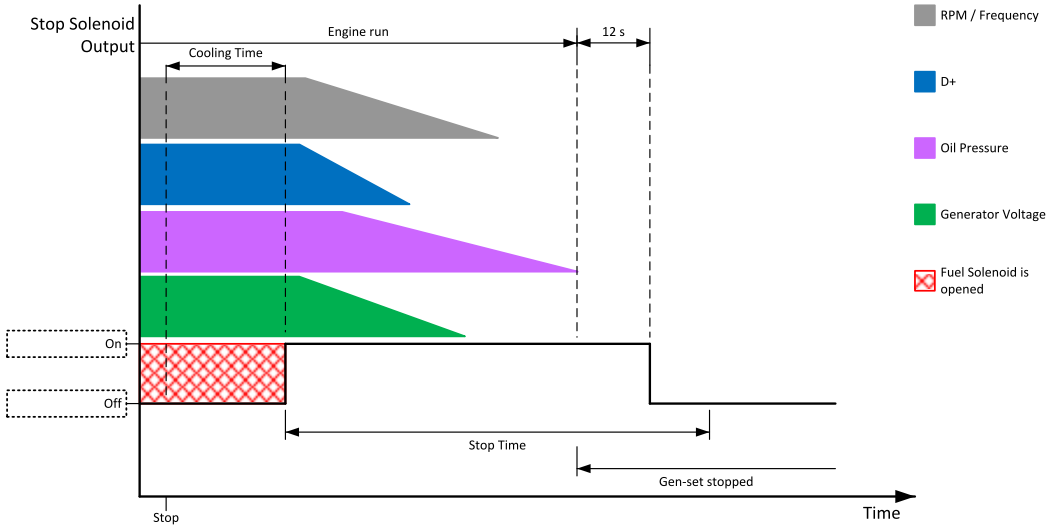


Image 8.67 Stop Solenoid 1

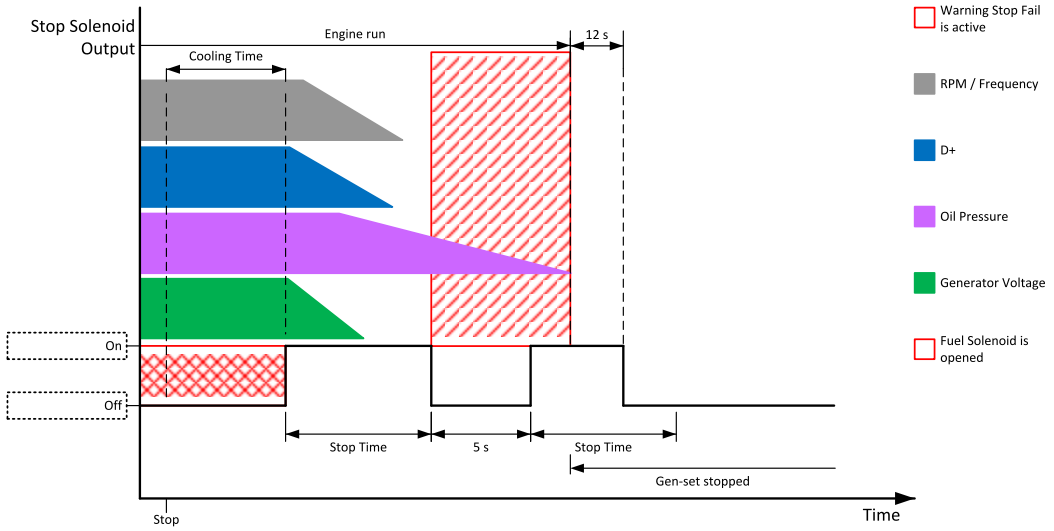


Image 8.68 Stop Solenoid 2

Note: *If **Additional running engine indications (page 118)** went off during 5 s pause than Stop Solenoid is not activated again otherwise stop solenoid is activated again.*

back to Logical binary outputs alphabetically

Supplying Load

Related FW	1.4.0	Related applications	AMF, MRS
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 210)** 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 210)** for 1 s then the binary output is inactive.			

back to Logical binary outputs alphabetically

LBO: V

Ventilation

Related FW	1.4.0	Related applications	AMF, MRS
Comm object	38		
Description			
This logical binary output is activated at the beginning of start procedure together with **PRESTART (PAGE 534)** LBO. Ventilation output is deactivated when engine stops revolving. Ventilation LBO is also deactivated immediately when **EMERGENCY STOP (PAGE 483)** (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	1.4.0	Related applications	AMF, MRS
Comm object	2090		
Description			
This logical binary output is activated on falling edge of **VENTILATION (PAGE 542)** LBO (when engine stops). The pulse duration is adjusted by **Ventilation Pulse Time (page 257)** 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	1.4.0	Related applications	AMF, MRS
Comm object	2089		
Description			
This logical binary output is activated on rising edge of **VENTILATION (PAGE 542)** LBO (at the begining of prestart period). The pulse duration is adjusted by **Ventilation Pulse Time (page 257)** 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 546
LAI: C 547
LAI: F 547
LAI: N 547
LAI: O 547
LAI: R 548

For a full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 545)**.

Logical analog inputs alphabetically

AIN Switch 01 546
AIN Switch 02 546
Coolant Temp 547
Fuel Level 547
Not Used 547
Oil Pressure 547
Oil Temp 548
RPM pickup 548

back to Controller objects

LAI: A

AIN Switch 01

Related FW	1.4.0	**Related applications**	AMF, MRS
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 53**. This analog input controls logical binary output **AIN SWITCH01 (PAGE 503)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch01 On (page 298)** and **AIN Switch01 Off (page 299)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

back to Logical analog inputs alphabetically

AIN Switch 02

Related FW	1.4.0	**Related applications**	AMF, MRS
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 53**. This analog input controls logical binary output **AIN SWITCH02 (PAGE 503)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch02 On (page 300)** and **AIN Switch02 Off (page 301)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

back to Logical analog inputs alphabetically

LAI: C

Coolant Temp

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	67		
Description			
Logical analog input designed for coolant temperature value received from analog sensor.			

back to Logical analog inputs alphabetically

LAI: F

Fuel Level

Related FW	1.4.0	**Related applications**	AMF, MRS
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 253) has to be adjusted correctly.**			

back to Logical analog inputs alphabetically

LAI: N

Not Used

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	230		
Description			
Input has no function.			

back to Logical analog inputs alphabetically

LAI: O

Oil Pressure

Related FW	1.4.0	**Related applications**	AMF, MRS
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 491)*** *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	1.4.0	**Related applications**	AMF, MRS
Comm object	77		
Description			
Logical analog input designed for oil temperature value received from analog sensor.			

back to Logical analog inputs alphabetically

LAI: R

RPM pickup

Related FW	1.4.0	**Related applications**	AMF, MRS
Comm object	8		
Description			
This LAI selects the source of RPM.			

back to Logical analog inputs alphabetically

8.1.7 PLC

List of PLC blocks

Group: Basic logical functions

OR/AND 550
Ext. XOR/RS 552

Group: Comparison of analog inputs

Comparator With Hysteresis 553
Comparator With Delay 554

Group: Time functions

Timer 555
Delay 557

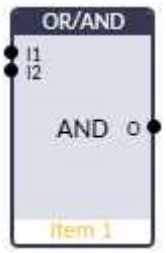
Group: Other functions

Decomp. 4 559

Group: Basic Logical functions

OR/AND

PLC group	Basic logical functions
Related FW	1.4.0
Related applications	AMF, MRS
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.

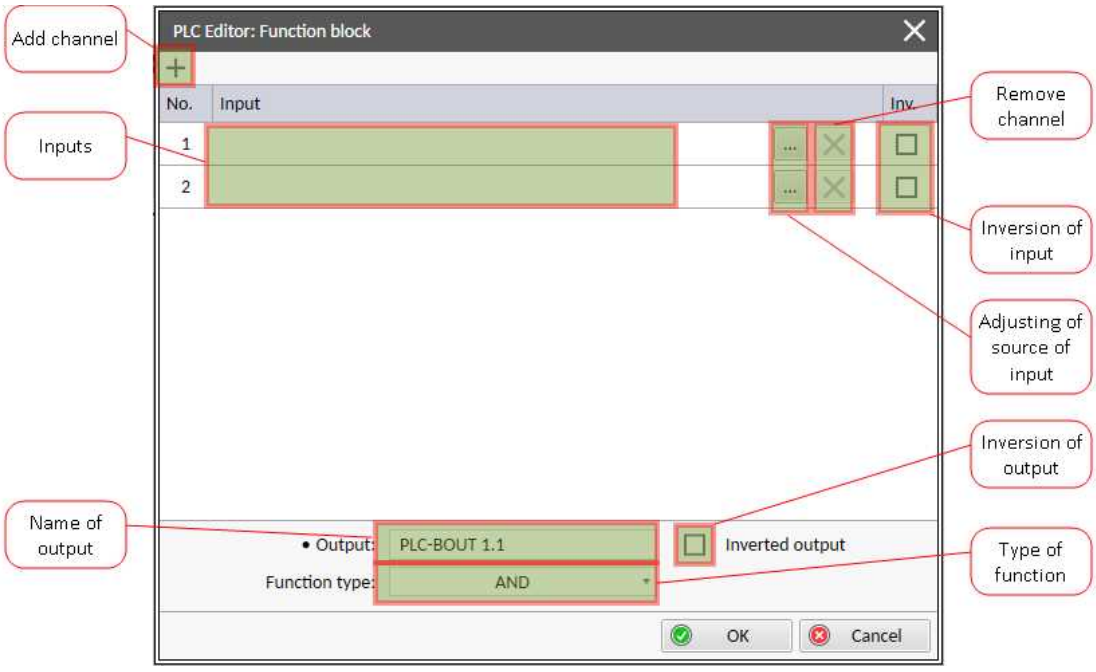


Image 8.69 Configuration of OR/AND block

back to List of PLC blocks

Ext. XOR/RS

PLC group	Basic logical functions
Related FW	1.4.0
Related applications	AMF, MRS
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})

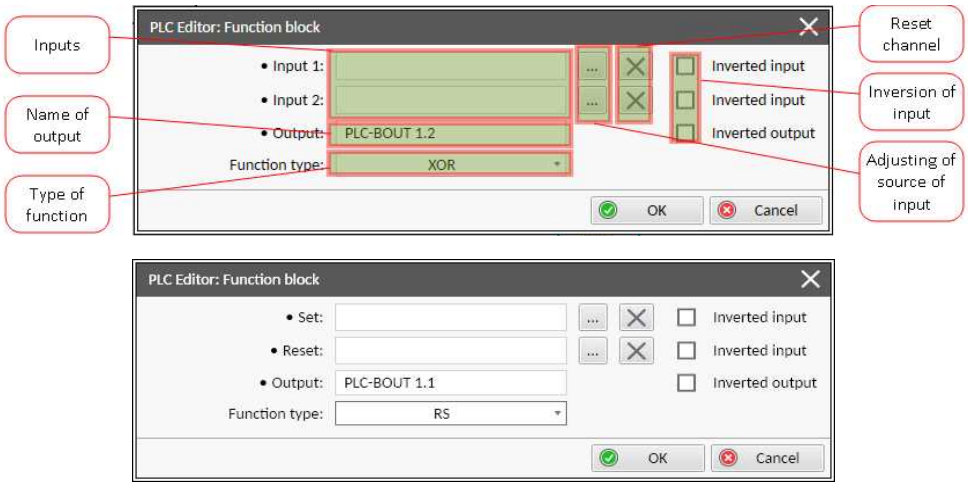


Image 8.70 Configuration of XOR/RS block

back to List of PLC blocks

Group: Comparison of analog inputs

Comparator With Hysteresis

PLC group	Comparison of analog inputs
Related FW	1.4.0
Related applications	AMF, MRS
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.

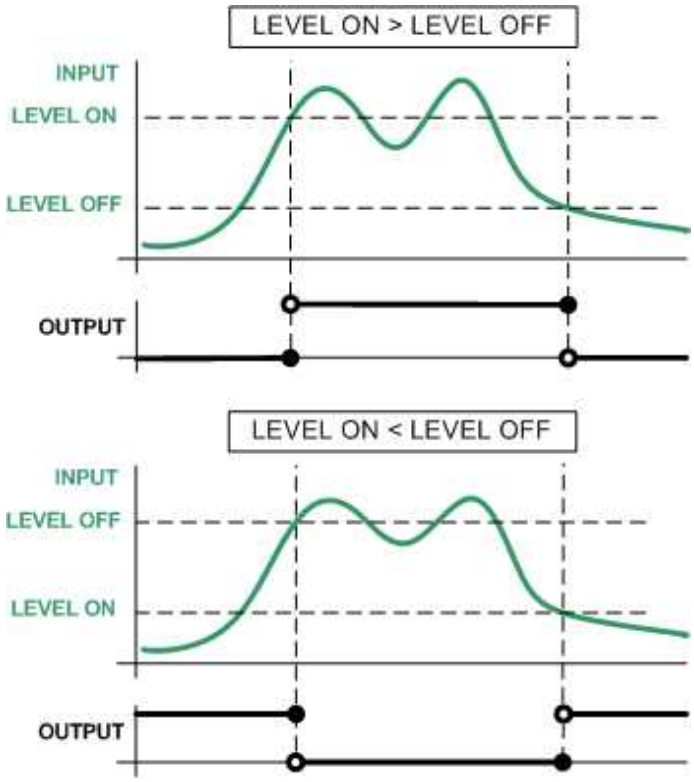


Image 8.71 Different On and Off levels

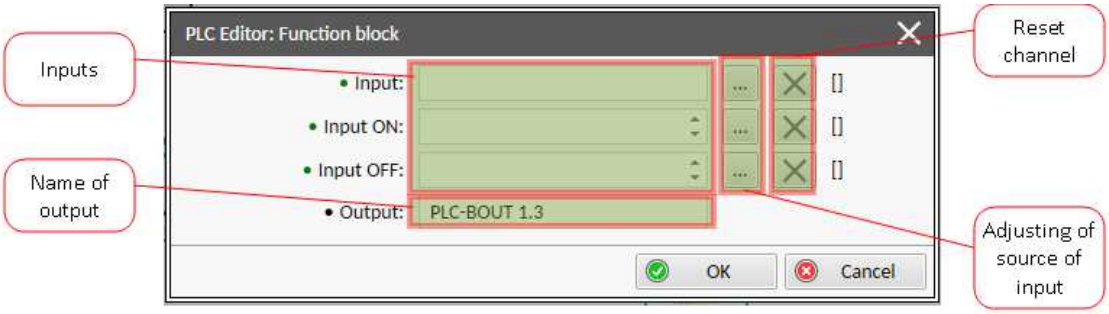


Image 8.72 Configuration of Comp Hyst block

Note: *Level On and Level Off can be constants or values from controller.*

> **IMPORTANT: In case that the values on inputs have different decimal numbers, then the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.**

back to List of PLC blocks

Comparator With Delay

PLC group	Comparison of analog inputs	
Related FW	1.4.0	
Related applications	AMF, MRS	
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.

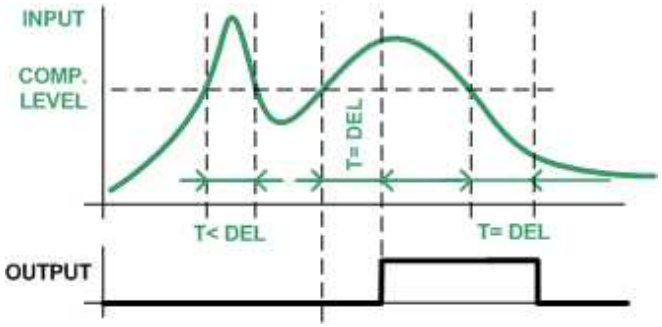


Image 8.73 Principle of delay

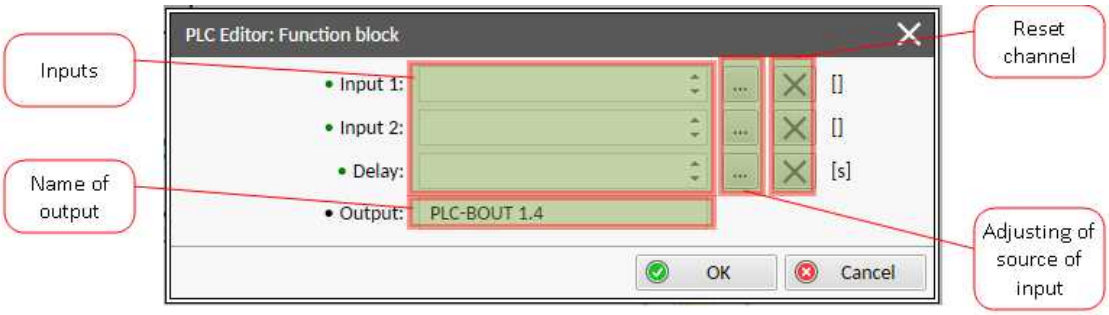


Image 8.74 Configuration of Comp Time block

Note: *Input 2 and Delay can be constants or values from controller.*

back to List of PLC blocks

Group: Time functions

Timer

PLC group	Time functions	
Related FW	1.4.0	
Related applications	AMF, MRS	
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.

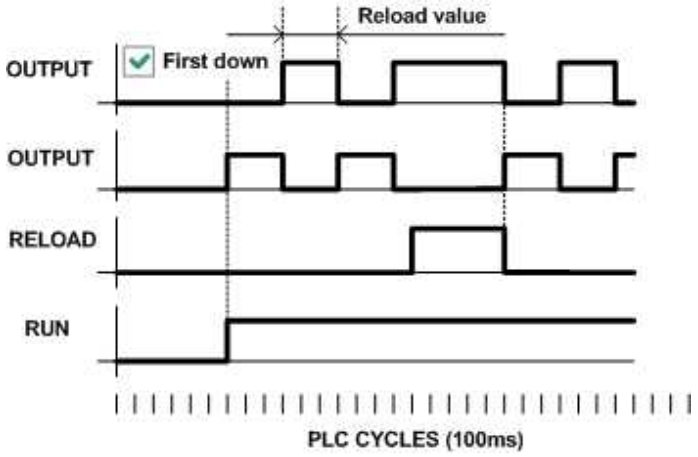


Image 8.75 Principle of timer

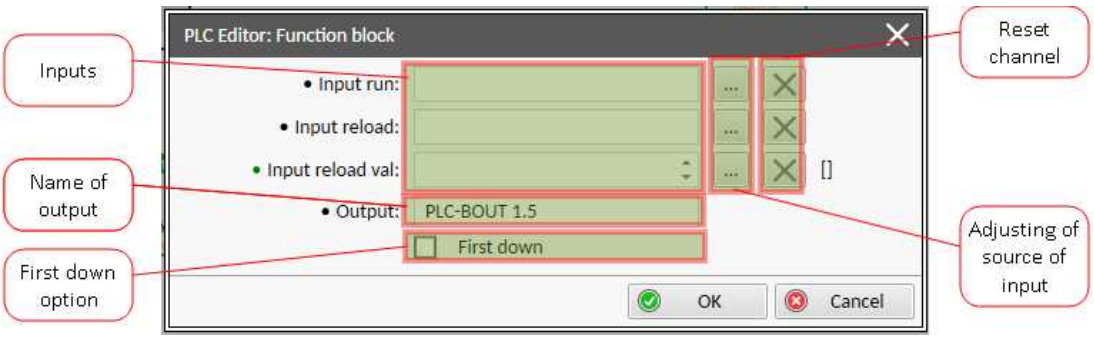


Image 8.76 Configuration of Timer block

Note: *Input reload value can be constant or value from controller.*

Note: *If you want the output to start at logical 0, tick First down option. Otherwise the output will start at logical 1.*

> **IMPORTANT: If the inputs are not connected and First down option is not ticked, then the output is active.**

back to List of PLC blocks

Delay

PLC group	Time functions
Related FW	1.4.0
Related applications	AMF, MRS
Comm object	33



Inputs

Input	Type	Negation	Range	Function
Input	Binary	No	0/1	Input signal to be delayed
Input time up	Analog	No	-3200.0 .. 3200.0 [s, m, h]	Delay of the rising edge resp. pulse length generated by rising edge of the input
Input time down	Analog	No	-3200.0 .. 3200.0 [s, m, h]	Delay of the falling edge resp. pulse length generated by falling edge of the input
Input reset	Binary	No	0/1	Resets the output to logical 0. The output remains in logical 0 until new rising edge appears on Input (when Input reset is deactivated already)

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output signal

Description

This block can work in two modes of operation:

- Delay mode – the rising edge at the output is generated with delay of "input time up" when a rising edge at the input is detected. The falling edge at the output is generated with delay of "input time down" when a falling edge at the input is detected. If the delayed falling edge at the output came earlier than the delayed rising edge, then no pulse would be generated at the output.
- Pulse mode – a pulse of "input time up" length is generated at the output when a rising edge is detected, a pulse of "input time down" length is generated at the output when a falling edge is detected.

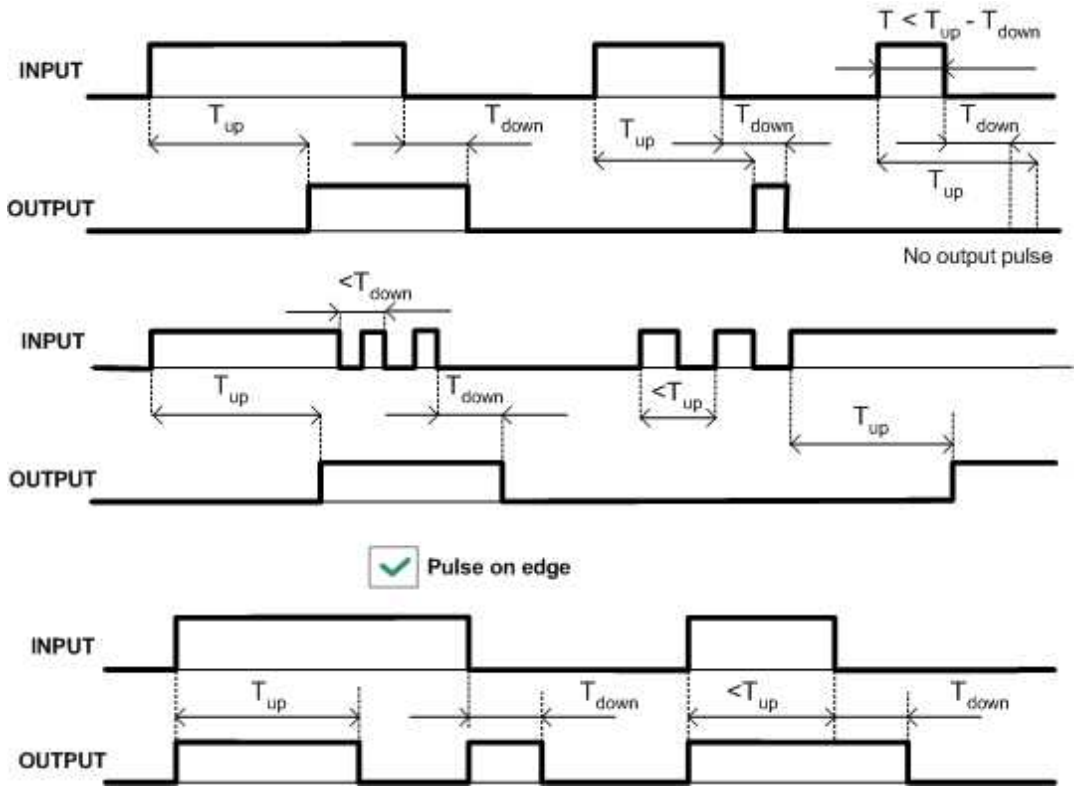


Image 8.77 Delay modes principles

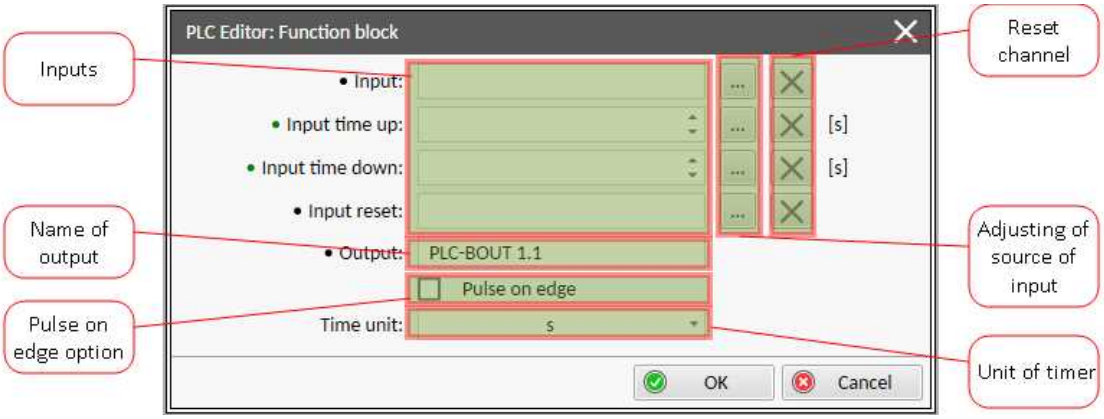


Image 8.78 Configuration of Delay block

Note: *If Input time up or Input time down value is <0, this input is internally set to zero.*

Note: *Input time up and Input time down values can be constants or values from controller.*

Note: *Use Pulse on edge option to choose between delay and pulse mode.*

back to List of PLC blocks

Group: Other functions

Decomp. 4

PLC group	Other functions
Related FW	1.4.0
Related applications	AMF, MRS
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.

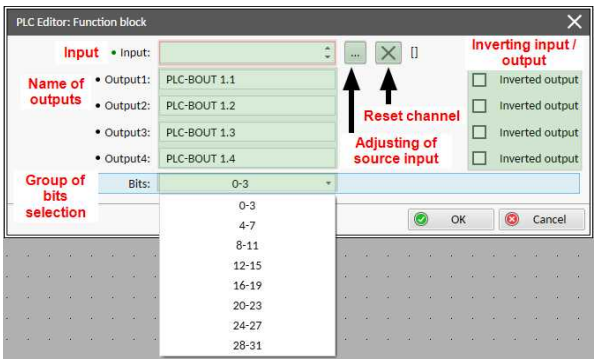


Image 8.79 Configuration of Decomp. 4 block

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 132**.

8.2.1 Alarm levels in the controller

8.2.2 Alarms level 1 560

8.2.3 Alarms level 2 594

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.

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MP Mains Volt Unbal Ph-N 614

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AHI Manual Idle

Alarm Type	AHI
Alarmlist message	AHI Manual Idle
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when LBI **FORCE IDLE (PAGE 485)** is active.

back to List of alarms level 1

AL Fuel Transfer Failed

Alarm Type	ALI
Alarmlist message	Fuel Transfer Failed
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when Fuel Level, received from ECU or LAI, does not increase during time **Transfer Wrn Delay (page 256)**.

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	AMF, MRS
Description	This alarm is active when LBI **EXTERNAL MAINS FAIL RELAY (PAGE 484)** is active.

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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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(slotA) - false module

Alarm Type	WRN
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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 EM(A) - a message lost

Alarm Type	WRN
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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 Event Email 1 Fail

Alarm Type	WRN
Alarmlist message	Event Email 1 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
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 396)** 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	AMF, MRS
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 397)** 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	AMF, MRS
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 397)** 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	AMF, MRS
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 398)** 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	AMF, MRS
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 379)** 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	AMF, MRS
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 379)** 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	AMF, MRS
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 380)** 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	AMF, MRS
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 380)** and SMS wasn't send.

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	AMF, MRS
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 396)** 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	AMF, MRS
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 397)** 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	AMF, MRS
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 397)** 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	AMF, MRS
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 398)** 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	AMF, MRS
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 379)** 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	AMF, MRS
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 379)** 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	AMF, MRS
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 380)** 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	AMF, MRS
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 380)** and SMS wasn't sent.

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	AMF, MRS
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	AMF, MRS
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 ECUDiagBlocked

Alarm Type	ALI
Alarmlist message	ECUDiagBlocked
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	LBO **Alarm (page 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Wrn ECU Communication Fail

Alarm Type	WRN
Alarmlist message	ECU Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 512)** – only when this LBO is active

	Without configured LBO **ECU POWER RELAY (PAGE 512)** – all the time
Related applications	AMF, MRS
Description	This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out.

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Wrn ECU 1 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 1 Comm Fail
Alarm evaluated	ECU 1 is configured
Related applications	AMF, MRS
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	AMF, MRS
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 Default Password

Alarm Type	WRN
Alarmlist message	Default Password
Alarm evaluated	All the time
Related applications	AMF, MRS
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 PasswEnterBlock

Alarm Type	WRN
Alarmlist message	PasswEnterBlock
Alarm evaluated	All the time
Related applications	AMF, MRS
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.*

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Wrn ECU Yellow Lamp

Alarm Type	AHI
Alarmlist message	Wrn ECU Yellow Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU Yellow lamp is activated. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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	AMF, MRS
Description	This alarm is activated when ECU send information that ECU Red lamp is activated. LBO **ALARM (PAGE 507)** 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.*

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Wrn ECU Wait To Start

Alarm Type	AHI
Alarmlist message	Wrn ECU Wait To Start
Alarm evaluated	Only when ECU is connected
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU Wait To Start lamp is activated. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Wrn ATT DPF Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT Filter Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT DPF Lamp is activated. LBO **ALARM (PAGE 507)** 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	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT Hest Lamp is activated. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Wrn ATT SCR Error Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT SCR Error Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT SCR Error Lamp is activated. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Wrn ATT DEF Level Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT DEF Level Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT DEF Level Lamp is activated. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Wrn ATT Inhibited Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT Inhibited Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT Inhibited Lamp is activated. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Wrn ATT Interlock Active

Alarm Type	AHI
Alarmlist message	ATT interlock Active

Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This message is written in the history when LBI **ATT INTERLOCK (PAGE 477)** is active. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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Hst ATT Force Regen Active

Alarm Type	AHI
Alarmlist message	Hst ATT Force Regen Active
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This message is written in the history when LBI **ATT FORCE REGEN (PAGE 475)** is active. LBO **ALARM (PAGE 507)** 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	AMF, MRS
Description	This message is written in the history when LBI **ATT INHIBIT REGEN (PAGE 476)** is active. LBO **ALARM (PAGE 507)** is not activated, after deactivation of lamp, alarm automatically disappears.

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AHI Dual Operation Fail

Alarm Type	AHI
Alarmlist message	Dual Operation Fail
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when there is fail between controllers in dual operation function. **Example:** › No connection – disconnection of cable › No connection – incorrect settings of COM Modes › Controllers not in AUTO mode › Different Operation Modes (AMF controllers only) › Different FW versions in controllers › Different mains statuses in controllers (AMF controllers only) ***Note:*** *This alarm is also written to history.*

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ALI Dual Operation Different FW Version

Alarm Type	ALI
Alarmlist message	Dual Operation Different FW Version
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when FW version (all numbers are checked) or Branch of Master and Slave is different.

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Wrn Dual Operation Master Fail

Alarm Type	AHI, WRN
Alarmlist message	Dual Operation Master Fail
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when Master is not able to take the load e.g. there is alarm of 2nd level on Master and setpoint **Master Error Protection (page 290)** option: Wrn is selected .

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Wrn Dual Operation Slave Fail

Alarm Type	AHI, WRN
Alarmlist message	Dual Operation Slave Fail
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when Slave is not able to take the load e.g. there is alarm of 2nd level on Master and setpoint **Slave Error Protection (page 290)** option: Wrn is selected.

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AHI Dual Operation Master Fail

Alarm Type	AHI
Alarmlist message	Dual Operation Master Fail
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when Master is not able to take the load e.g. there is alarm of 2nd level on Master and setpoint **Master Error Protection (page 290)** option: AL Indic is selected.

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AHI Dual Operation Slave Fail

Alarm Type	AHI
Alarmlist message	Dual Operation Slave Fail
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when Slave is not able to take the load e.g. there is alarm of 2nd level on Master and setpoint **Slave Error Protection (page 290)** option: AL Indic is selected.

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AHI Dual Operation Different Mains

Alarm Type	AHI
Alarmlist message	Dual Operation Different Mains
Alarm evaluated	Only during dual operation
Related applications	AMF, MRS
Description	This alarm is active when there are different states of mains on controllers. For example Master see healthy mains and slave see mains fail. ***Note:*** *This alarm is also written to history.*

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AL Transferring Fuel

Alarm Type	ALI
Alarmlist message	Transferring Fuel

Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if **FUEL PUMP (PAGE 516)** is active.

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Wrn Coolant Temp

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Coolant Temp
Related applications	AMF, MRS
Description	Warning alarm for Coolant Temp user protection.

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Wrn Coolant Temp Low

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Coolant Temp Low
Related applications	AMF, MRS
Description	Warning alarm for Coolant Temp Low user protection.

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Wrn Fuel Level

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Fuel Level
Related applications	AMF, MRS
Description	Warning alarm for Coolant Temp Low user protection.

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AL Fuel Transfer Failed

Alarm Type	Warning
Alarmlist message	Wrn Fuel Transfer Failed
Alarm evaluated	When **FUEL PUMP (PAGE 516)** is active
Related applications	AMF, MRS
Description	This alarm will occur when there is no increase of fuel level when **FUEL PUMP (PAGE 516)** is active.

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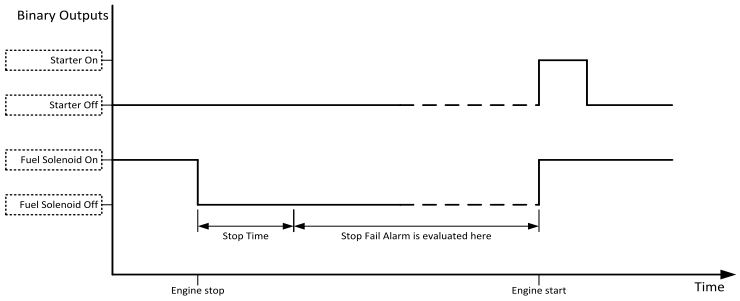
Wrn Charging Alternator Fail

Alarm Type	SD
Alarmlist message	Sd Charging Alternator Fail
Alarm evaluated	Engine running only

Related applications	AMF, MRS
Description	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than **D+ Threshold (page 246)** 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 Stop Fail

Alarm Type	WRN
Alarmlist message	Wrn Stop Fail
Alarm evaluated	While the engine shall be stopped
Related applications	AMF, MRS
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 516)** has been switched off and time delay **Stop Time (page 243)** has elapsed and lasts for the entire time the **FUEL SOLENOID (PAGE 516)** or **STARTER (PAGE 539)** are off.  Image 8.80 Stop Fail ***Note:*** *Gen-set cannot be started until this alarm is inactive and reset.*

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Wrn Maintenance Timer 1 RunHours

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 1 RunHours
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 RunHours (page 259)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 1 Protection (page 260)** has to be set to: Warning

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	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 Interval (page 445)** Interval reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 Interval (page 259)** (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 260)** 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	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 2 RunHours (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 RunHours (page 260)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 2 Protection (page 261)** has to be set to: Warning

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Wrn Maintenance Timer 2 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 2 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 2 Interval (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 Interval (page 261)** (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 261)** 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	AMF, MRS

Description	The alarm is active when the value **Maintenance Timer 3 RunHours (page 446)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 RunHours (page 262)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 3 Protection (page 263)** has to be set to: Warning

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Wrn Maintenance Timer 3 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 3 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 3 Interval (page 446)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 Interval (page 262)** (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 263)** has to be set to: Warning

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Wrn MCB Fail

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm will occur when the **MCB FEEDBACK (PAGE 490)** input does not match the expected position given by the **MCB CLOSE/OPEN (PAGE 529)** 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 274)** 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.

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Wrn MCB Fail To Close

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail To Close
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when there is a problem with circuit breaker position while closing. › LBO **MCB CLOSE/OPEN (PAGE 529)** closed but LBI **MCB FEEDBACK (PAGE 490)** did not closed in 5 seconds. › **Self-closing of breaker with mains parameters with limits** – not considered as fault, MCB close command is issued after **MCB Close Delay (page 275)**.

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Wrn MCB Fail To Open

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail To Open
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when there is a problem with circuit breaker position while opening. › LBO **MCB CLOSE/OPEN (PAGE 529)** opened but LBI **MCB FEEDBACK (PAGE 490)** did not opened in 5 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 288)**.

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Wrn Generator L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 267)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2 > Voltage

Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 267)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 267)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L1L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 267)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L2L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 267)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L3L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 267)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 268)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 268)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 268)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L1L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L2L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator L3L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

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Wrn Generator Overfrequency

Alarm Type	WRN
Alarmlist message	Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator overfrequency in the phase L1. The following setpoints are related to it: › **Generator Overfrequency Wrn (page 270)**

	› **Generator <> Frequency Delay (page 271)**

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Wrn Generator Uderfrequency

Alarm Type	WRN
Alarmlist message	Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator underfrequency in the phase L1. The following setpoints are related to it: › **Generator Underfrequency Wrn (page 270)** › **Generator <> Frequency Delay (page 271)**

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Wrn Overload

Alarm Type	WRN
Alarmlist message	Overload
Alarm evaluated	All the time
Related applications	AMF, MRS
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 264)** adjusts the overload limit. › **Overload BOC (page 263)** Overload Del adjusts the delay.

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Wrn Battery Overvoltage

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Battery > Voltage
Related applications	AMF, MRS
Description	This alarm informs the operator that the controller supply voltage is too high. The following setpoints are related to it: › **Battery Overvoltage (page 257)** › **Battery <> Voltage Delay (page 257)**

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Wrn Battery Undervoltage

Alarm Type	WRN
Alarmlist message	Wrn Battery < Voltage
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm informs the operator that the controller supply voltage is too low. The following setpoints are related to it:

	› **Battery Undervoltage (page 256)** › **Battery <> Voltage Delay (page 257)**

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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	AMF, MRS
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.*

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ALI Manual Restore

Alarm Type	ALI
Alarmlist message	Manual Restore
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Alarm is activated when controller is in AUTO mode, **Return From Island (page 286)** setpoint is set to manual, load is on Gen-set and mains has returned.

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	AMF, MRS
Description	This alarm occurs when binary input **SD OVERRIDE (PAGE 496)** is activated.

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	AMF, MRS
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 Brute Force Protection Active

Alarm Type	WRN
Alarmlist message	Wrn Brute Force Protection Active
Alarm evaluated	All the time
Related applications	AMF, MRS
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 174)** rules.

back to List of alarms level 1

Wrn AI/Hist.msg. 1

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 1
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued when history event 1 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 2

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 2
Alarm evaluated	All the time
Related applications	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
Description	This alarm is issued when history event 13 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 14

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 14
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued when history event 14 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 15

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 1
Alarm evaluated	All the time

Related applications	AMF, MRS
Description	This alarm is issued when history event 15 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 16

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 16
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued when history event 16 will trigger.

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	AMF, MRS
Description	This alarm is active if LBI **START BLOCKING (PAGE 496)** is closed before Gen-set is started.

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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
Description	This alarm is issued if generator phases are wired in wrong order.

back to List of alarms level 1

ALI Mains Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L1 Inverted
Alarm evaluated	All the time
Related applications	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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	AMF, MRS
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 281)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Mains Voltage Unbalance Delay (page 282)** 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	AMF, MRS
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 281)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Mains Voltage Unbalance Delay (page 282)** adjusts the alarm delay.

back to List of alarms level 1

Mains Overfrequency

Alarm Type	MP
Alarmlist message	Mains Overfrequency
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is active when Mains frequency is above the setpoint **Mains Overfrequency (page 282)** for the period longer than **Mains < > Frequency Delay (page 286)**.

back to List of alarms level 1

Mains Underfrequency

Alarm Type	MP
Alarmlist message	Mains Underfrequency
Alarm evaluated	All the time
Related applications	AMF, MRS

Description	This alarm is active when Mains frequency is bellow the setpoint **Mains Underfrequency (page 284)** for the period longer than **Mains < > Frequency Delay (page 286)**.

back to List of alarms level 1

Wrn Mains Voltage Detected

Alarm Type	WRN
Alarmlist message	Wrn Mains Voltage Detected
Alarm evaluated	Gen-set is running
Related applications	AMF, MRS
Description	This alarm occurs when setpoint **Default Application Select (page 221)** is adjusted to MRS and voltage is detected on mains.

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	AMF, MRS
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 GCB Control Mode

Alarm Type	WRN
Alarmlist message	Wrn Wrong GCB Control Mode
Alarm evaluated	all the time
Related applications	AMF, MRS
Description	This alarm is issued when GCB Control Mode is selected to option No Button and simultaneously the controller is in AMF mode.

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	AMF, MRS
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 353)** › **Fence 1 Protection (page 355)** › **Fence 1 Radius (page 356)**

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	AMF, MRS
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 353)** › **Fence 2 Protection (page 357)** › **Fence 2 Radius (page 358)**

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	AMF, MRS
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 253)**.

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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BOC Fence 2 Alarm 618
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back to Alarms

Sd Module: Slot 1

Alarm Type	SD
Alarmlist message	Module: Slot 1
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 1.

back to List of alarms level 2

Sd Module: Slot 2

Alarm Type	SD
Alarmlist message	Module: Slot 2
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 2.

back to List of alarms level 2

Sd Module: Slot 3

Alarm Type	SD
Alarmlist message	Module: Slot 3
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 3.

back to List of alarms level 2

Sd Module(slotA) - false module

Alarm Type	SD
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 2

Sd Module(slotA) - unknown module

Alarm Type	SD
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 2

Sd Module(slotA) - unattended

Alarm Type	SD
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 2

Sd Module(slotA) - comm. outage

Alarm Type	SD
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	AMF, MRS
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 Module(slotA) - unexpected

Alarm Type	SD
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 2

Sd EM(A) - a message lost

Alarm Type	SD
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	AMF, MRS
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(A) - configuration mistake

Alarm Type	SD
Alarmlist message	EM(A) - configuration mistake
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 2

Sd EM(A) - insufficient

Alarm Type	SD
Alarmlist message	EM(A) - insufficient
Alarm evaluated	All the time
Related applications	AMF, MRS
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	AMF, MRS
Description	This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot).

back to List of alarms level 2

Sd ECU Communication Fail

Alarm Type	SD
Alarmlist message	ECU Communication Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if ECU is configured but the communication with ECU is not established or has dropped out.

back to List of alarms level 2

Sd ECU 1 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 1 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 512)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 512)** – all the time

Related applications	AMF, MRS
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 512)** – only when this LBO is active Without configured LBO **ECU POWER RELAY (PAGE 512)** – all the time
Related applications	AMF, MRS
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 Emergency Stop

Alarm Type	SD
Alarmlist message	Sd Emergency Stop
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Alarm is activated when binary input **EMERGENCY STOP (PAGE 483)** is activated. The Gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed. ***Note:*** *Use red emergency button placed on the switchboard door and connect it to a binary input of the controller. Then configure the function Emergency Stop to this binary input. It is recommended to use NC contact of the button.* ***Note:*** *The MCB control is not affected by this alarm.*

back to List of alarms level 2

Sd E-Stop

Alarm Type	SD
Alarmlist message	Sd E-Stop
Alarm evaluated	All the time
Related applications	AMF, MRS
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 Charging Alternator Fail

Alarm Type	SD

Alarmlist message	Wrn Charging Alternator Fail
Alarm evaluated	Engine running only
Related applications	AMF, MRS
Description	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than 80%**D+ Threshold (page 246)** 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

Sd Overspeed

Alarm Type	SD
Alarmlist message	Sd Overspeed
Alarm evaluated	All the time
Related applications	AMF, MRS
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 247)** adjust the overspeed limit

back to List of alarms level 2

Sd Underspeed

Alarm Type	SD
Alarmlist message	Sd Underspeed
Alarm evaluated	Engine running only
Related applications	AMF, MRS
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 249)**. 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

Sd RPM Measurement Fail

Alarm Type	SD
Alarmlist message	Sd RPM Measurement Fail
Alarm evaluated	During cranking
Related applications	AMF, MRS
Description	The alarm is issued if the engine speed has not exceeded the **Starting RPM (page 230)** within the **Maximum Cranking Time (page 229)**, although some of additional running engine indication sources indicate that the engine has started.

back to List of alarms level 2

Sd Battery Flat

Alarm Type	SD
Alarmlist message	Sd Battery Flat

Alarm evaluated	During cranking
Related applications	AMF, MRS
Description	This alarm will be issued if the controller was reset during cranking of the gen-set. If this situation occurs, the controller supposes the starting battery is so exhausted that its voltage drops so low when starter motor is energized that it causes controller reset.

back to List of alarms level 2

Sd Start Fail

Alarm Type	SD
Alarmlist message	Sd Start Fail
Alarm evaluated	When the gen-set is being started
Related applications	AMF, MRS
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 229)** adjust the number of attempts

back to List of alarms level 2

Sd GCB Fail

Alarm Type	SD
Alarmlist message	SD GCB Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm will occur when the **GCB Feedback (page 487)** input does not match the expected position given by the **GCB Close/Open (page 518)** output. It stays active until the mismatch between the output and feedback persists. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. › The alarm will be also issued if the breaker does not respond to an open or close command within 5 seconds.

back to List of alarms level 2

Sd GCB Fail To Close

Alarm Type	SD
Alarmlist message	Sd GCB Fail To Close
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when there is a problem with circuit breaker position while closing. › LBO **GCB Close/Open (page 518)** opened but LBI **GCB Feedback (page 487)** did not closed in 5 seconds.

back to List of alarms level 2

Sd GCB Fail To Open

Alarm Type	SD
Alarmlist message	Sd GCB Fail To Open
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when there is a problem with circuit breaker position while opening. › LBO **GCB CLOSE/OPEN (PAGE 518)** opened but LBI **GCB FEEDBACK (PAGE 487)** did not opened in 5 seconds.

back to List of alarms level 2

Sd Generator L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Overvoltage Sd (page 267)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

Sd Generator L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Overvoltage Sd (page 267)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

Sd Generator L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Overvoltage Sd (page 267)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

Sd Generator L1L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 267)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

Sd Generator L2L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 267)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

Sd Generator L3L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 267)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 268)**

	› **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L1L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L2L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L3L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

Sd Current Unbalance

Alarm Type	SD
Alarmlist message	Current Unbalance
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued to indicate if **Current Unbalance BOC (page 266)** timer elapses.

back to List of alarms level 2

BOC Generator Overfrequency

Alarm Type	BOC
Alarmlist message	Sd Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: › **Generator Overfrequency BOC (page 270)** › **Generator <> Frequency Delay (page 271)**

back to List of alarms level 2

Generator Underfrequency

Alarm Type	BOC
Alarmlist message	Sd Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: › **Generator Underfrequency BOC (page 271)**

	› **Generator <> Frequency Delay (page 271)**

back to List of alarms level 2

Sd Overload

Alarm Type	SD
Alarmlist message	Sd Overload
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is issued when the Gen-setmains 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 263)** adjusts the overload limit. › **Overload Delay (page 264)** adjusts the delay.

back to List of alarms level 2

Sd Oil Pressure

Alarm Type	BOCSD
Alarmlist message	Sd Oil Pressure
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Shutdown alarm for Oil Pressure user protection.

back to List of alarms level 2

BOC Coolant Temp

Alarm Type	BOC
Alarmlist message	BOC Coolant Temp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Breaker Open and Stop alarm for Coolant Temp user protection.

back to List of alarms level 2

BOC Coolant Temp

Alarm Type	BOC
Alarmlist message	BOC Coolant Temp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Breaker Open and Stop alarm for Fuel Level user protection.

back to List of alarms level 2

BOC Generator L1 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L1 < Voltage

Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L2 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L3 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L1L2 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L2L3 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Generator L3L1 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
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 268)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

BOC Gen Voltage Unbalance Ph-Ph

Alarm Type	BOC
Alarmlist message	BOC Gen Voltage Unbalance ph-ph
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the unbalance of the phase to phase voltages, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it: › **Voltage Unbalance BOC (page 269)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Voltage Unbalance BOC Delay (page 269)** adjusts the alarm delay.

back to List of alarms level 2

BOC Gen Voltage Unbalance Ph-N

Alarm Type	BOC
Alarmlist message	BOC Gen Voltage Unbalance ph-n
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the unbalance of the phase voltages, i.e. the difference between highest and lowest phase voltage at any given time. The following

	setpoints are related to it: › **Voltage Unbalance BOC (page 269)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Voltage Unbalance BOC Delay (page 269)** adjusts the alarm delay.

back to List of alarms level 2

BOC Generator Overfrequency

Alarm Type	BOC
Alarmlist message	BOC Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: › **Generator Overfrequency BOC (page 270)** › **Generator <> Frequency Delay (page 271)**

back to List of alarms level 2

BOC Generator Underfrequency

Alarm Type	BOC
Alarmlist message	BOC Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: › **Generator Underfrequency BOC (page 271)** › **Generator <> Voltage Delay (page 269)**

back to List of alarms level 2

MP Mains L1 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases. The following setpoints are related to it: › **Mains Overvoltage (page 277)** › **Mains Overvoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L1 Undervoltage

Alarm Type	MP

Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases. The following setpoints are related to it: › **Mains Undervoltage (page 279)** › **Mains Undervoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L2 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases. The following setpoints are related to it: › **Mains Overvoltage (page 277)** › **Mains Overvoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L2 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases. The following setpoints are related to it: › **Mains Undervoltage (page 279)** › **Mains Undervoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases. The following setpoints are related to it: › **Mains Overvoltage (page 277)** › **Mains Overvoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases. The following setpoints are related to it: › **Mains Undervoltage (page 279)** › **Mains Undervoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L1L2 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases L1 and L2. The following setpoints are related to it: › **Mains Overvoltage (page 277)** › **Mains Overvoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L1L2 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases L1 and L2. The following setpoints are related to it: › **Mains Undervoltage (page 279)** › **Mains Undervoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L2L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases L2 and L3. The following setpoints are related to it: › **Mains Overvoltage (page 277)** › **Mains Overvoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L2L3 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases L2 and L3. The following setpoints are related to it: › **Mains Undervoltage (page 279)** › **Mains Undervoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L3L1 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases L3 and L1. The following setpoints are related to it: › **Mains Overvoltage (page 277)** › **Mains Overvoltage Delay (page 281)**

back to List of alarms level 2

MP Mains L3L1 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases L3 and L1. The following setpoints are related to it: › **Mains Undervoltage (page 279)** › **Mains Undervoltage Delay (page 281)**

back to List of alarms level 2

MP Mains Overfrequency

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases 1. The following setpoints are related to it: › **Mains Overfrequency (page 282)**

	› **Mains < > Frequency Delay (page 286)**

back to List of alarms level 2

MP Mains Underfrequency

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains phase voltage in phases 1. The following setpoints are related to it: › **Mains Underfrequency (page 284)** › **Mains < > Frequency Delay (page 286)**

back to List of alarms level 2

MP Mains Volt Unbal Ph-N

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains voltage unbalance in phase Ph-N. The following setpoints are related to it: › **Mains Voltage Unbalance (page 281)** › **Mains Voltage Unbalance (page 281)**

back to List of alarms level 1

MP Mains Volt Unbal Ph-N

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains voltage unbalance in phase Ph-Ph. The following setpoints are related to it: › **Mains Voltage Unbalance (page 281)** › **Mains Voltage Unbalance (page 281)**

back to List of alarms level 1

BOC Current Unbalance

Alarm Type	BOC
Alarmlist message	BOC Current Unbalance
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the unbalance of the phase currents, i.e. the difference between highest and lowest phase current at any given time. The following

	setpoints are related to it: › **Current Unbalance BOC (page 266)** adjusts the maximum allowed difference between the highest and lowest phase current at any given time. › **Current Unbalance BOC Delay (page 266)** adjusts the alarm delay.

back to List of alarms level 2

BOC Overload

Alarm Type	BOC
Alarmlist message	BOC Overload
Alarm evaluated	All the time
Related applications	AMF, MRS
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 263)** adjusts the overload limit. › **Overload Delay (page 264)** adjusts the delay

back to List of alarms level 2

BOC Short Circuit

Alarm Type	BOC
Alarmlist message	BOC Short Circuit
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This is a fast overcurrent protection. The following setpoints are related to this alarm: › **Short Circuit BOC (page 264)** adjusts the short current limit › **Short Circuit BOC Delay (page 265)** adjusts the delay in fine steps

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	AMF, MRS
Description	This alarm indicates that the value of earth fault current is higher than adjusted limit. The following setpoints are related to it: › **Earth Fault Sd (page 404)** adjusts the maximum allowed earth fault current. › **Earth Fault Delay (page 403)** adjusts the alarm delay.

back to List of alarms level 2

BOC Overcurrent IDMT

Alarm Type	BOC
Alarmlist message	Sd + Name of binary input
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm is issued if IDMT protection is activated due to over-crossing the IDMT curve set by setpoints **IDMT Overcurrent Delay (page 265)**. The behaviour of the overcurrent alarm is adjusted by the following setpoints: › **IDMT Overcurrent Delay (page 265)** defines the reaction time of the protection when the current is twice the amount of nominal value. › **Nominal Current (page 211)** set the nominal current level, where the alarm starts to be evaluated. The reaction time is infinite at this point.

back to List of alarms level 2

BOC Maintenance Timer 1 RunHours

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 1 RunHours
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 RunHours (page 259)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 1 Protection (page 260)** has to be set to: BOC

back to List of alarms level 2

BOC Maintenance Timer 1 Interval

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 1 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 Interval (page 259)** (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 260)** has to be set to: Warning

back to List of alarms level 2

BOC Maintenance Timer 2 RunHours

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 2 RunHours
Alarm evaluated	All the time

Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 2 RunHours (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 RunHours (page 260)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 2 Protection (page 261)** has to be set to: BOC

back to List of alarms level 2

BOC Maintenance Timer 2 Interval

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 2 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 2 RunHours (page 445)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 Interval (page 261)** (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 261)** has to be set to: Warning

back to List of alarms level 2

BOC Maintenance Timer 3 RunHours

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 3 RunHours
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 3 RunHours (page 446)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 RunHours (page 262)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 3 Protection (page 263)** has to be set to: BOC

back to List of alarms level 2

BOC Maintenance Timer 3 Interval

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 3 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 3 RunHours (page 446)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 Interval (page 262)** (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 263)** has to be set to: Warning

back to List of alarms level 2

Sd Fence 1 Alarm

Alarm Type	Shutdown
Alarmlist message	Sd Fence 1 Alarm
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 353)** › **Fence 1 Protection (page 355)** › **Fence 1 Radius (page 356)**

back to List of alarms level 2

BOC Fence 1 Alarm

Alarm Type	BOC
Alarmlist message	BOC Fence 1 Alarm
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 353)** › **Fence 1 Protection (page 355)** › **Fence 1 Radius (page 356)**

back to List of alarms level 2

Sd Fence 2 Alarm

Alarm Type	Shutdown
Alarmlist message	Sd Fence 2 Alarm
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 353)** › **Fence 1 Protection (page 355)** › **Fence 1 Radius (page 356)**

back to List of alarms level 2

BOC Fence 2 Alarm

Alarm Type	BOC
Alarmlist message	BOC Fence 2 Alarm
Alarm evaluated	All the time

Related applications	AMF, MRS
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 353)** › **Fence 1 Protection (page 355)** › **Fence 1 Radius (page 356)**

back to List of alarms level 2

Sd Parallel Work

Alarm Type	Shutdown
Alarmlist message	Sd Parallel Work
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is active when GCB is closed externally while MCB is closed.

back to List of alarms level 2

8.3 Modules

8.3.1 Plug-in 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 1 plug-in module slots.*

Communication modules

CM-RS232-485 619
CM3-Ethernet 621
CM2-4G-GPS 623

CM-RS232-485

CM-RS232-485 is optional plug-in card to enable InteliLite 4 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.

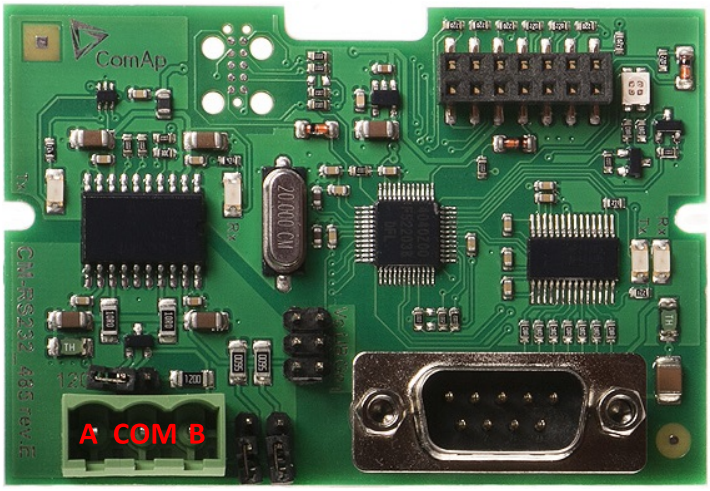


Image 8.81 CM-RS232-485 interface

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

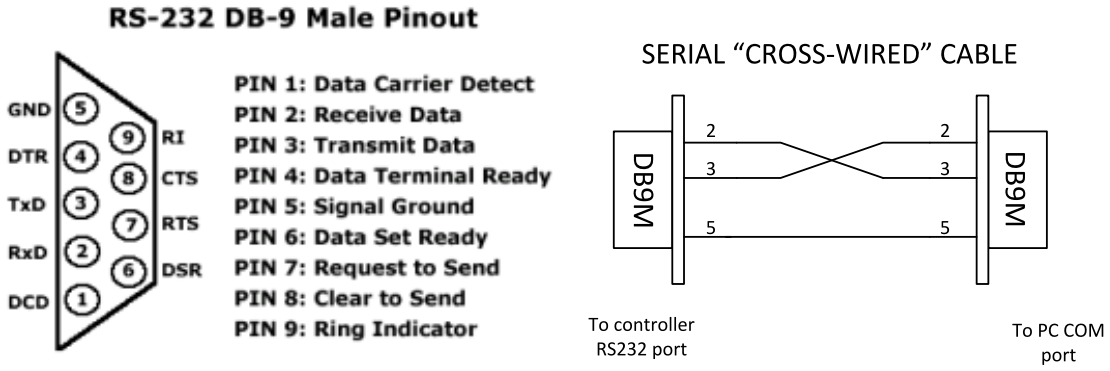


Image 8.82 Pinout of RS232 line

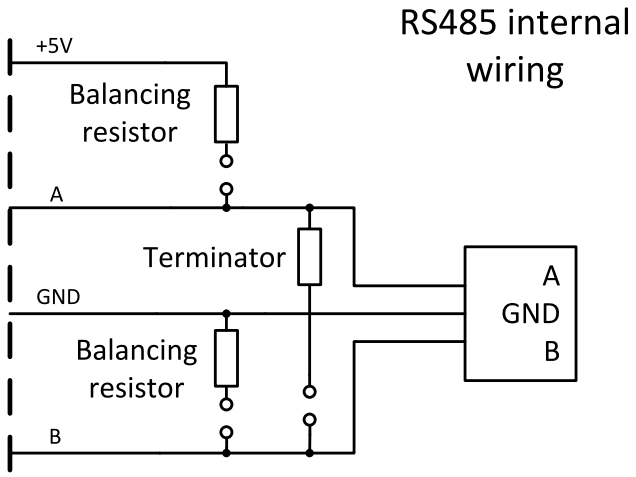


Image 8.83 Pinout of RS485 line



Image 8.84 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).

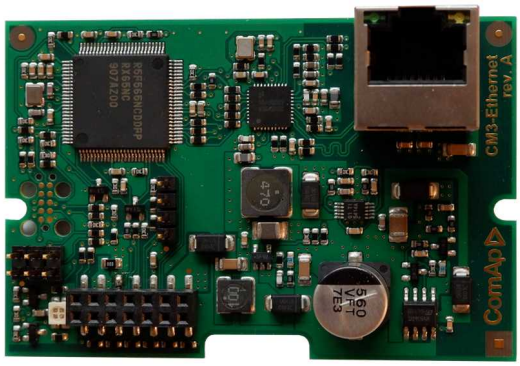


Image 8.85 CM3-Ethernet interface

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.

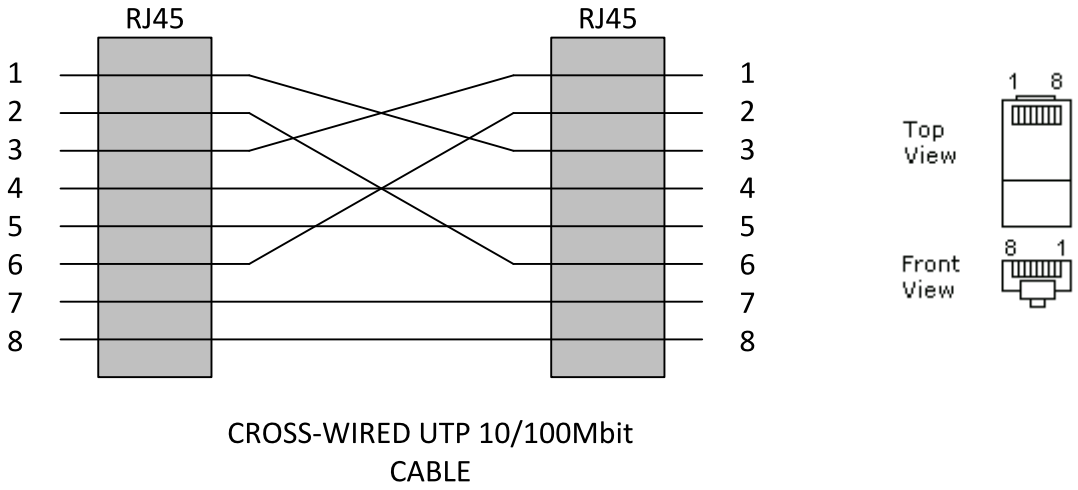


Image 8.86 Cross-wired cable

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 384)**.

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 363)**.

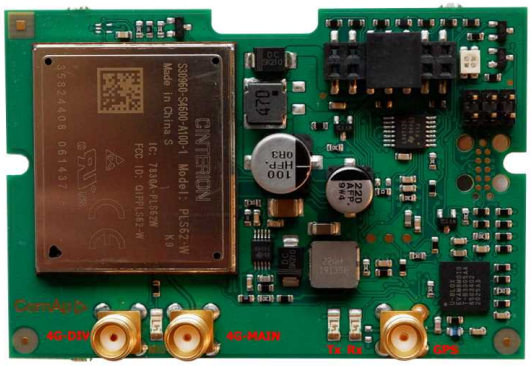


Image 8.87 CM2-4G-GPS module

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.*

- 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.
- Activate CM2-4G-GPS module by switching the setpoint **Internet Connection (page 363)** to enabled
- Enter correct **Access Point Name** (this information is provided by Mobile Operator). Setpoint can be set on controller's front panel or by InteliConfig.
- Wait for approx 2 – 4 minutes for first connection of the system to AirGate. AirGate will automatically generate the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.



Image 8.88 Main screen of CM2-4G-GPS module

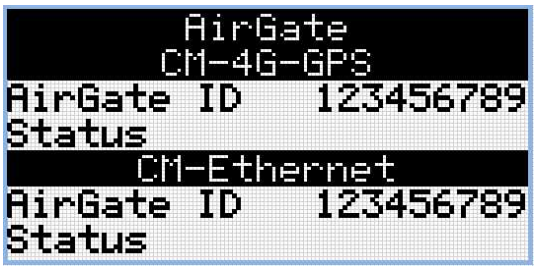


Image 8.89 Screen of AirGate

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 627

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 8.90 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.

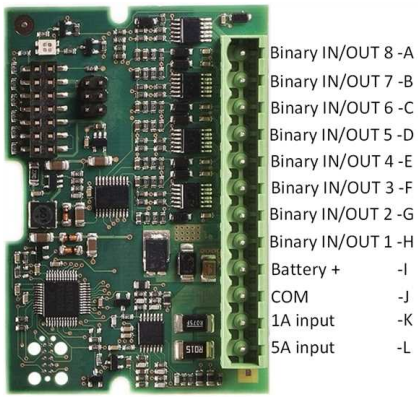


Image 8.91 Overview of EM-BIO8-EFCP

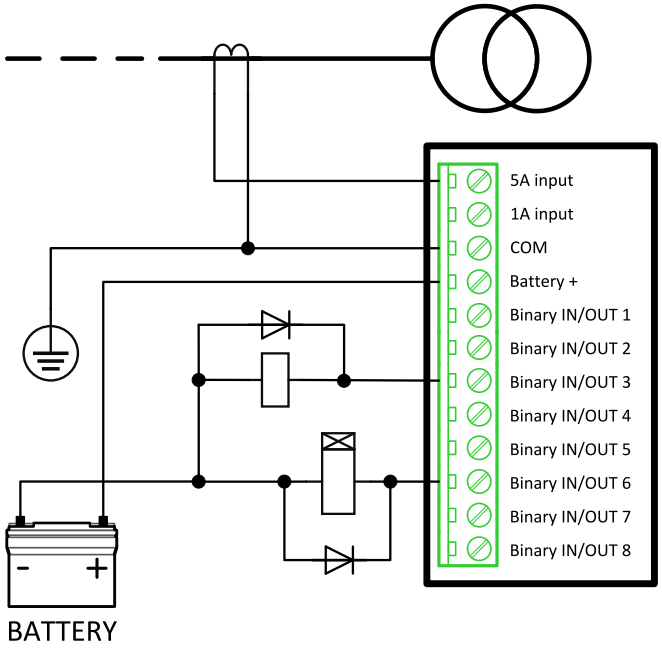


Image 8.92 EM-BIO8-EFCP wiring

Note: *Current inputs are supported only in MRS 16 and AMF 25 and AMF9 controllers.*

EM-BIO8-EFCP technical data

Power supply

Power supply range	8-36 VDC
Power consumption	40 mA / 8 VDC 27 mA / 12 VDC 22 mA / 24 VDC 19 mA / 36 VDC

Binary inputs

Number	Up to 8, non-isolated
Close/Open indication	0-2 VDC close contact >6 VDC open contact

Binary outputs

Number	Up to 8 , non-isolated
Max. current	0,5A
Switching to	positive supply terminal

Current measuring input

Number of inputs	2
Nominal input current	1A/5A
Load (CT output impedance)	< 0,1

Max measured current from CT	10 A
Current measurement tolerance	2% from Nominal current
Max peak current from CT	150 A / 1 s
Max continuous current	10 A

Earth fault current measurement

The Earth Fault protection is done by the extension module EM-BIO8-EFCP.

When the measured current exceeds the set value, which indicates that part of the current is dispersed to earth, and when the set **Earth Fault Delay (page 403)** time elapses, the **Earth Fault Current Protection (page 402)**, **Sd Earth Fault Current (page 615)** alarms activate. Earth Fault protection is not active when Gen-set does not run and when the **Earth Fault Current Protection (page 402)** is disabled.

> **IMPORTANT: Earth fault current measurement is not intended to protect human health, but the device!**

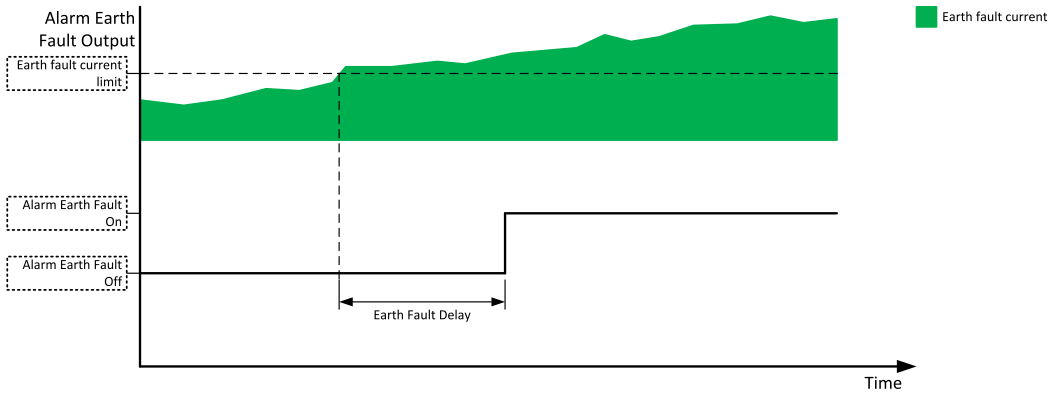


Image 8.93 Earth fault current protection

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.

8.3.2 CAN modules

The available extension CAN modules are:

- Inteli AIN8 – extension CAN module with 8 analog inputs
- Inteli IO8/8 – extension CAN module with 8 binary inputs, 8 binary outputs and 2 analog outputs
  - this CAN module can be switched to Inteli IO16/0 – extension CAN module with 16 binary inputs and 2 analog outputs

Supported combinations of modules

Slot	Inteli AIN8	Inteli AIN8TC	Inteli IO8/8	Inteli IO16/0	IGL-RA15	IGS-PTM	Inteli AIO9/1
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✓	✗	✗
5	✗	✗	✓	✓	✗	✗	✗

IMPORTANT: In slot 3, 4 and 5 CAN modules Inteli IO8/8 and Inteli IO16/0 are supported without analog outputs. Analog outputs of these CAN modules are supported only in slot 1 and 2.

It is possible to add up to 80 binary inputs or up to 68 binary outputs or up to 32 analog inputs on CAN modules.

Extension modules

Inteli AIN8 631
Inteli IO8/8 637
IGS-PTM 644
Inteli AIN8TC 650
Inteli AIO9/1 654
IGL-RA15 659

Inteli AIN8

Inteli AIN8 module is an extension module equipped with analog inputs. Inteli AIN8 module is connected to controller by CAN1 bus.



Image 8.94 Inteli AIN8

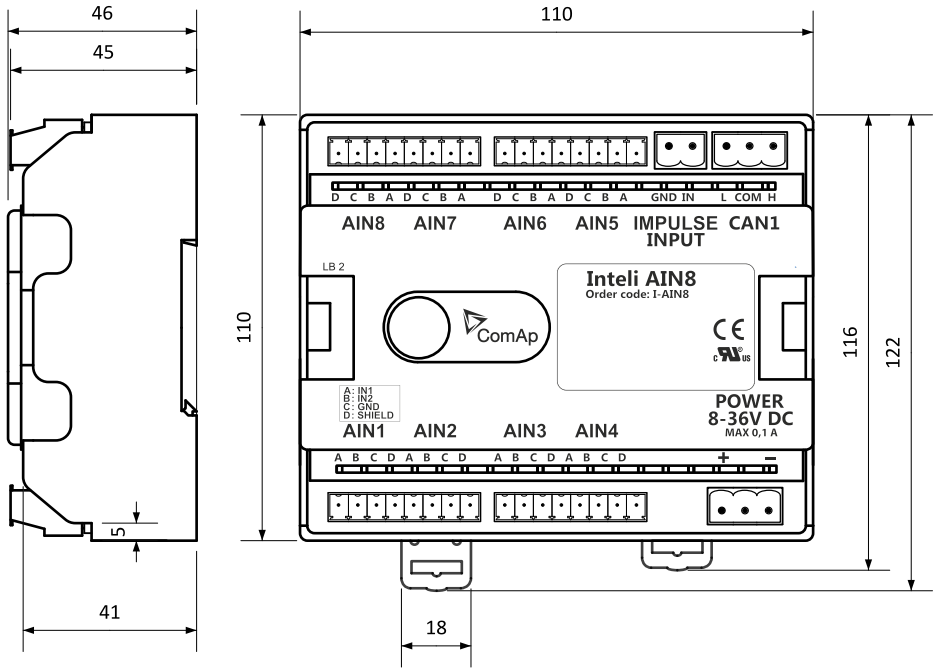
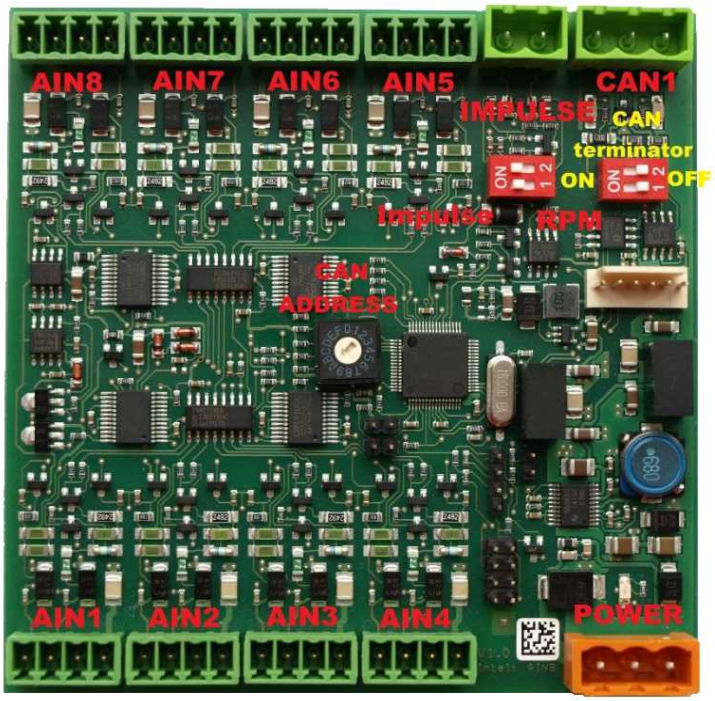


Image 8.95 Inteli AIN8 dimensions

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.

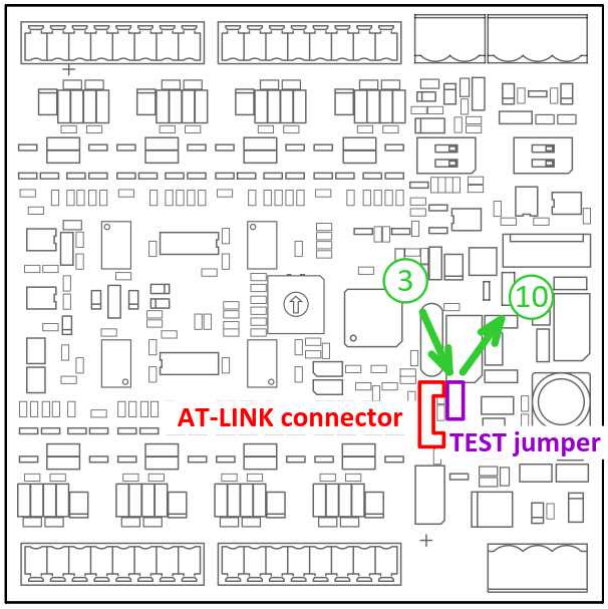


Note: *When setting the CAN address to zero, the appropriate group of signals is deactivated.*

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

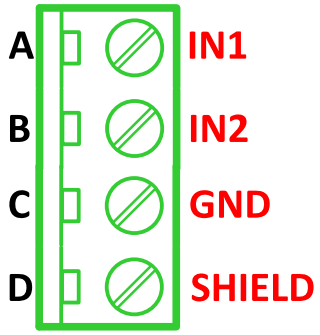
LED indication

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).

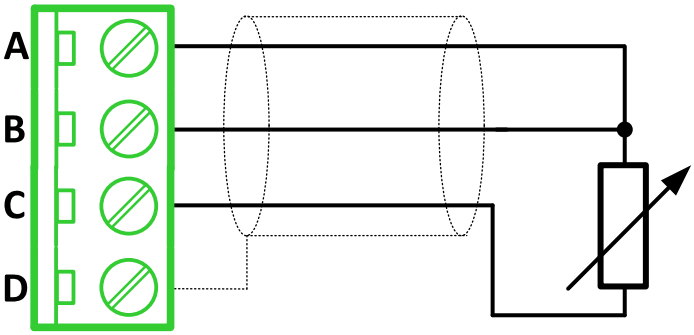
Wiring

The following diagrams show the correct connection of sensors.

Terminator

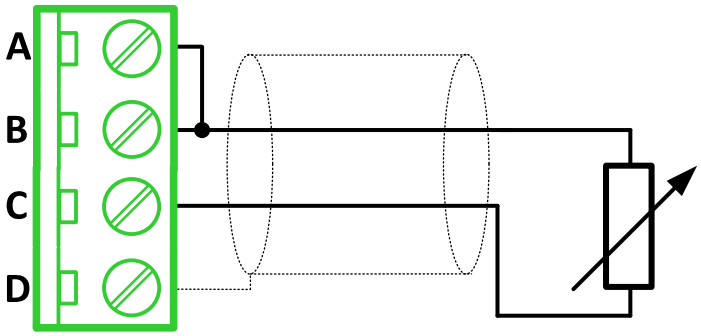


Resistance sensor - 3 wires



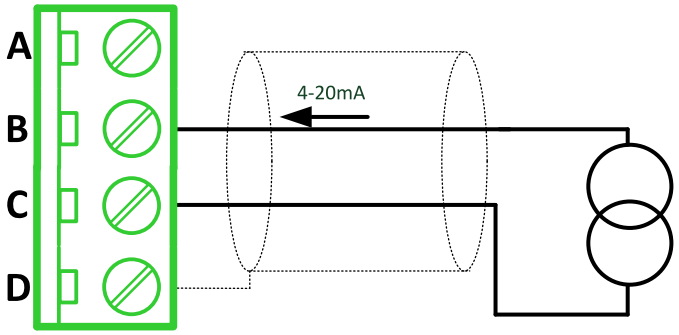
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0-2400 Ω, 0-10 kΩ*

Resistance sensor – 2 wires



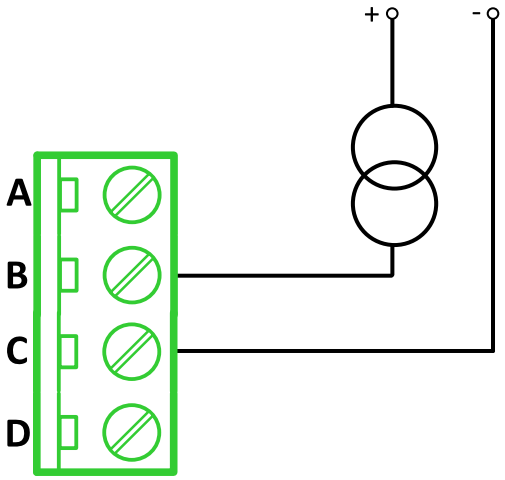
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0-2400 Ω, 0-10 kΩ*

Current sensor - active



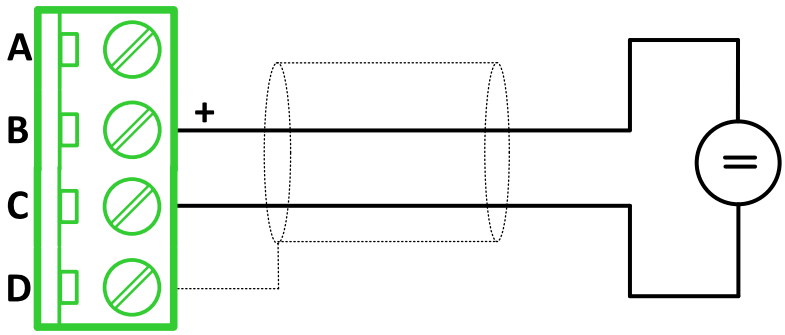
Note: *Ranges: ±20 mA, 4 – 20 mA*

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 8.96 Inteli IO8/8

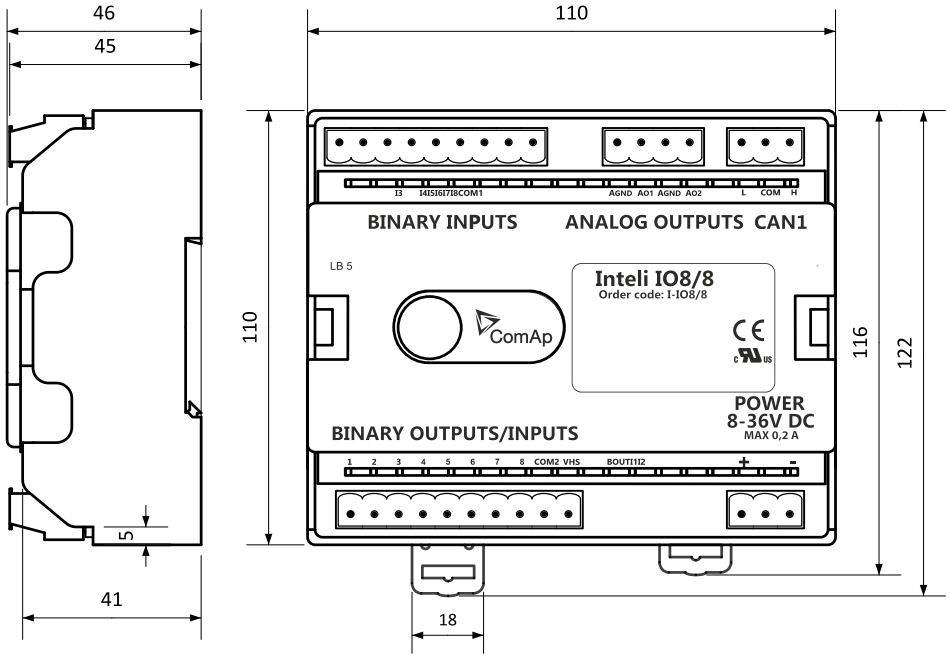
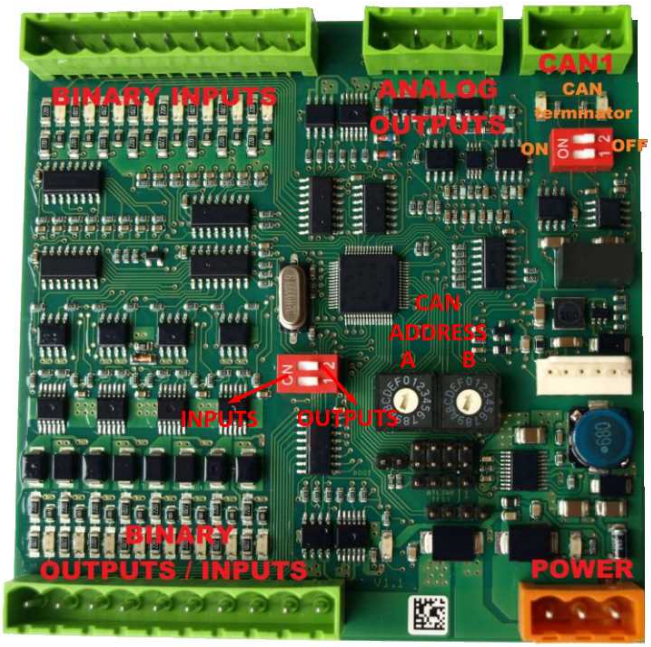


Image 8.97 Inteli IO8/8 dimensions

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.



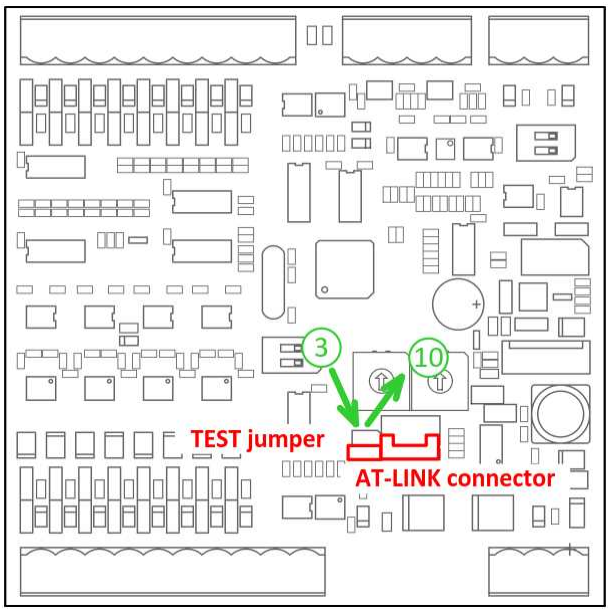
Note: *When setting the CAN address to zero, the appropriate group of signals is deactivated.*

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.

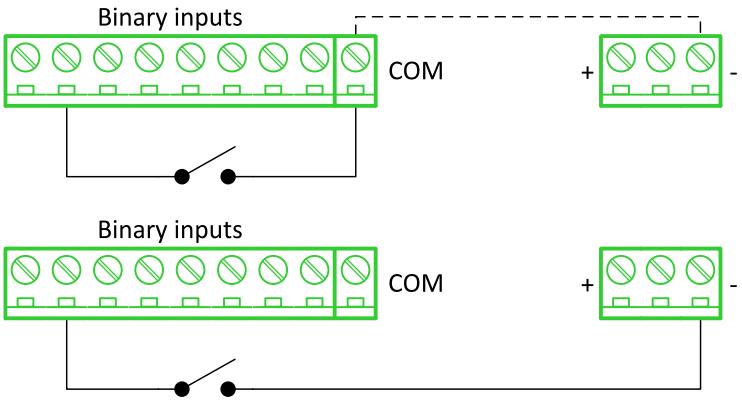
LED at power connector – status LED

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.

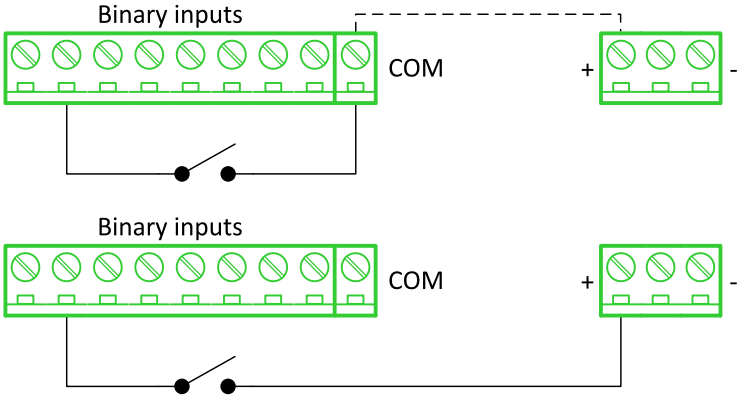
Binary inputs – pull up



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.

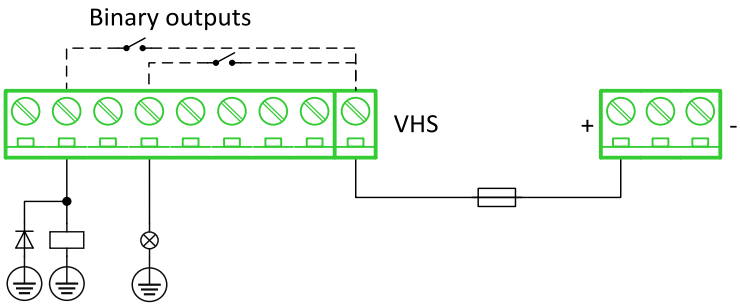
Binary inputs – pull down



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).

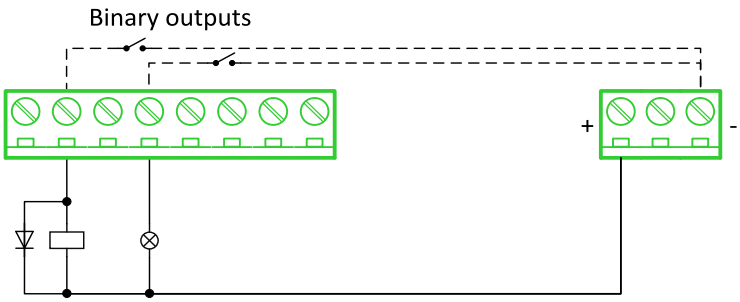
In the lower picture is an example of wiring between BIN2 and Ucc (+). Both ways are correct.

Binary outputs – high side



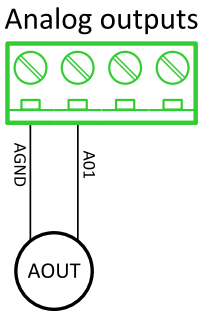
When high side setting of outputs is chosen – binary output must be connected to the negative potential directly Terminal VHS (voltage High side) must be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

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.

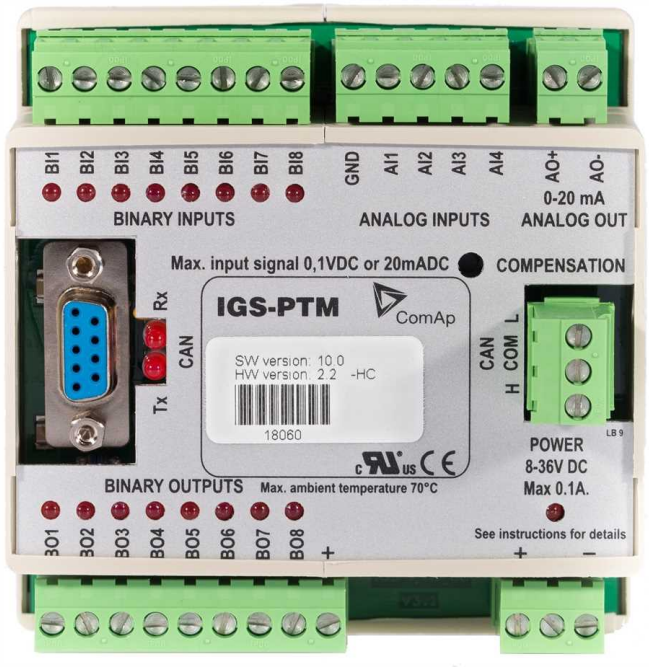


Image 8.98 IGS-PTM

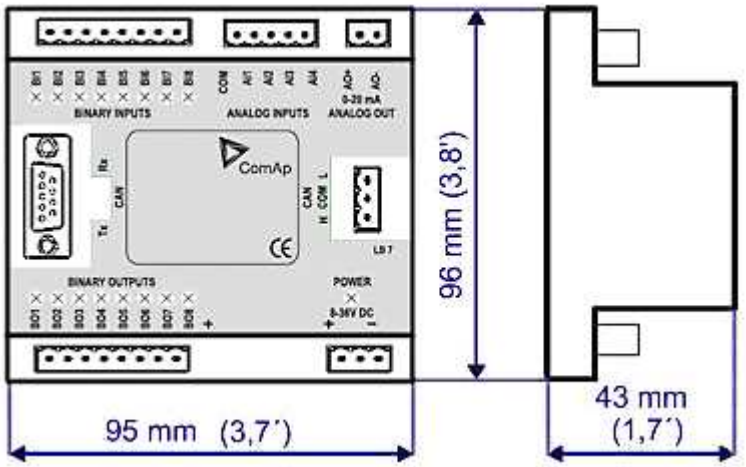
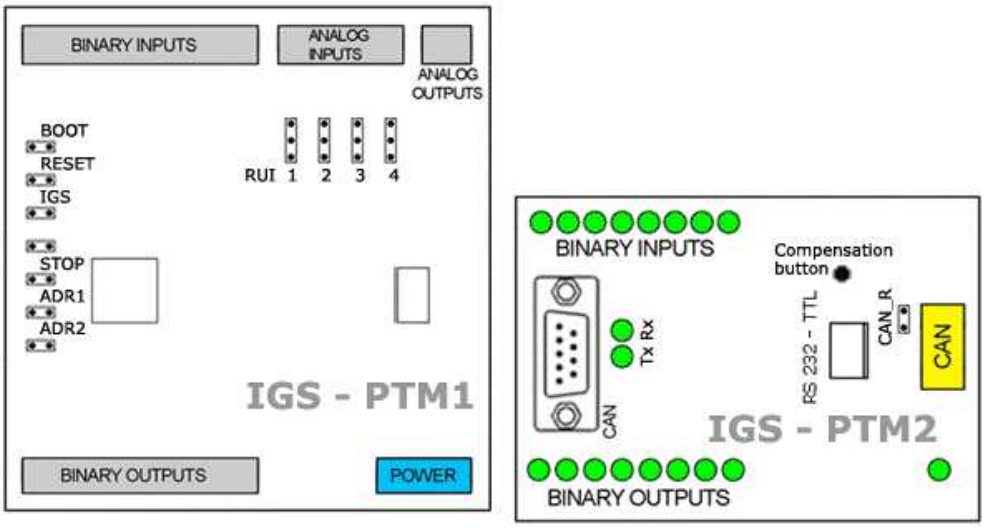


Image 8.99 IGS-PTM dimensions

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, InteliLite 4

Address configuration

If InteliLite 4 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

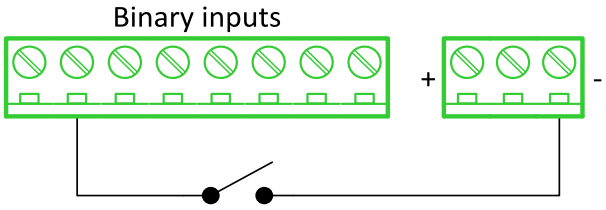
Each binary output has an LED which indicates output signal. Binary output LED is shining when binary output is set.

LED at power connector – status LED

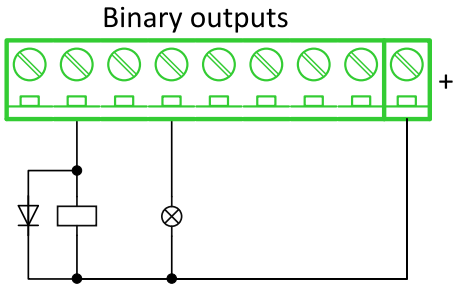
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

Wiring

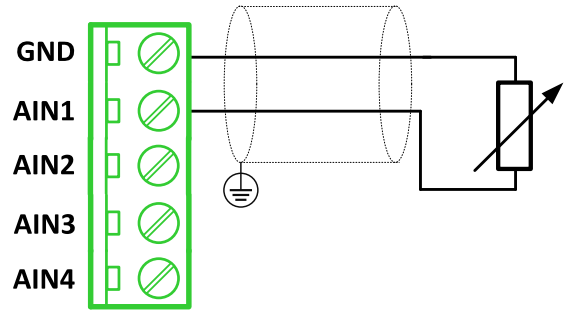
Binary inputs



Binary outputs



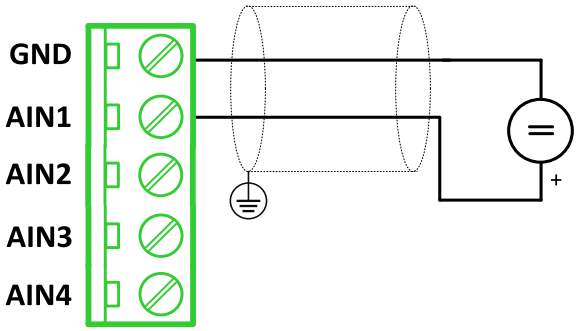
Resistance sensor



Note: *Range: 0-2400 Ω*

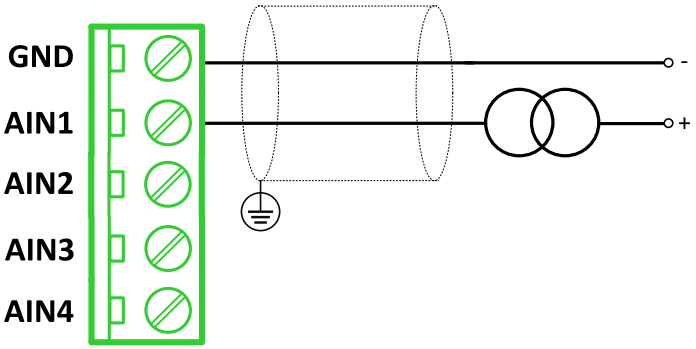
IMPORTANT: Physical analog input range is 0-250 Ω. In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.

Voltage sensor



Note: *Range 0-100 mV*

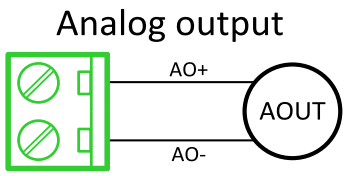
Current sensor – passive



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 8.100 Inteli AIN8TC

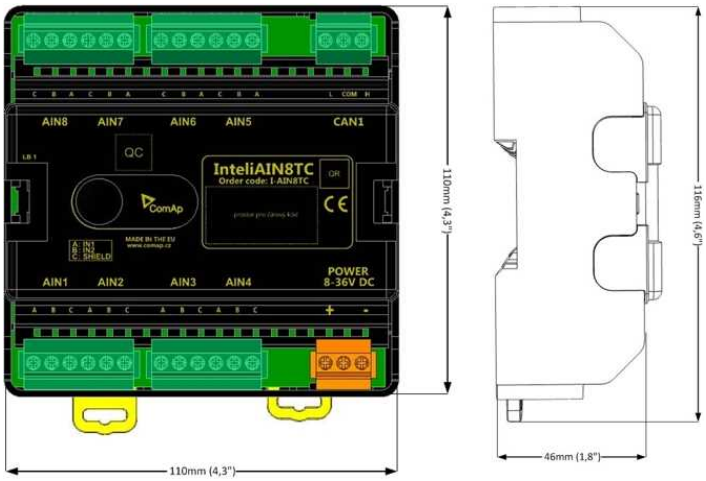
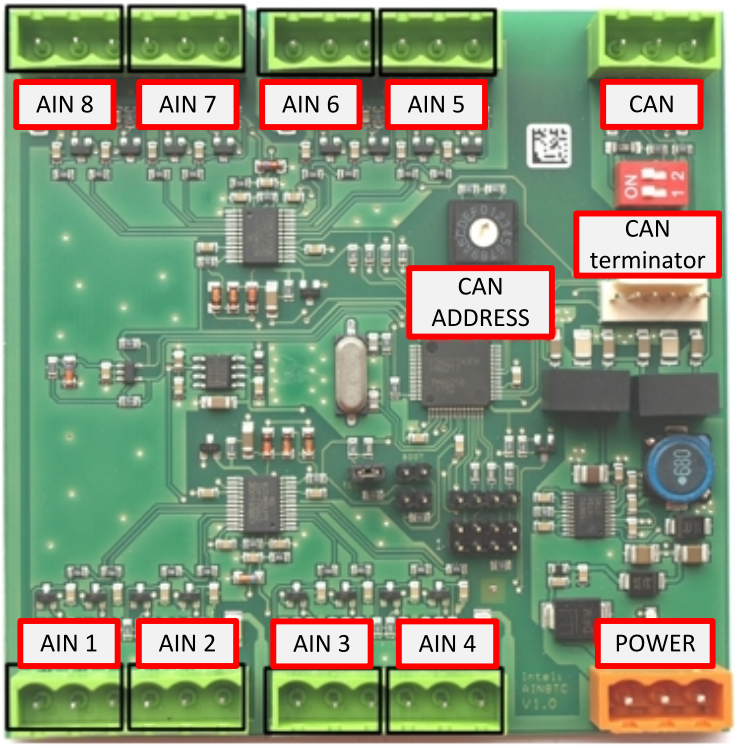


Image 8.101 Inteli AIN8TC dimensions

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.

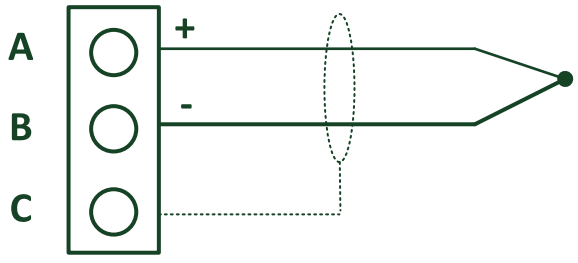
For programming FlashProg PC tool version 4.2 or higher must be used.

LED indication

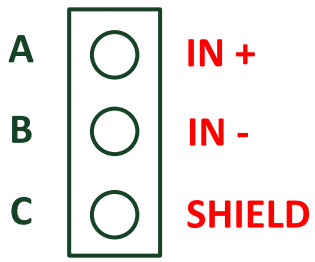
LED status	Description
Dark	FW in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)
Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Inteli AIN8TC and controller works 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 8.102 Inteli AIO9/1

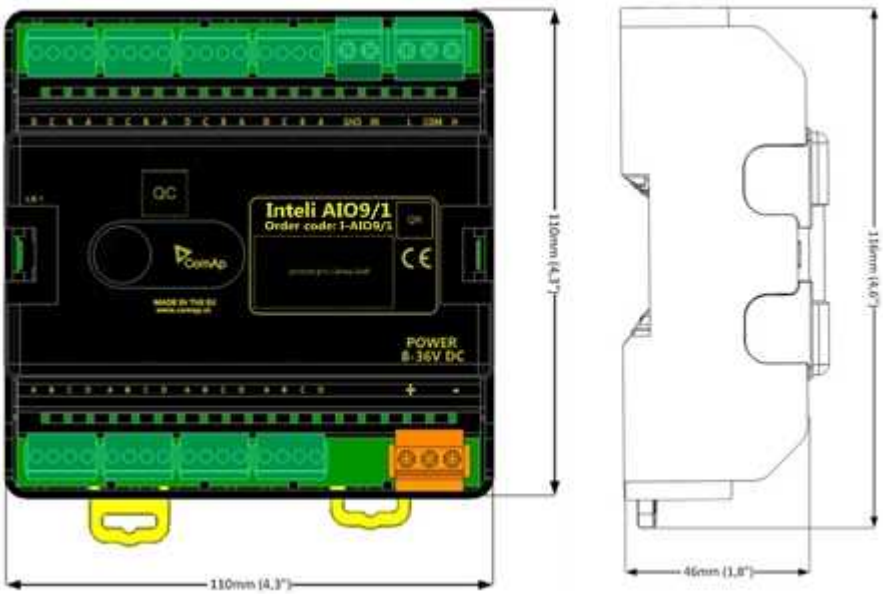
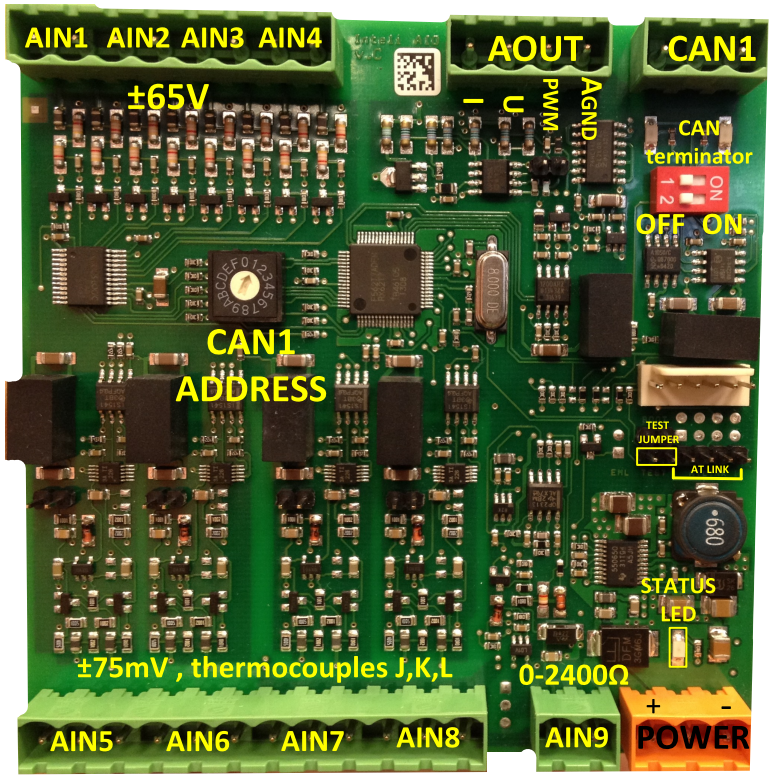


Image 8.103 Inteli AIO9/1 dimensions

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.

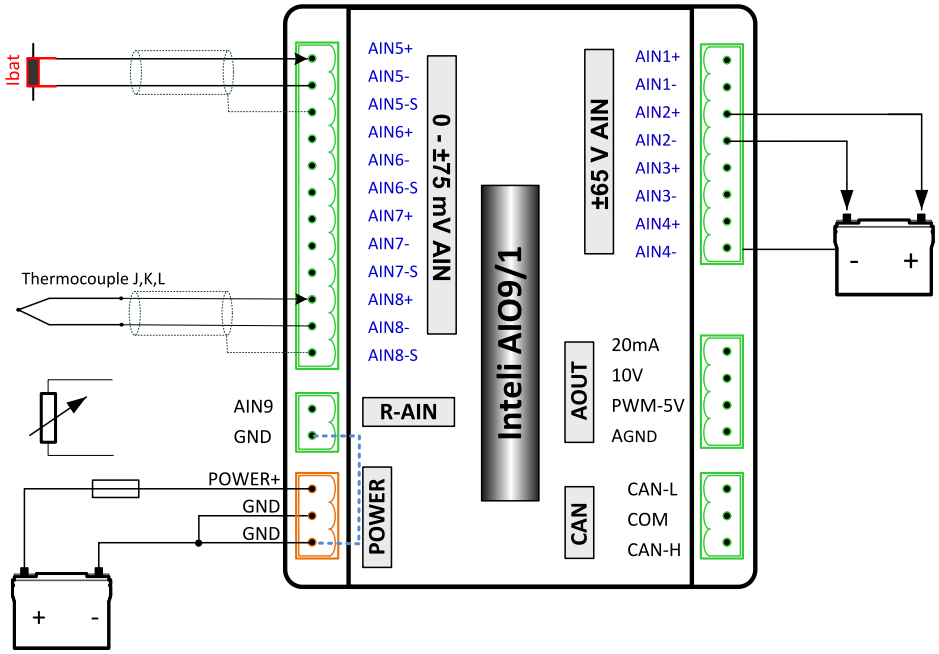
LED indication

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 8.104 IGL-RA15

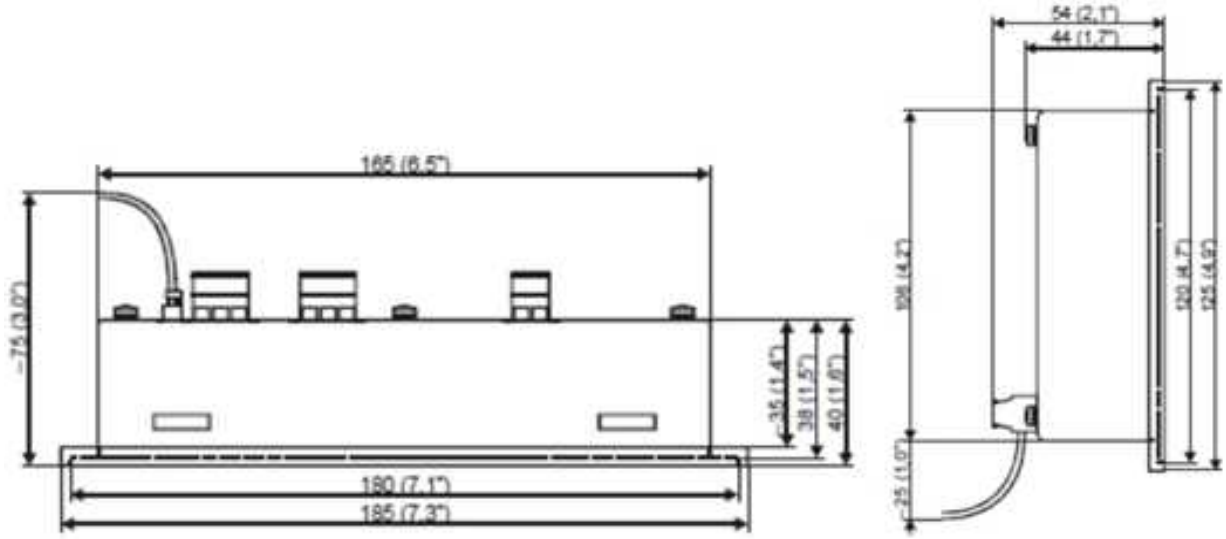


Image 8.105 IGL-RA15 dimensions

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 662)**

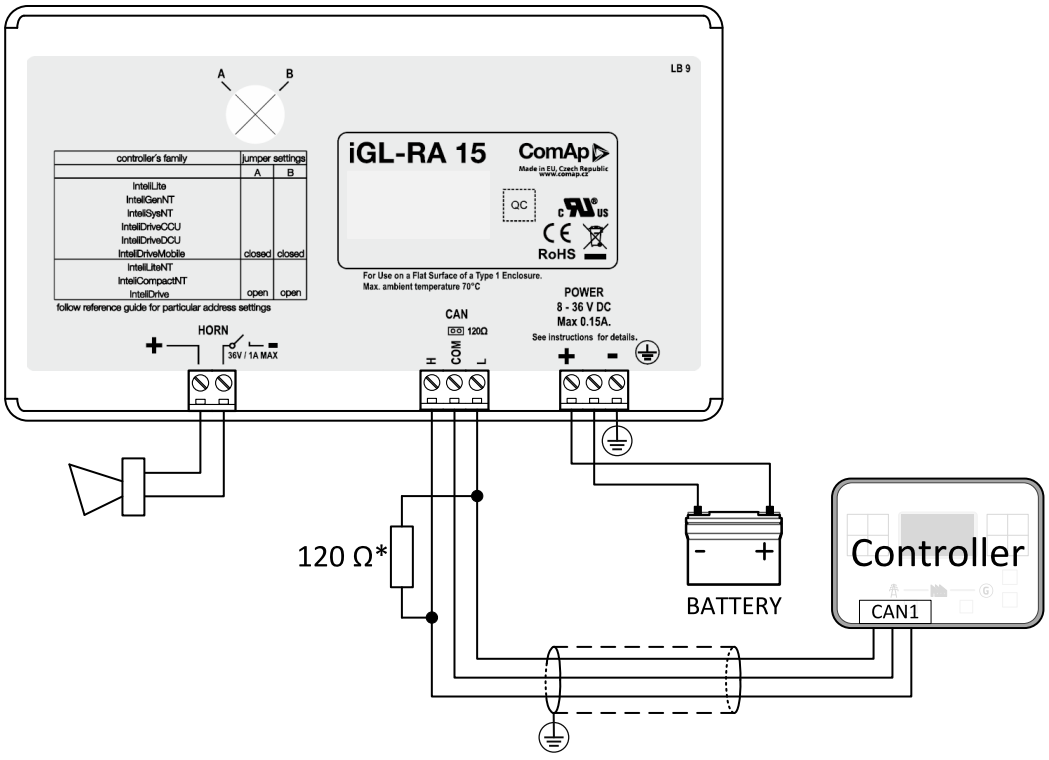
The horn can be silenced:

- 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 201)** 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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