

# InteliLite AMF20

## Controller for single gen-set applications

### SW version 1.9.0

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## 1.1 Clarification of notation

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

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

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

## 1.2 About this Global Guide

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

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

This manual is dedicated for:

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

## 1.3 Legal notice

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### **Security Risk Disclaimer**

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

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

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

General security recommendations and set of measures

#### 1. AccessCode

- Change the AccessCode BEFORE the device is connected to a network.
- Use a secure AccessCode – ideally a random string of 8 characters containing lowercase, uppercase letters and digits.
- For each device use a different AccessCode.

#### 2. Password

- Change the password BEFORE the device enters a regular operation.
- Do not leave displays or PC tools unattended if an user, especially administrator, is logged in.

#### 3. Controller Web interface

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

#### 4. MODBUS/TCP

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

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

## 5. SNMP

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

Used Open Source Software: mBed-TLS

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

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

Used Font: zpix-pixel-font

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

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## 1.4 General warnings

### 1.4.1 Remote control and programming

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

To be sure:

- ▶ Disconnect remote control
- ▶ Disconnect binary outputs

### 1.4.2 SW and HW versions compatibility

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

### 1.4.3 Dangerous voltage

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

Always connect grounding terminals!

In any case do not disconnect controller CT terminals!



### 1.4.4 Adjust the setpoints

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



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

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

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

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

## 1.5 Certifications and standards

<ul style="list-style-type: none"> <li>▶ EN 61000-6-2</li> <li>▶ EN 61000-6-4</li> <li>▶ EN 61010-1</li> <li>▶ EN 60068-2-1 (-20 °C/16 h for std version)</li> <li>▶ EN 60068-2-2 (70 °C/16 h)</li> <li>▶ EN 60068-2-6 (2÷25 Hz / ±1,6 mm; 25÷100 Hz / 4,0 g)</li> <li>▶ EN 60068-2-27 (a=500 m/s<sup>2</sup>; T=6 ms)</li> <li>▶ EN 60068-2-30:2005 25/55°C, RH 95%, 48hours</li> <li>▶ EN 60529 (front panel IP65, back side IP20)</li> </ul>	 
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## 1.6 Document history

Revision number	Related sw. version	Date	Author
11	1.9.0	23.9.2019	Michal Slavata
10	1.8.0	21.5.2019	Michal Slavata
9	1.7.0	22.8.2018	Michal Slavata
8	1.7.0	4.7.2018	Michal Slavata
7	1.6.0	28.2.2018	Michal Slavata
6	1.5.0	9.10.2017	Michal Slavata
5	1.3.2	24.5.2017	Michal Slavata
4	1.2.1	5.12.2016	Michal Slavata
3	1.1.0	23.5.2016	Michal Slavata
2	1.1.0	6.3.2016	Michal Slavata
1	1.0.0	15.7.2016	Michal Slavata

## 1.7 Symbols in this manual

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



## 2 System overview

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### 2.1 General description

InteliLite Family controllers are comprehensive gen-set controllers for single gen-sets operating in stand-by (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. The controllers are equipped with a powerful graphic display showing icons, symbols and bar graphs for intuitive operation, which, together with its high level of functionality, sets new standards in Gen-set controls.

#### 2.1.1 The key features of InteliLite

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

### 2.2 True RMS measurement

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

### 2.3 Configurability and monitoring

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

#### 2.3.1 Supported configuration and monitoring tools

- ▶ InteliConfig - complete configuration and single gen-set monitoring
- ▶ WinScope - special graphical monitoring software

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

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

## 2.3.2 Configuration parts

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

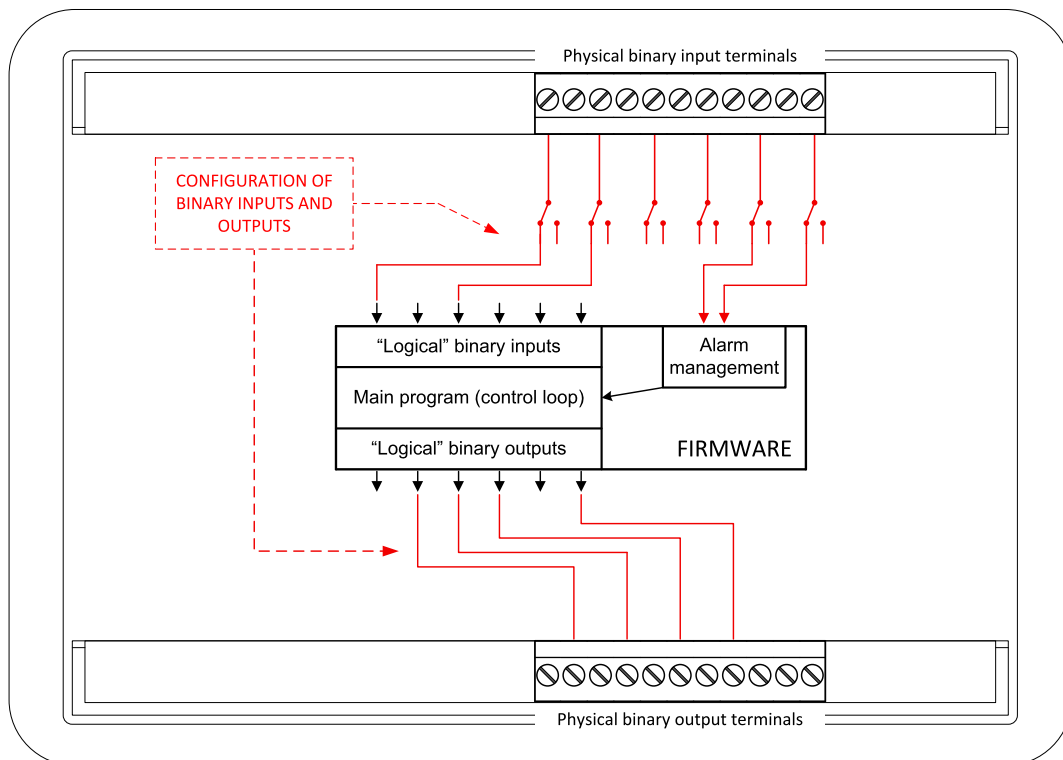


Image 2.1 Principle of binary inputs and outputs configuration

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

Once the configuration is modified, it can be saved to a file for later usage with another controller or for backup purposes. The file is called archive and has the file extension .ail3. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

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

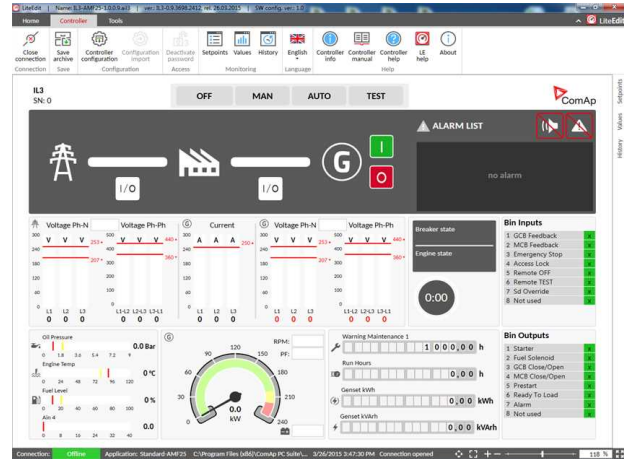
## 2.4 PC Tools

### 2.4.1 IntelliConfig

Configuration and monitoring tool for IntelliLite controllers. See more in IntelliConfig Reference Guide.

**This tool provides the following functions:**

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



### 2.4.2 WinScope

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

**This tool provides the following functions:**

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

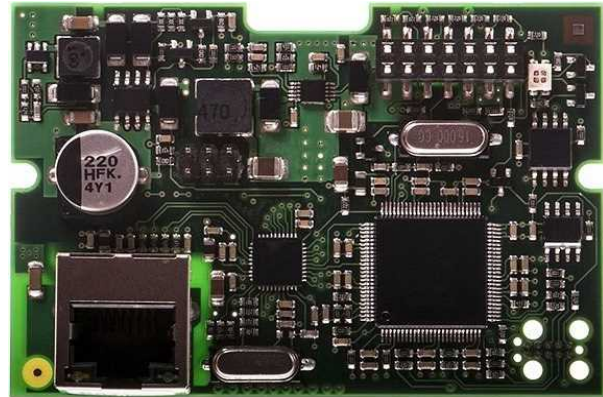


## 2.5 Plug-in Modules

### 2.5.1 CM-Ethernet

Internet/Ethernet module including web server.

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



### 2.5.2 CM-4G-GPS

GSM/4G module

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



### 2.5.3 CM-GPRS

GSM/GPRS module

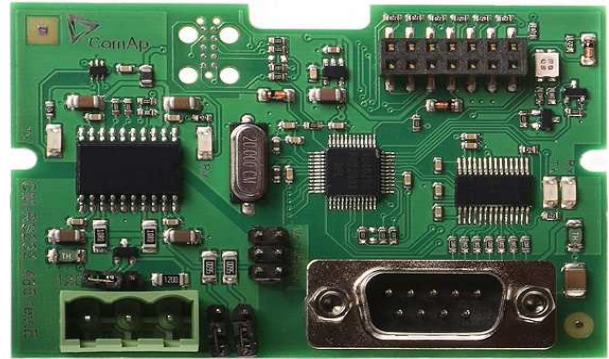
- ▶ Wireless integrated solution
- ▶ Quick and easy installation
- ▶ Instant alarm SMS notification
- ▶ System control over SMS
- ▶ Quad Band GPRS/EDGE modem, 850/900/1800/1900 MHz
- ▶ GPRS multi-slot class 10



## 2.5.4 CM-RS232-485

Communication module with two communication ports.

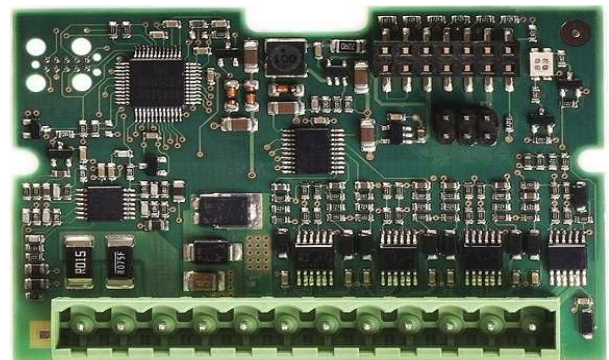
- ▶ RS232 and RS485 interface
- ▶ MODBUS
- ▶ Serial connection to IntelliConfig



## 2.5.5 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

- ▶ Up to 8 additional configurable binary inputs or outputs





## 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 (0-10V), current (0-20mA) and PWM (5V, adjustable frequency 200Hz-2,4kHz))

#### Configuration 16/0

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



### 2.6.2 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: 0-250Ω, 0-2400Ω, 0-10kΩ
  - Temperature sensor: Pt100, Pt1000, Ni100, Ni1000
- ▶ Current (active or passive sensors)
  - ±20mA, 0-20mA, 4-20mA
- ▶ Voltage
  - ±1V, 0-2,4V, 0-5V, 0-10V
  - Lambda probes
  - Thermocouples are not supported (the measuring loop was designed for lambda probes, what caused non-support of thermocouples)



## 2.6.3 IntelI AIN8TC

### 8 Analog Channels Module

- ▶ 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 V – 0 V
- ▶ 4× shielded, galvanically separated  $\pm 75$  mV inputs
- ▶ Resistance analog input 0 – 2500 ohm
- ▶ One analog output



## 2.6.5 IGS-PTM

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

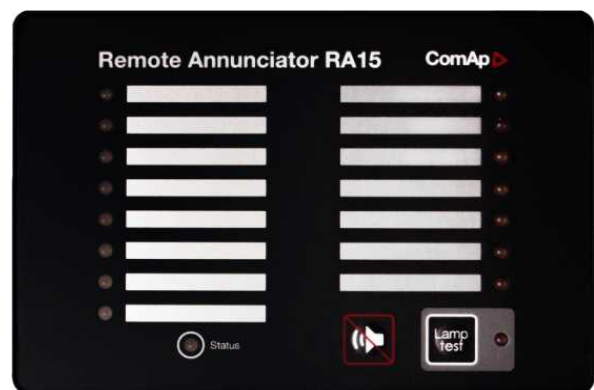
- ▶ Configurable 8 binary and 4 analog inputs
- ▶ Configurable 8 binary and 1 analog output
- ▶ LEDs indicate the state of binary inputs/outputs
- ▶ Measures values from Pt100 and Ni100 sensors
- ▶ Analog inputs (resistance range 0-250 Ohms, voltage range 0-100mV, current range 0-20mA - selectable via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



## 2.6.6 IGL-RA15

Remote annunciator.

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



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# 3 Applications overview

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## 3.1 AMF - Automatic Mains Failure Start

The typical scheme 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 isn't necessary. IntelliLite controllers can also work without breaker feedbacks.

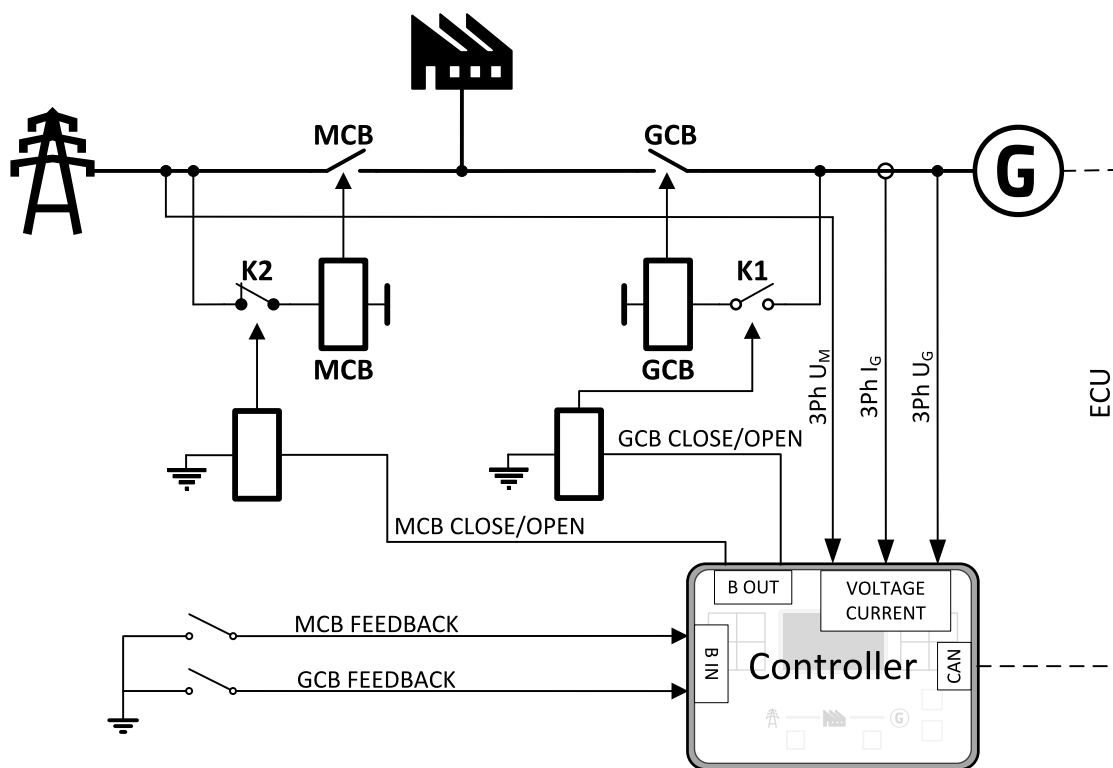


Image 3.1 AMF application overview

## 3.2 MRS - Manual Remote Start

The typical scheme of Manual Remote Start application is shown below. The controller controls one breaker – a generator breaker. Feedback from breaker isn't necessary. IntelliLite controllers can also work without breaker feedback.

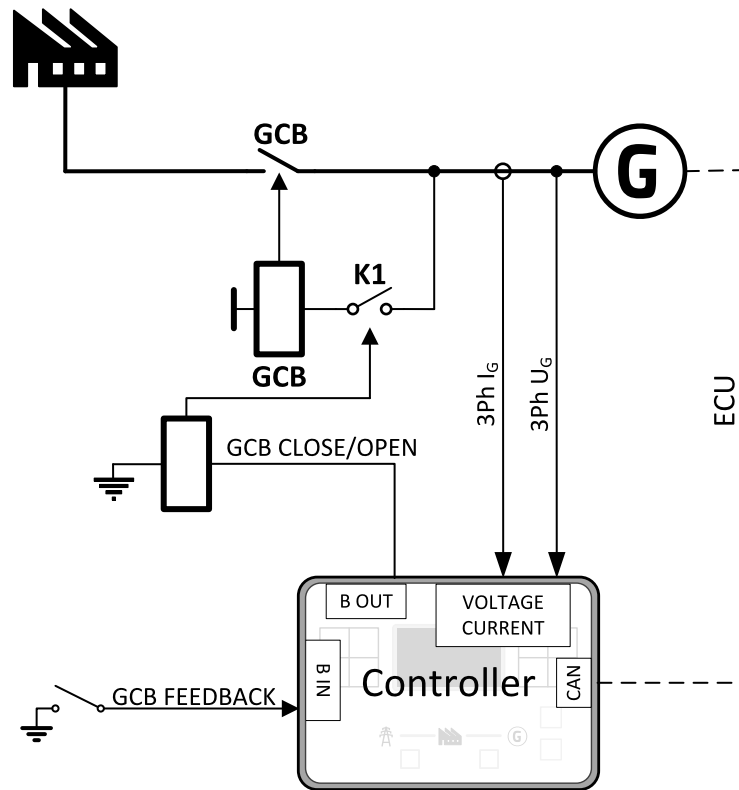


Image 3.2 MRS application overview

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## 4.1 Package content

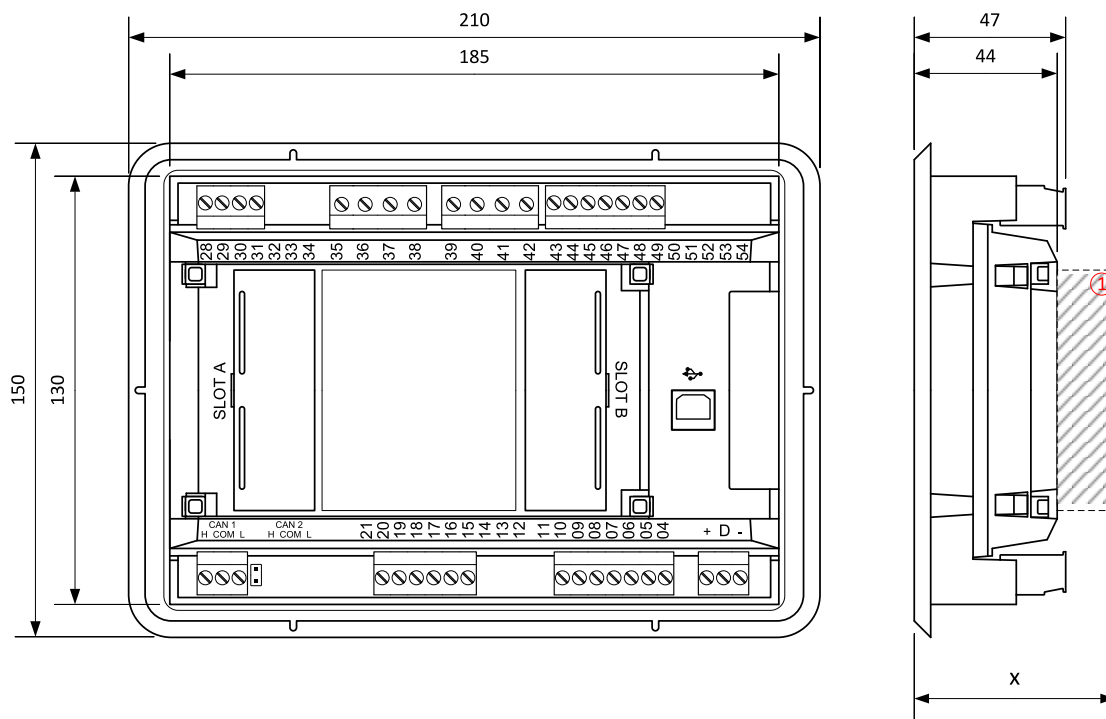
The package contains:

-  Controller
-  Mounting holders
-  Terminal blocks

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

## 4.2 Controller installation

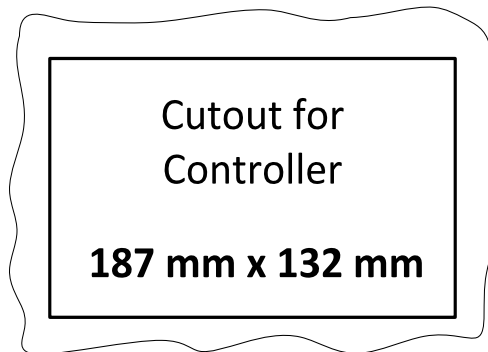
### 4.2.1 Dimensions



① Plug-in module

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

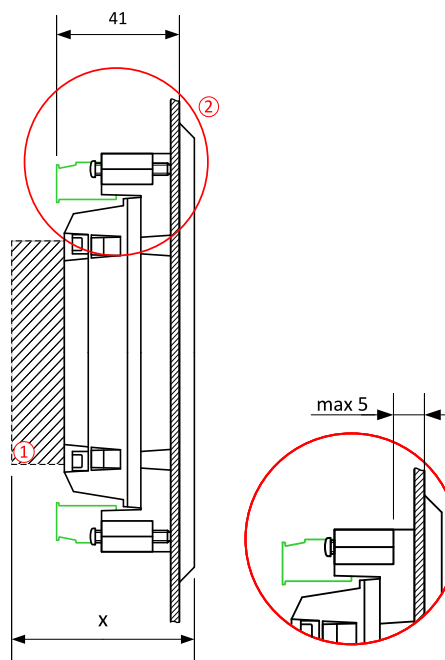
**Note:** Dimensions are in millimeters and are the same for all versions of IntelliLite.



## 4.2.2 Mounting

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

### Panel door mounting



**Note:** 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	
T28	COM	T35	N	T39	N	T43	BIN1
T29	L1	T36	L1	T40	L1	T44	BIN2
T30	L2	T37	L2	T41	L2	T45	BIN3
T31	L3	T38	L3	T42	L3	T46	BIN4
						T47	BIN5
						T48	BIN6
						T49	BIN7

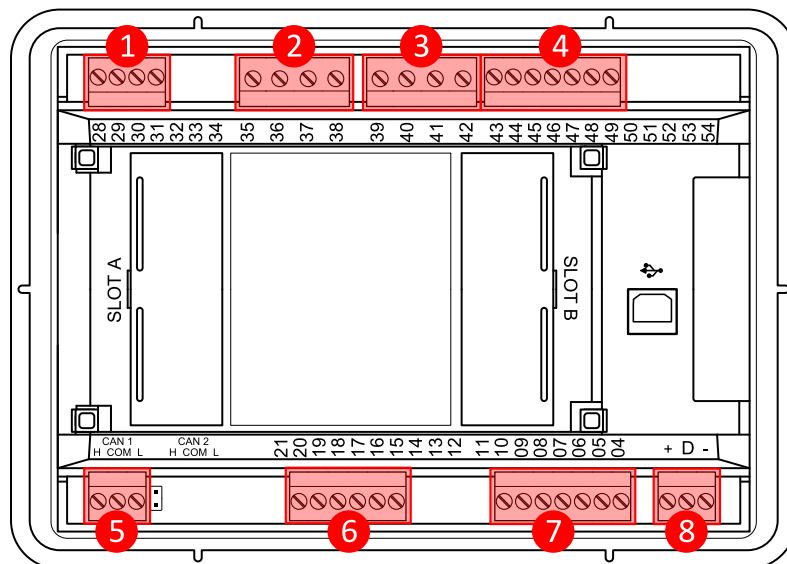
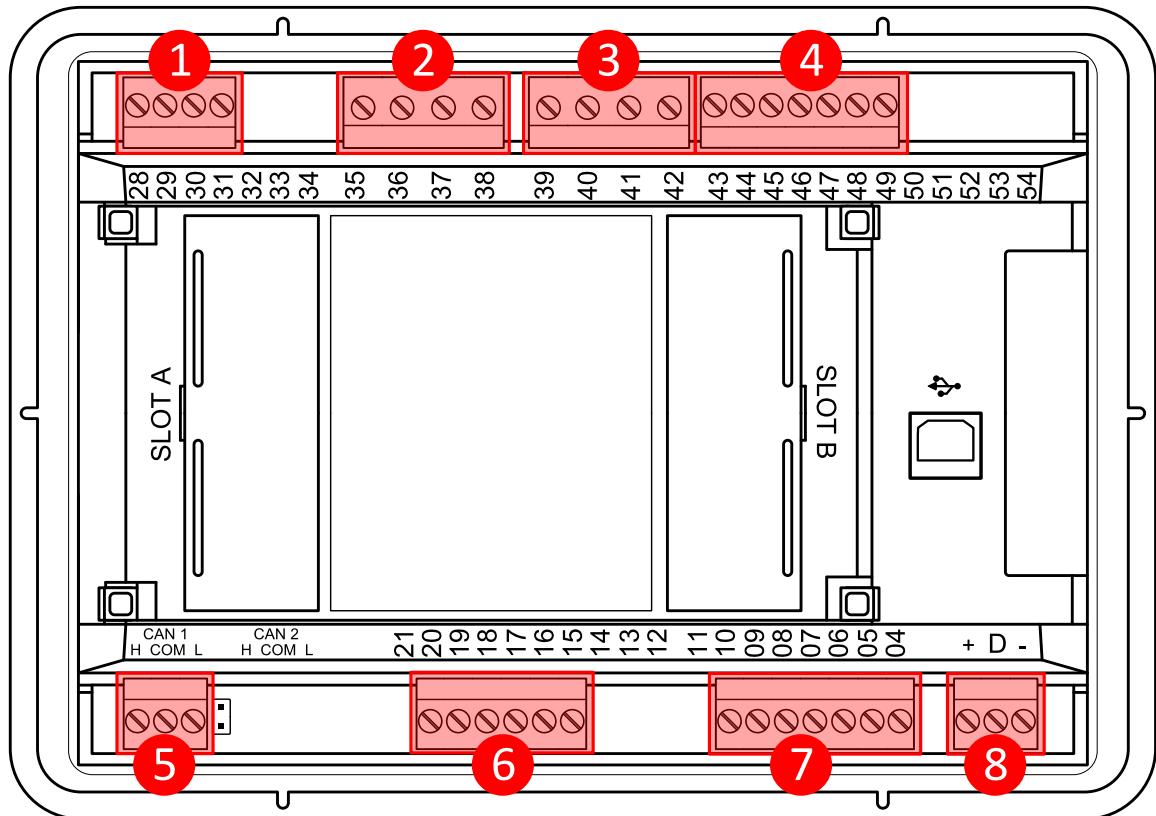


Image 4.1 Terminal diagram for Intelilite AMF20

⑤ CAN1		⑥ ANALOG INPUTS		⑦ BINARY OUTPUTS		⑧ POWER SUPPLY, D+	
T25	L	T15	RPM GND	T04	BOUT1	T01	BATT -
T26	COM	T16	RPM IN	T05	BOUT2	T02	D+
T27	H	T17	A COM	T06	BOUT3	T03	BATT +
		T18	A01	T07	BOUT4		
		T19	A02	T08	BOUT5		
		T20	A03	T09	BOUT6		
				T10	BOUT7		

## 4.4 Recommended wiring



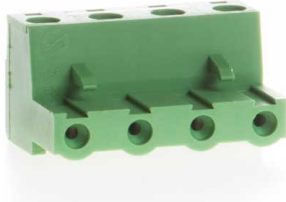


1	Current inputs	28 - 31	Current measurement wiring (page 28)
2	Generator voltage inputs	35 - 38	Voltage measurement AMF wiring (page 30) Voltage measurement MRS wiring (page 37)
3	Mains voltage inputs	39 - 42	Voltage measurement AMF wiring (page 30)
4	Binary inputs	43 - 49	Binary inputs (page 45)
5	CAN bus and RS485	H, COM, L	CAN bus and RS485 wiring (page 51)
6	Analog inputs	15 - 20	Analog inputs (page 47)
7	Binary outputs	04 - 10	Binary Outputs (page 46)
8	Power supply	"+", "D", "-"	Power supply (page 25)
9	USB		USB (page 54)

**Note:** Wiring terminal markings to included tightening torque: 0,5 N-m (4,5 lb-in)., and wire size: 2 mm<sup>2</sup> (12-26AWG).

## 4.4.1 General

To ensure proper function:

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

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

## 4.4.2 Grounding

The shortest possible length of wire should be used for controller grounding. Use cable min 2.5 mm<sup>2</sup>.

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

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

## 4.4.3 Power supply

To ensure proper function:

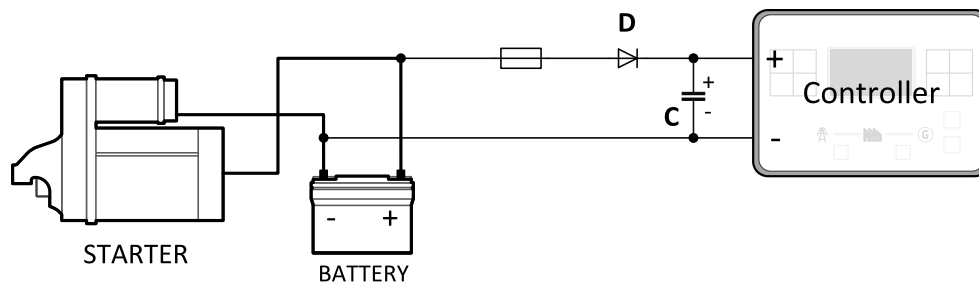
- ▶ Use power supply cable min. 1.5 mm<sup>2</sup>

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

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

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

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



**Note:** Recommended fusing is 3 A fuse.

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

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

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

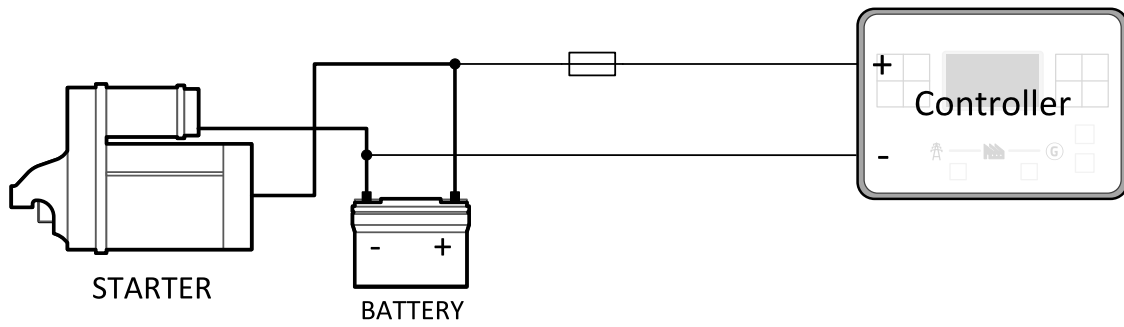
**Note:** Low voltage circuits (35 volts or less) shall be supplied from the engine starting battery or an isolated secondary circuit.

**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  $\mu$ F. The capacitor size should be 5 000  $\mu$ F to withstand 150 ms voltage dip under following conditions: Voltage before dip is 12 V, after 150 ms the voltage recovers to min. allowed voltage, i.e. 8 V.

## Power supply fusing

A 3 A fuse should be connected in-line with the battery positive terminal to the controller and modules. These items should never be connected directly to the starting battery. Fuse value and type depends on number of connected devices and wire length. Recommended fuse (not fast) type - T3 A. Not fast due to internal capacitors charging during power up.





**Note:** Recommended fusing is 3 A fuse.

**IMPORTANT:** 3 A fuse is calculated without BOUT consumption nor extension modules. Real value of fuse depends on consumption of binary outputs and modules.

**Example:** Maximal consumption of binary outputs can be 22 A

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

#### 4.4.4 Measurement wiring

Use 1.5 mm<sup>2</sup> cables for voltage connection and 2.5 mm<sup>2</sup> for current transformers connection. Adjust Connection type (page 175), Nominal Voltage Ph-N (page 177), Nominal Voltage Ph-Ph (page 177), Nominal Current (page 173), PT Ratio (page 177), Vm PT Ratio (page 178) and CT Ratio (page 174) by appropriate setpoints in the Basic Settings group.

**IMPORTANT:** Risk of personal injury due to electric shock when manipulating voltage terminals under voltage. Be sure the terminals are not under voltage before touching them.

Do not open the secondary circuit of current transformers when the primary circuit is closed. Open the primary circuit first.

#### CT Location

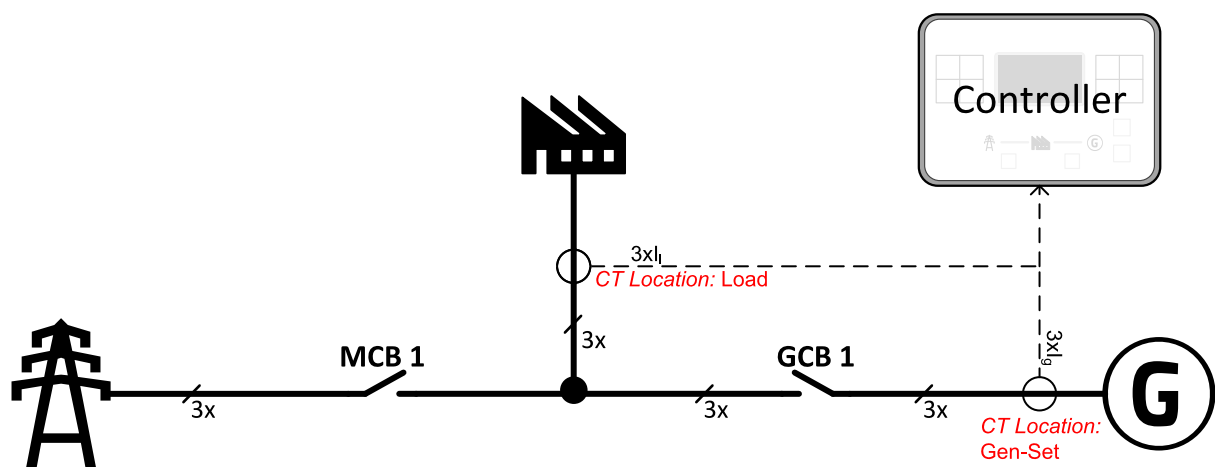


Image 4.2 CT Location

There are two options of CT location.

- a) Load

b) Gen-Set

**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 217) 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 175) [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph].

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

To ensure proper function:

- ▶ Use cables of 2.5 mm<sup>2</sup>
- ▶ Use transformers to 5 A
- ▶ Connect CT according to following drawings:

#### 3 phase application:

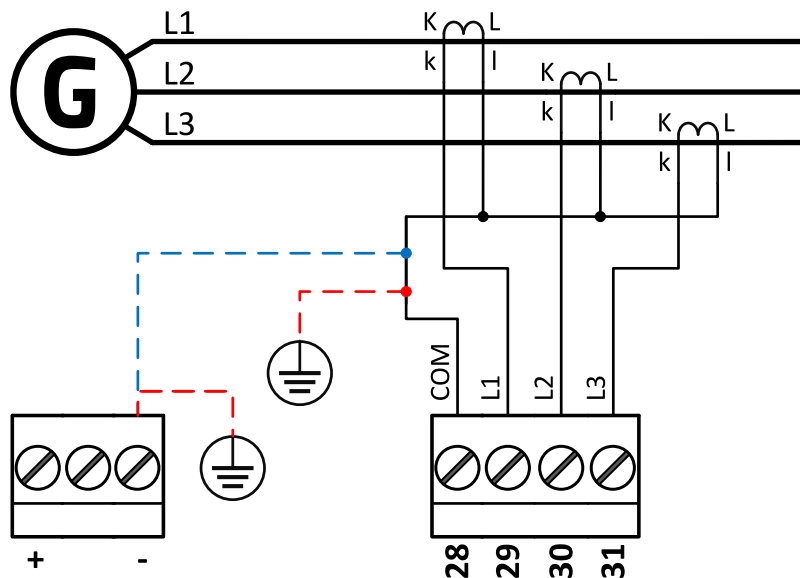


Image 4.3 3 phase application

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

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

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

Split phase application:

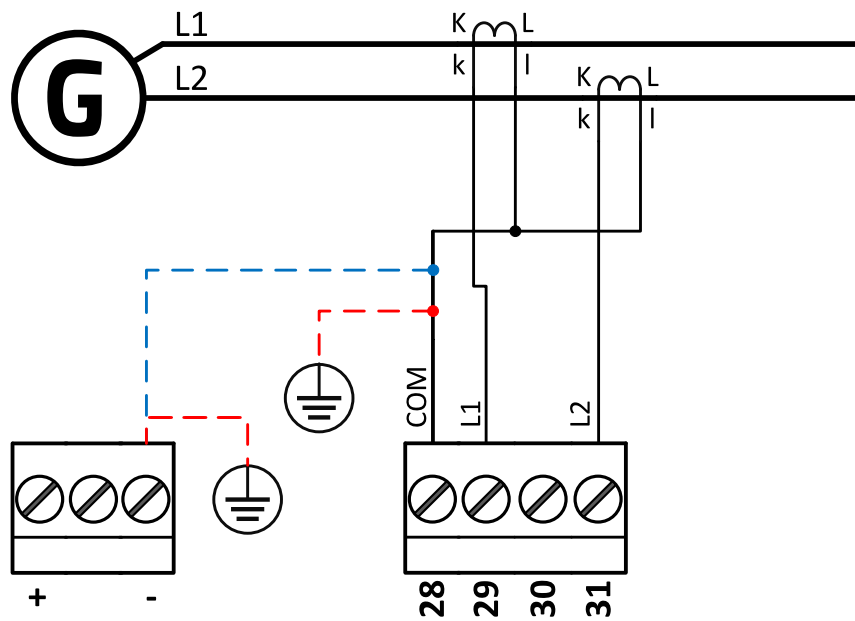


Image 4.4 Split phase application

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

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

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

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

### Mono phase application:

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

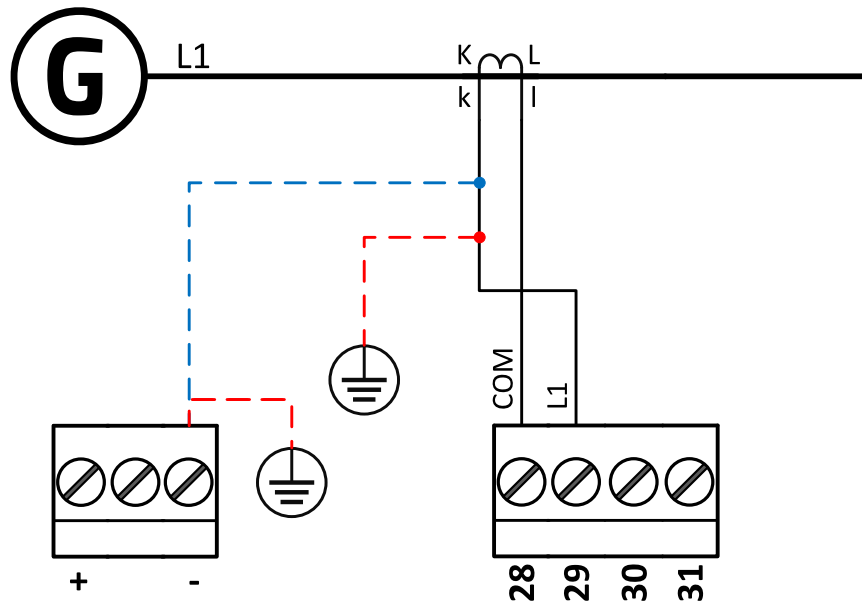


Image 4.5 Mono phase application

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

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

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

### Voltage measurement AMF wiring

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 175)** [3Ph4Wire / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages based on **Connection type (page 175)** setting:

- ▶ 3Ph 4W – Ph-Ph voltage, Ph-N voltage
- ▶ 3Ph 3W – Ph-Ph voltage
- ▶ SpIPhL1L2 – Ph-N voltage
- ▶ SpIPhL1L3 – Ph-N voltage
- ▶ Mono Ph – Ph-N voltage

ConnectionType: 3 Phase 4 Wires

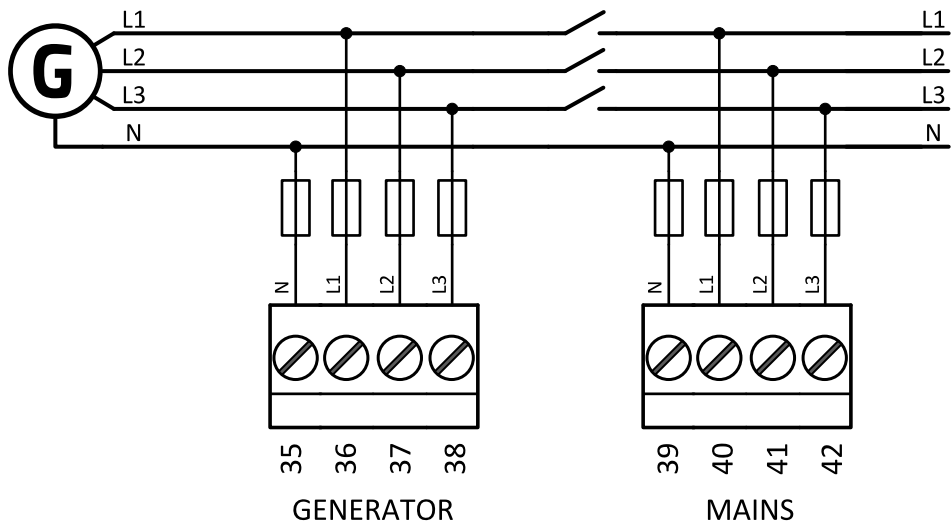


Image 4.6 3 phase application with neutral

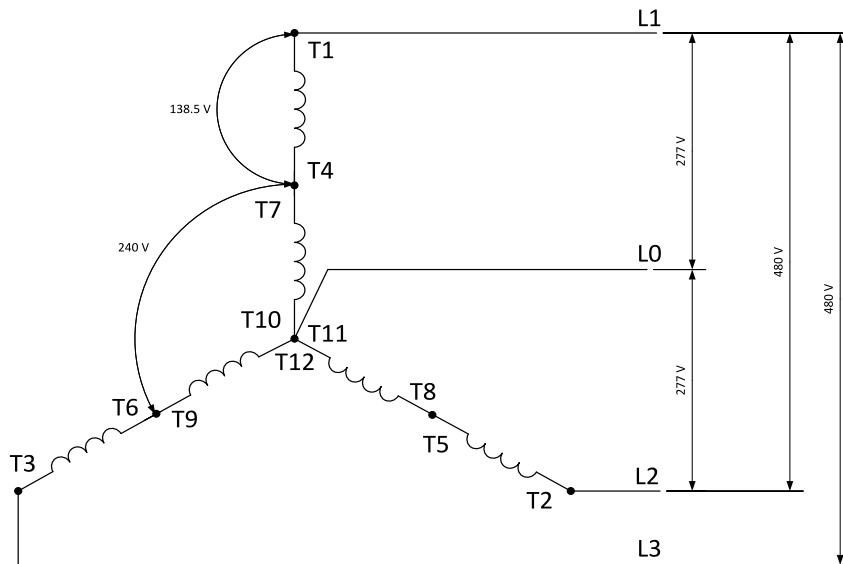


Image 4.7 Typical 3 Phase 4 Wires generator wiring

ConnectionType: High Leg D

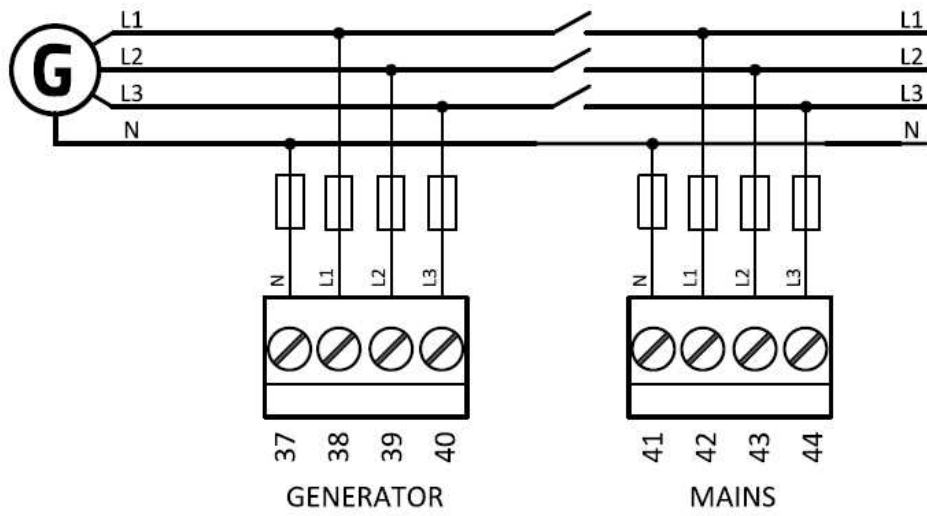


Image 4.8 High Leg Delta application

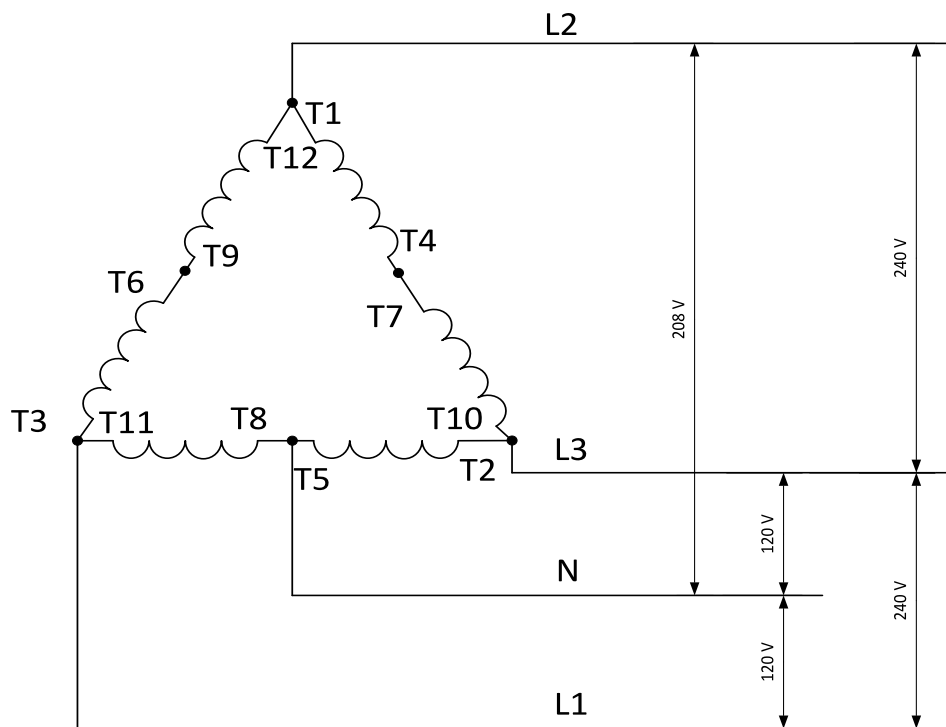


Table 4.1 Typical High Leg D generator wiring

ConnectionType: 3 Phase 3 Wires

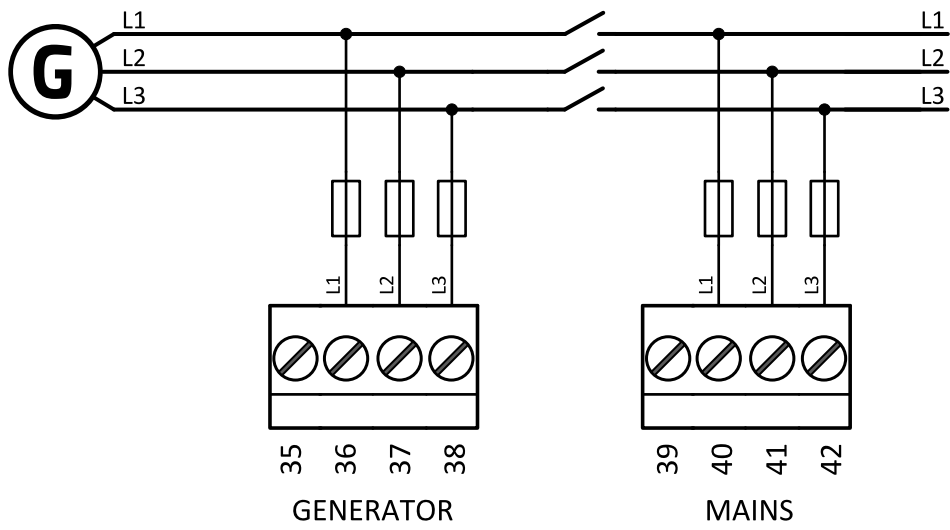


Image 4.9 3 phase application without neutral

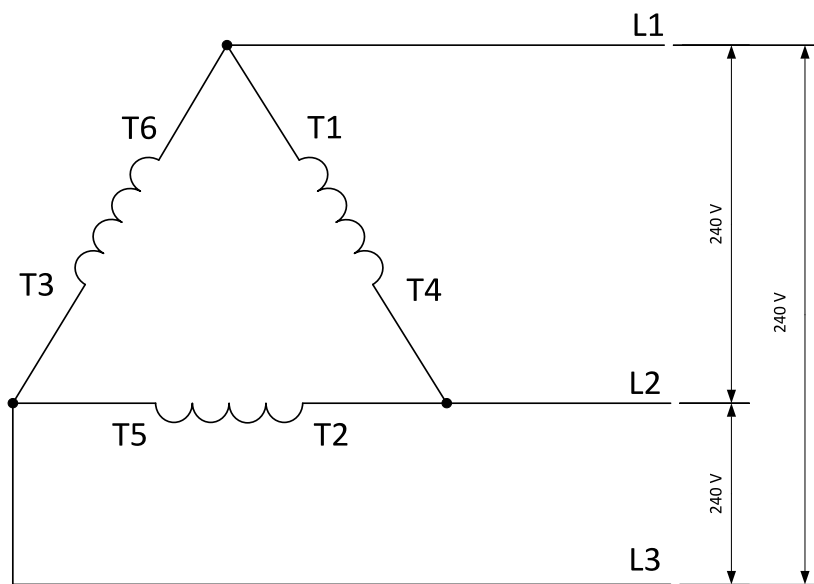


Image 4.10 Typical 3 Phase 3 Wires generator wiring

ConnectionType: SpIPhL1L2

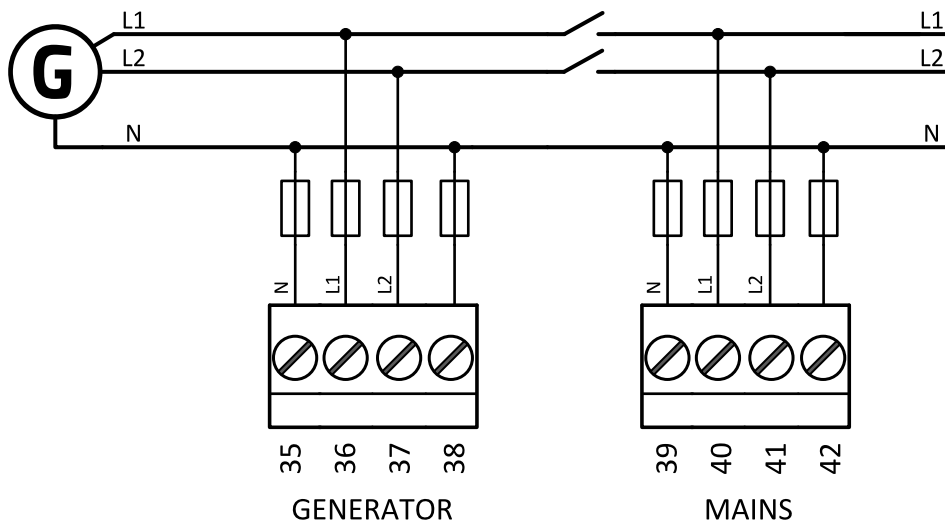
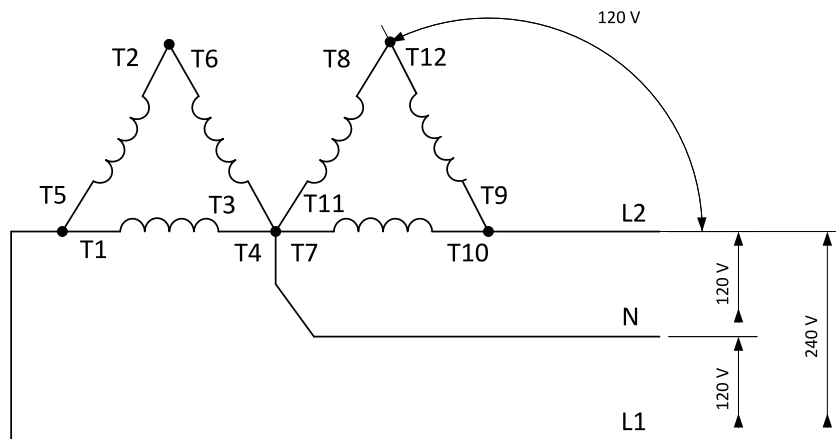


Image 4.11 Split phase L1L2 application

DOUBLE DELTA Connection





### ZIG ZAG (DOG LEG) Connection

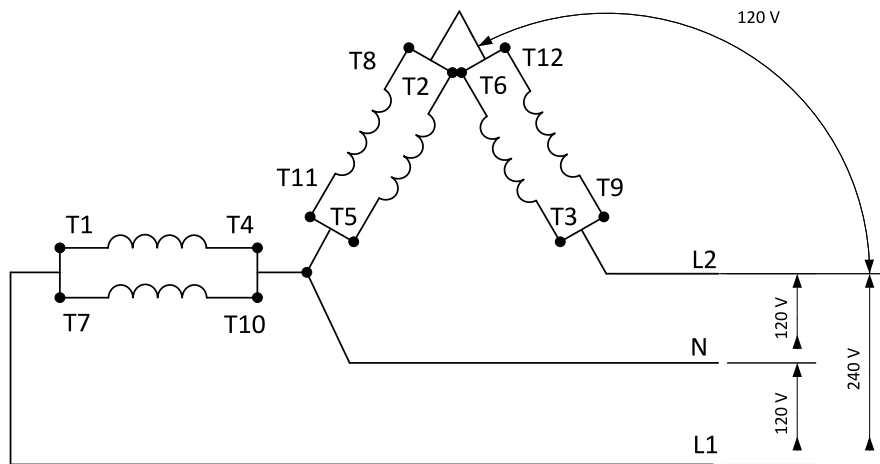


Image 4.12 Typical Split Phase generator wiring

### ConnectionType: SpIPhL1L3

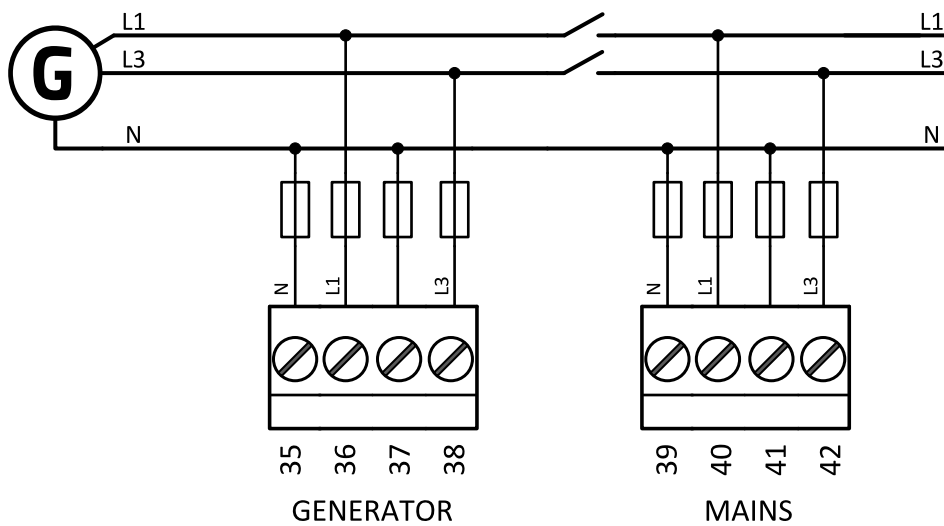
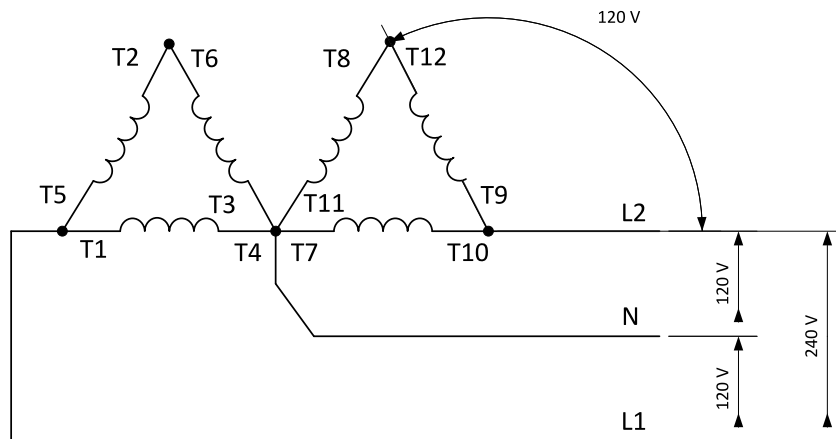


Image 4.13 Split phase L1L3 application

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

### DOUBLE DELTA Connection



### ZIG ZAG (DOG LEG) Connection

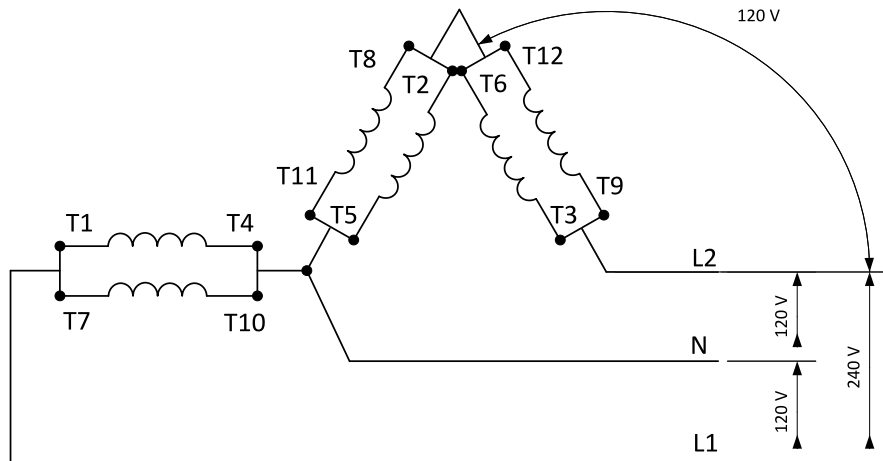


Image 4.14 Typical Split Phase generator wiring

## ConnectionType: Mono Phase

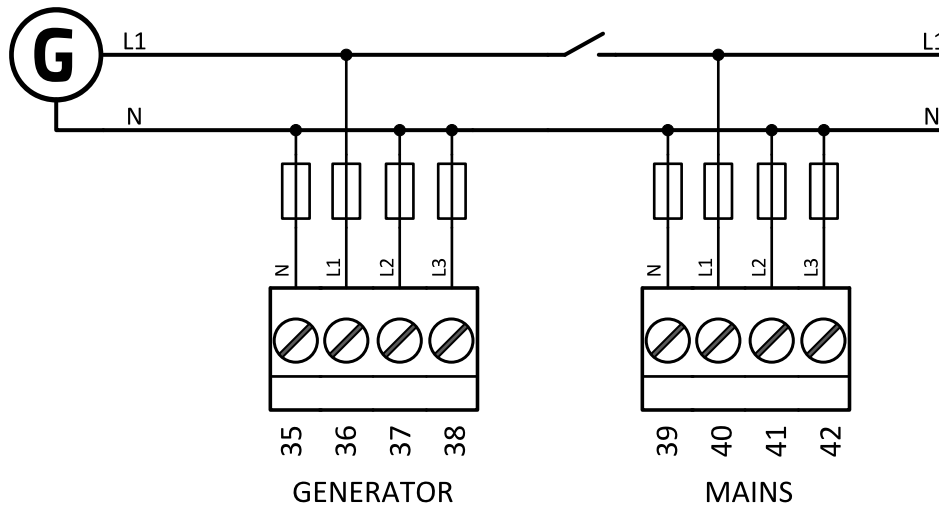


Image 4.15 Mono phase application

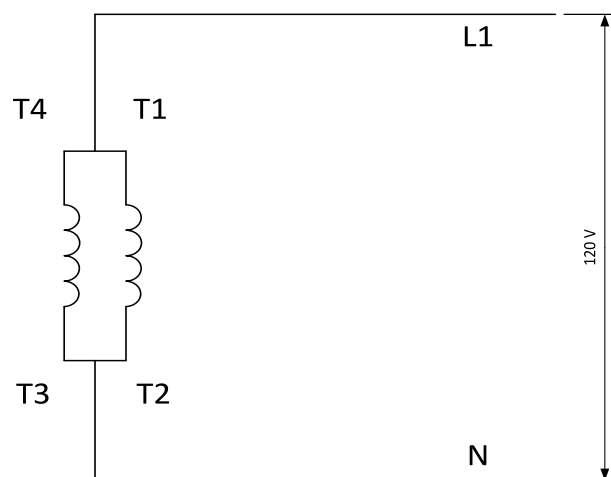


Image 4.16 Typical Mono Phase generator wiring

### Voltage measurement MRS wiring

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 175)** [3Ph4Wire / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages based on **Connection type (page 175)** setting:

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

ConnectionType: 3 Phase 4 Wires

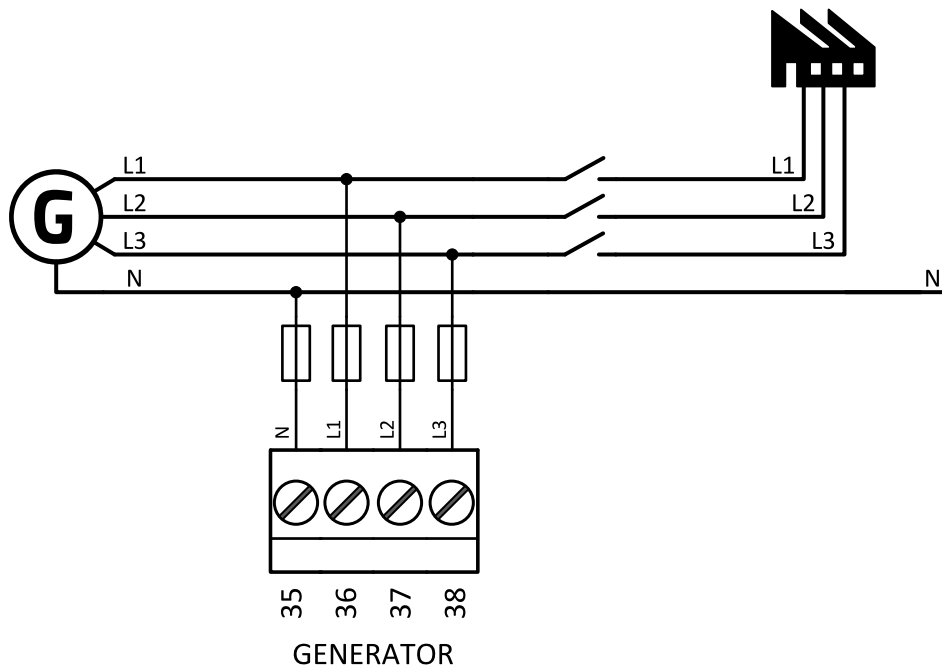


Image 4.17 3 phase application with neutral

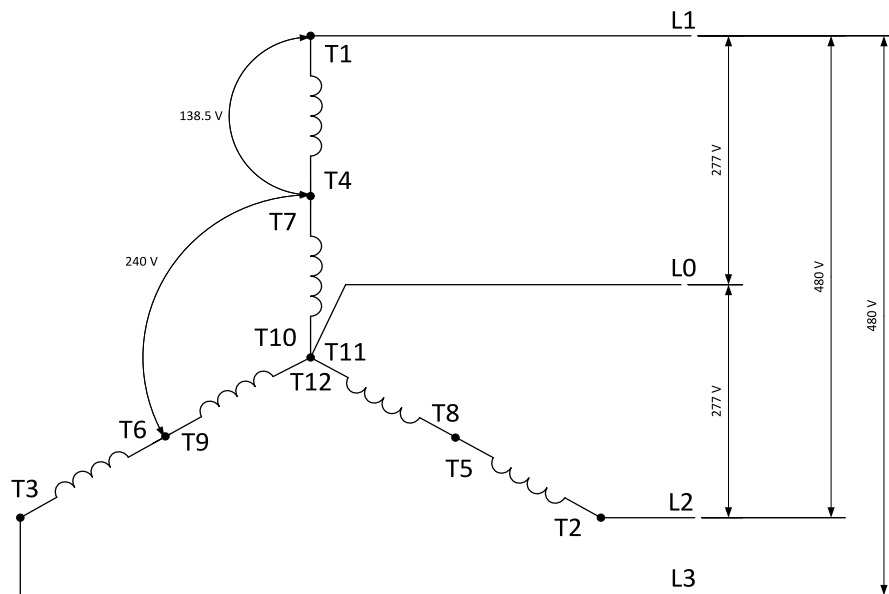


Image 4.18 Typical 3 Phase 4 Wires generator wiring

ConnectionType: High Leg D

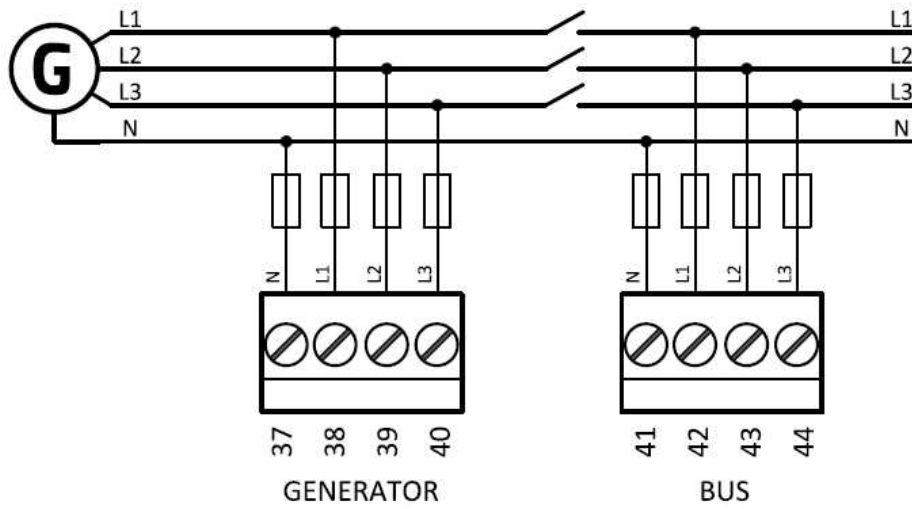


Image 4.19 High Leg Delta application

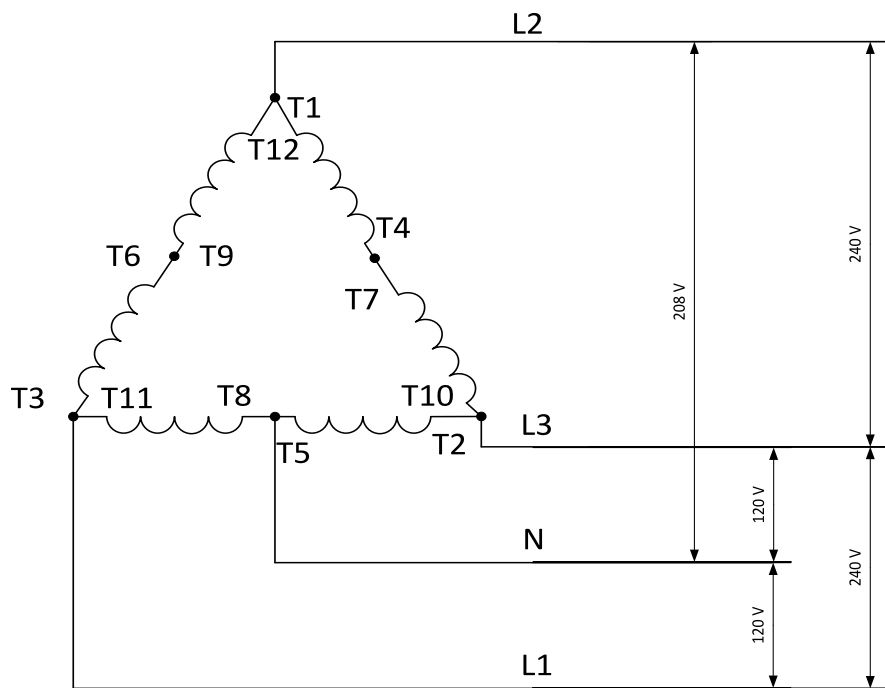


Image 4.20 Typical High Leg D generator wiring

ConnectionType: 3 Phase 3 Wires

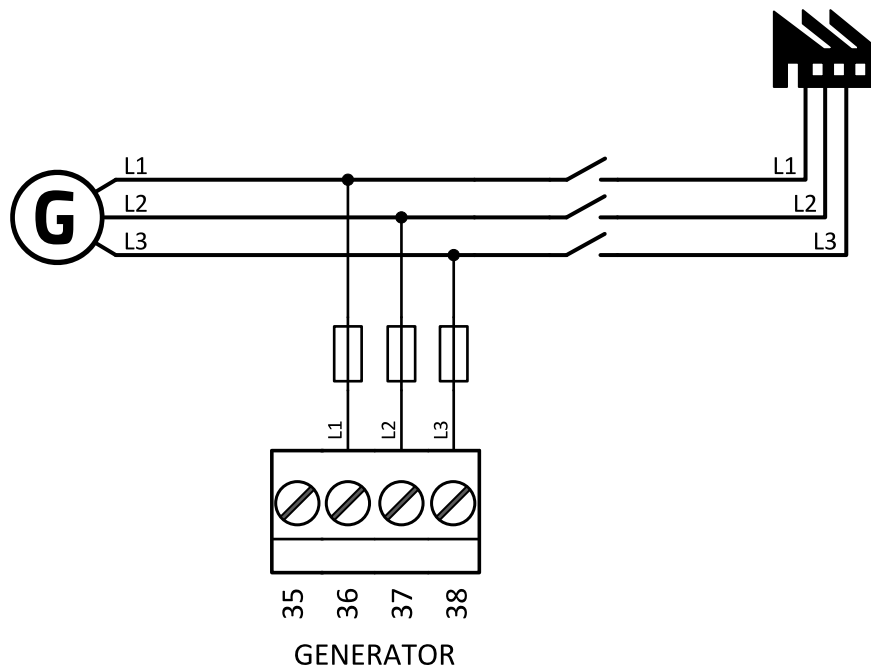


Image 4.21 3 phase application without neutral

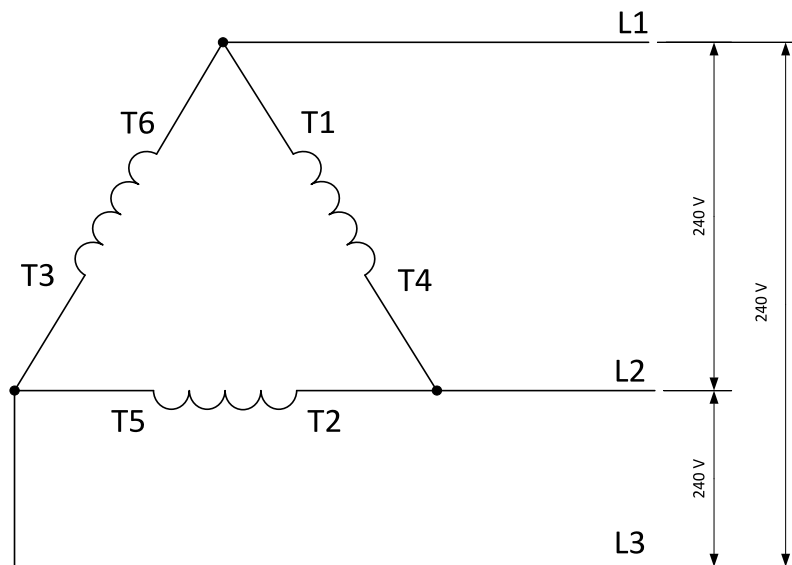


Image 4.22 Typical 3 Phase 3 Wires generator wiring

ConnectionType: SpIPhL1L2

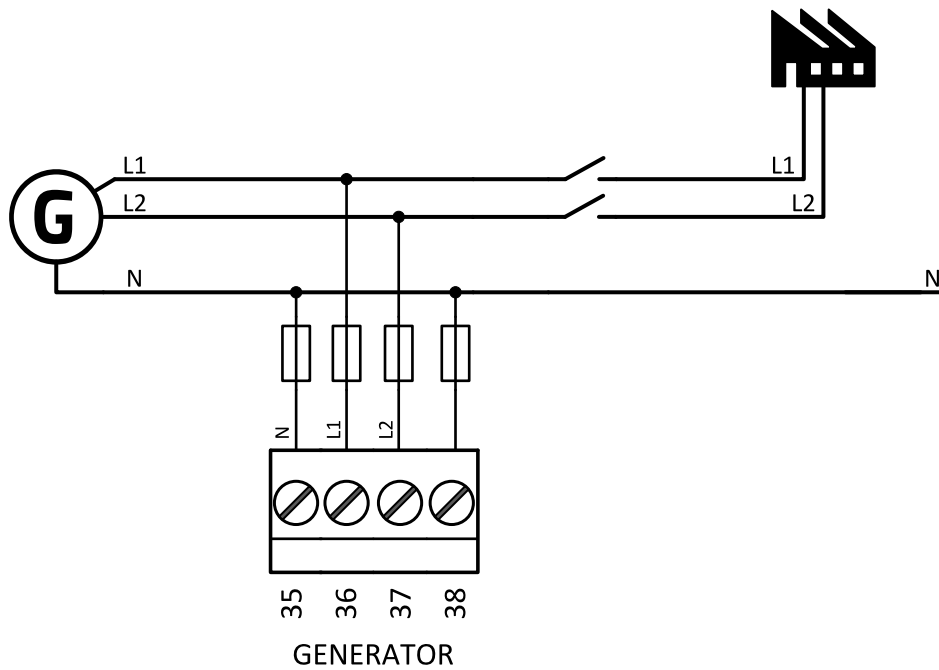
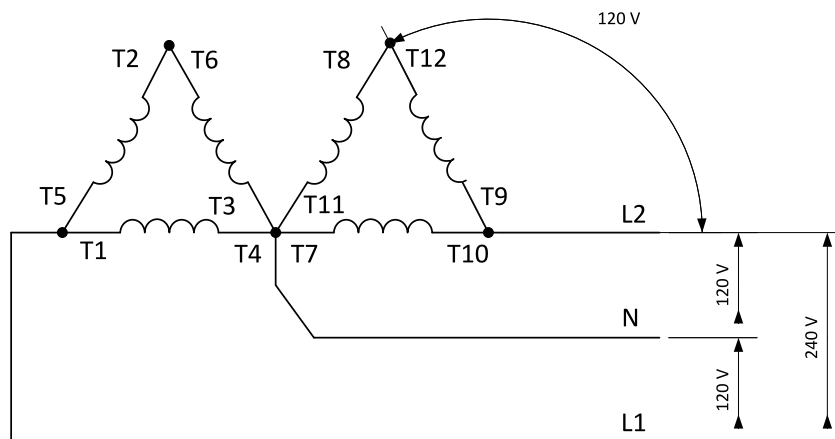


Image 4.23 Split phase L1L2 application

### DOUBLE DELTA Connection



### ZIG ZAG (DOG LEG) Connection

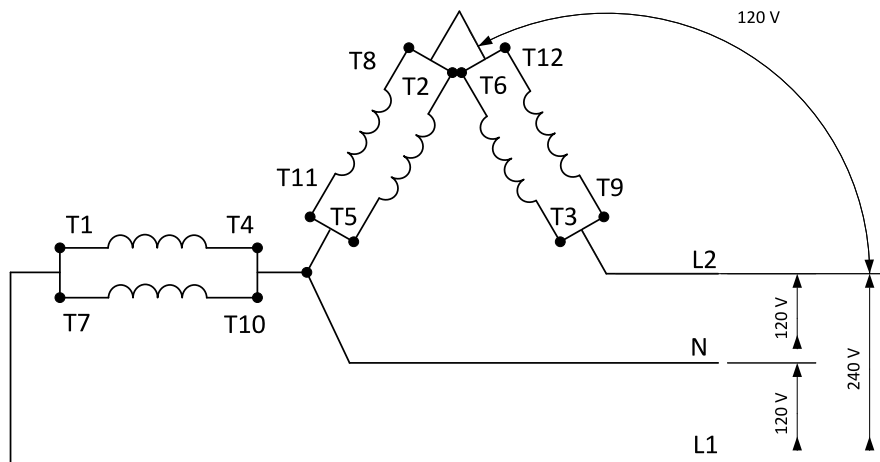


Image 4.24 Typical Split Phase generator wiring

### ConnectionType: SpIPhL1L3

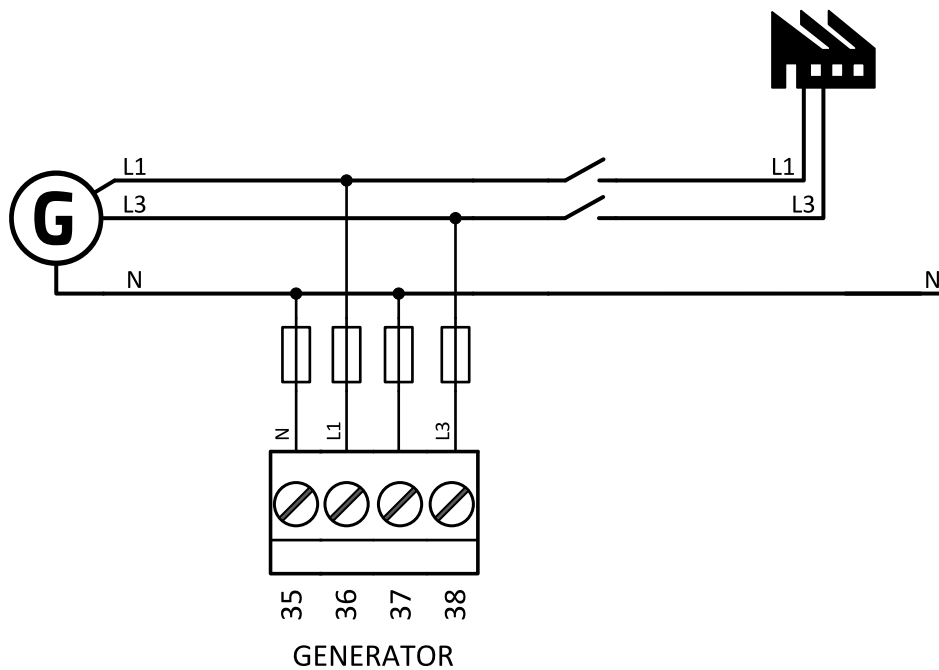
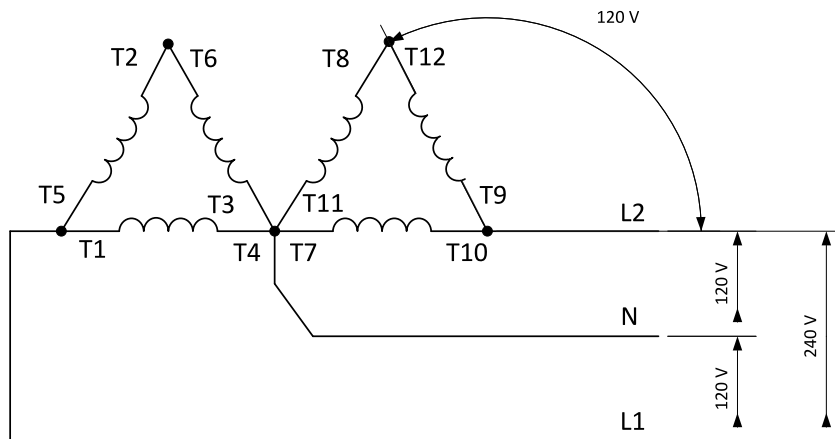


Image 4.25 Split phase L1L3 application

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



### DOUBLE DELTA Connection



### ZIG ZAG (DOG LEG) Connection

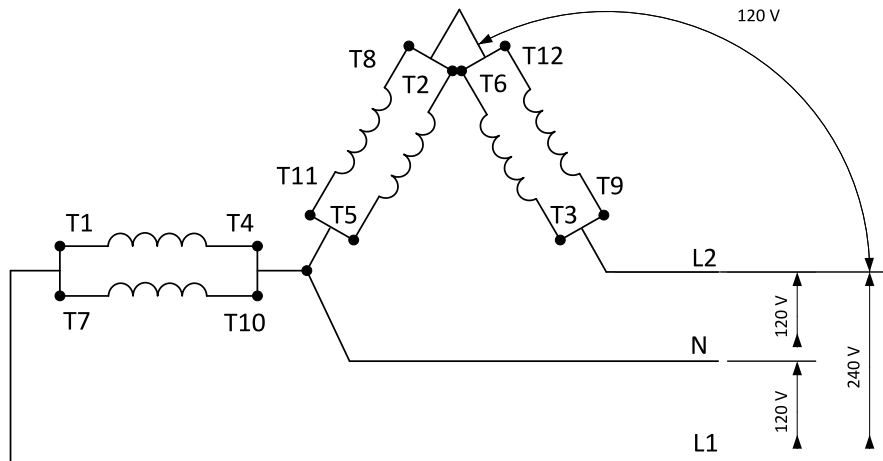


Image 4.26 Typical Split Phase generator wiring

ConnectionType: Mono Phase

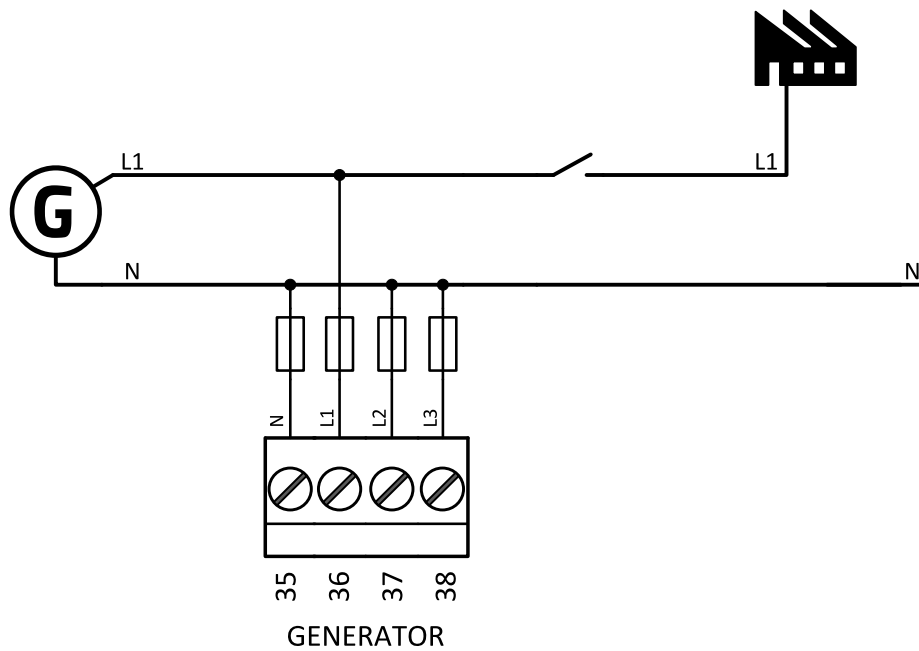


Image 4.27 Mono phase application

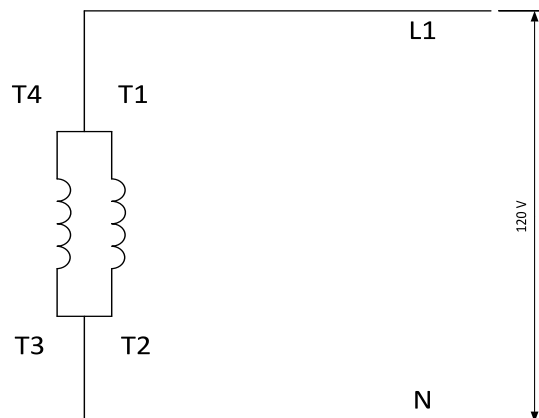
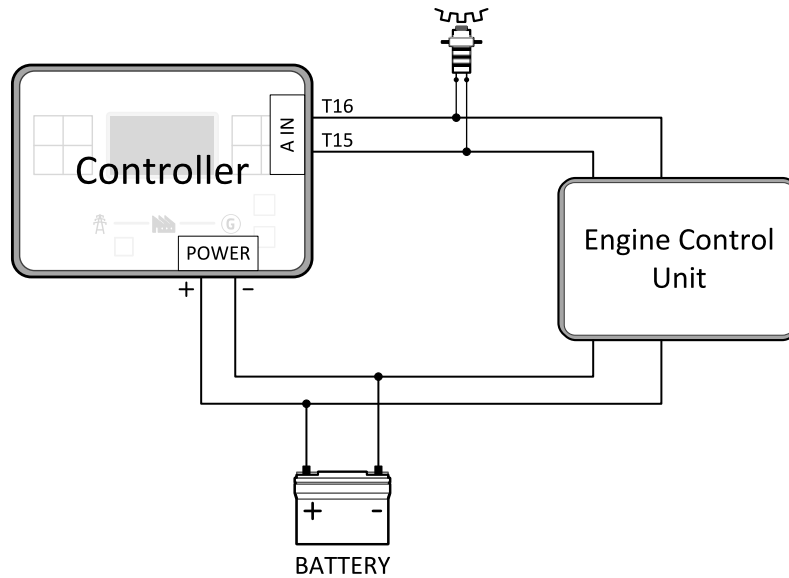


Image 4.28 Typical Mono Phase generator wiring

### 4.4.5 Magnetic pick-up

A magnetic speed sensor (pickup) is the most common method of engine speed measurement. To use this method, mount the pickup opposite to the engine flywheel, connect the cable to the controller as shown on the picture below and adjust the setpoint **Gear Teeth** (page 179) according to the number of teeth on the flywheel. For the details about the pick-up input parameters see **Technical data on page 164**

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



If engine will not start:

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

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

### 4.4.6 Binary inputs

Use minimally 1 mm<sup>2</sup> cables for wiring of Binary inputs.

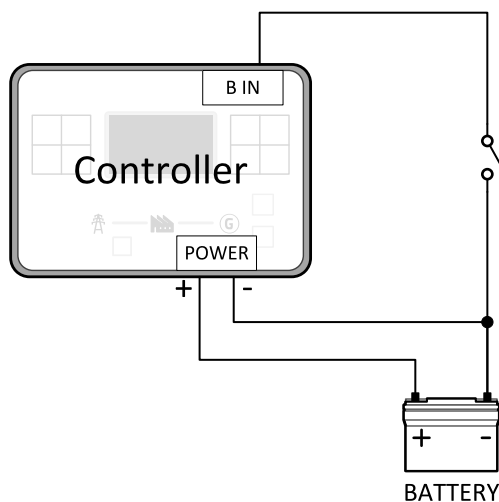


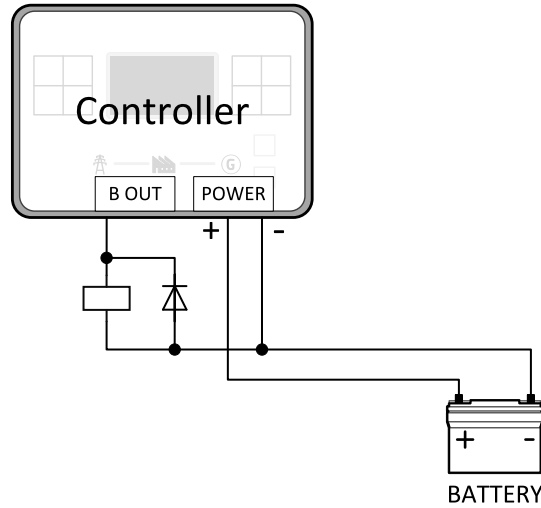
Image 4.29 Wiring binary inputs

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

### 4.4.7 Binary Outputs

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

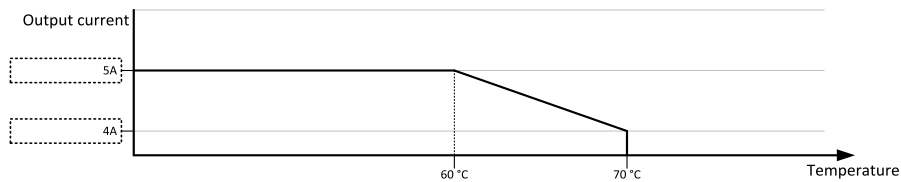
**IMPORTANT: Use suppression diodes on all relays and other inductive loads!**



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

**Note:** Binary output 1 (terminal 4) and binary output 2 (terminal 5) are high current outputs (5 A for long term).

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



## 4.4.8 Emergency stop

The Emergency Stop function can be made in two ways:

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

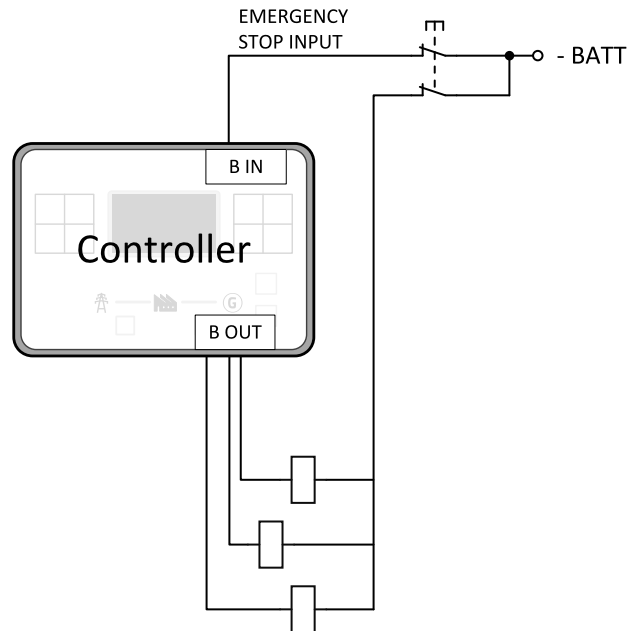


Image 4.30 Hard-wired emergency stop

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

## 4.4.9 Analog inputs

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

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

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

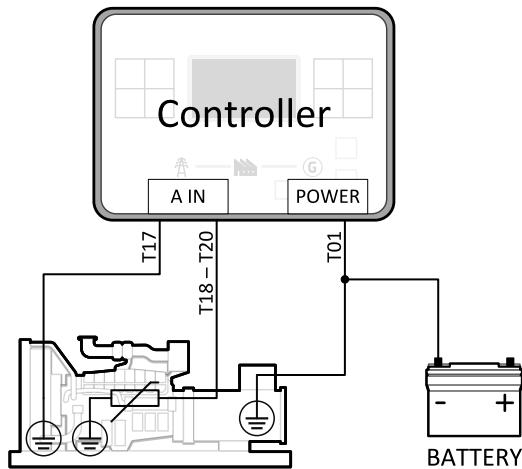


Image 4.31 Grounded sensors

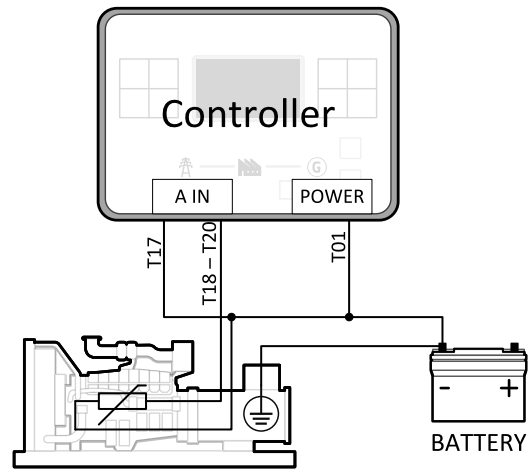


Image 4.32 Isolated sensors

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

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

## Analog inputs with voltage & current sensors

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

### Voltage sensors

Sensor's output range (V)	R1 ( $\Omega$ )	R2 ( $\Omega$ )
0 - 10	390	100
0 - 30	1500	100
0 - 70	3300	100

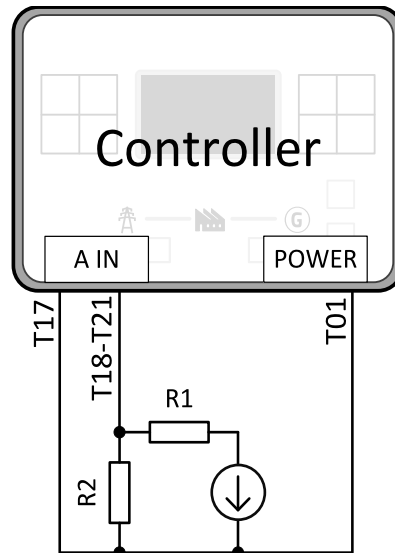


Image 4.33 Wiring of analog input with voltage sensor

**Tables for HW versions 1.1 and lower.**

0 - 10 V											
<b>V</b>	0	1	2	3	4	5	6	7	8	9	10
<b>Ω</b>	81	145	219	306	409	539	685	887	1125	1458	1933

0 - 30 V									
<b>V</b>	0	2	4	6	8	10	12	14	
<b>Ω</b>	95	134	177	223	274	330	395	465	
<b>V</b>	16	18	20	22	24	26	28	30	
<b>Ω</b>	543	633	735	853	993	1154	1350	1589	

0 - 70 V												
<b>V</b>	0	2	4	6	8	10	12	14	16	18	20	22
<b>Ω</b>	99	117	137	155	175	196	219	242	266	291	318	346
<b>V</b>	24	26	28	30	32	34	36	38	40	42	44	46
<b>Ω</b>	375	406	439	473	510	549	589	633	679	729	781	838
<b>V</b>	48	50	52	54	56	58	60	62	64	66	68	70
<b>Ω</b>	873	963	1033	1110	1193	1283	1383	1492	1612	1748	1896	2065

**Tables for HW versions 1.2 and higher.**

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

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

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

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

### Current sensors

Sensor's output range (mA)	R ( $\Omega$ )
0-20	100

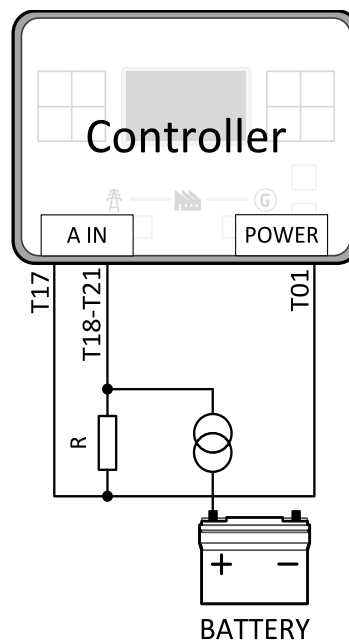


Image 4.34 Wiring of analog input with current sensor



Table for HW versions 1.1 and lower.

0 - 22 mA												
mA	0	1	2	3	4	5	6	7	8	9	10	11
$\Omega$	100	131	164	200	238	280	325	374	427	485	550	621
mA	12	13	14	15	16	17	18	19	20	21	22	
$\Omega$	700	788	887	1000	1128	1276	1450	1654	1900	2200	2575	

Table for HW versions 1.2 and higher.

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

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

## 4.4.10 CAN bus and RS485 wiring

### CAN bus wiring

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

- ▶ The maximum length of the CAN bus depends on the communication speed. For a speed of 250 kbps, which is used on the CAN1 bus (extension modules, ECU), 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<sup>1</sup> has to be used, shielding has to be connected to the terminal T01 (Grounding).
- ▶ External units can be connected on the CAN bus line in any order, but keeping line arrangement (no tails, no star) is necessary.
- ▶ The CAN bus has to be terminated by 120 Ohm resistors at both ends use a cable with following parameters:

<b>Cable type</b>	Shielded twisted pair
<b>Impedance</b>	120 $\Omega$
<b>Propagation velocity</b>	$\geq 75\%$ (delay $\leq 4,4$ ns/m)
<b>Wire crosscut</b>	$\geq 0,25$ mm <sup>2</sup>
<b>Attenuation (@1MHz)</b>	$\leq 2$ dB/100 m

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

<sup>1</sup>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)

**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.

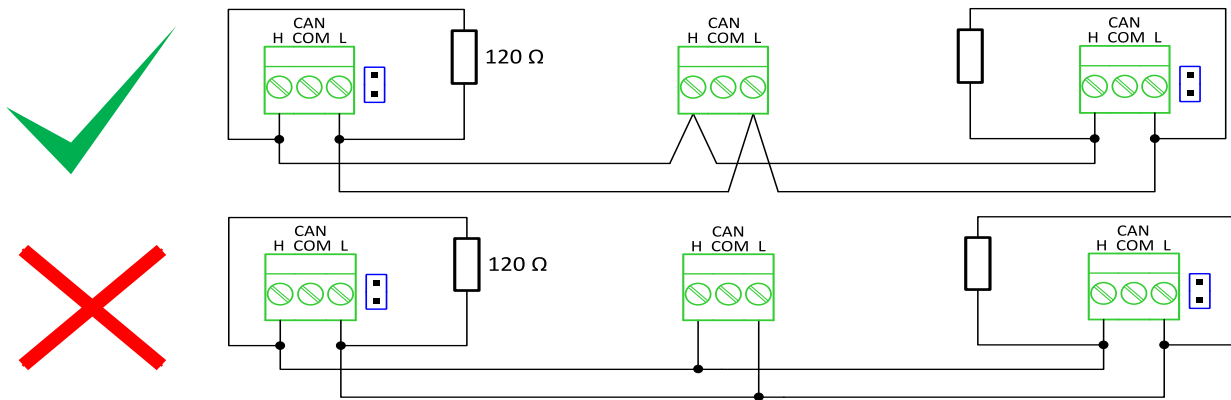


Image 4.35 CAN bus topology

► For shorter distances (connection within one building)

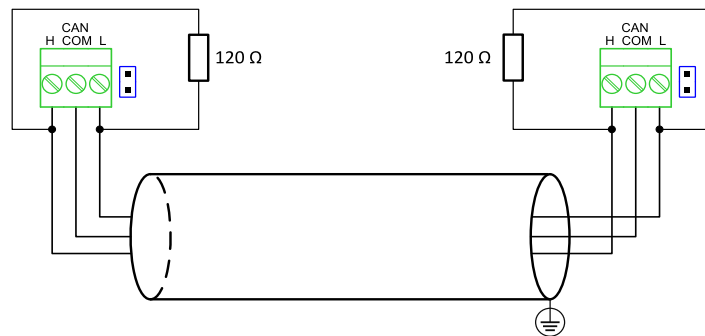


Image 4.36 CAN bus wiring for shorter distances

**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.)

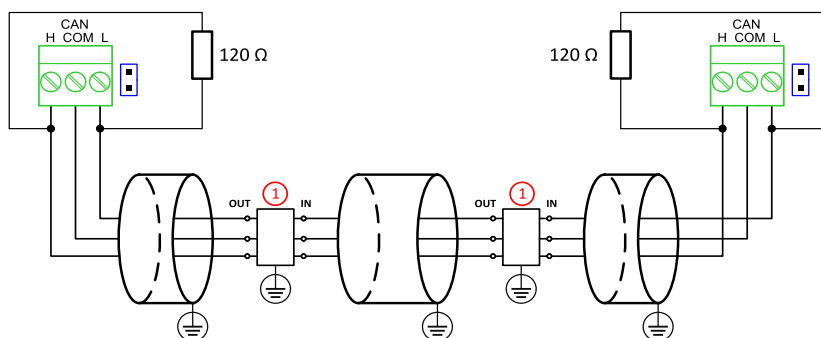


Image 4.37 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST<sup>1</sup>

<sup>1</sup>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 should be provided in such a way that the following rules are observed:

**Note:** A termination resistor at the RS485 (120Ω) is already implemented on the PCB. For connecting, close the jumper near the appropriate RS485 terminal.

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

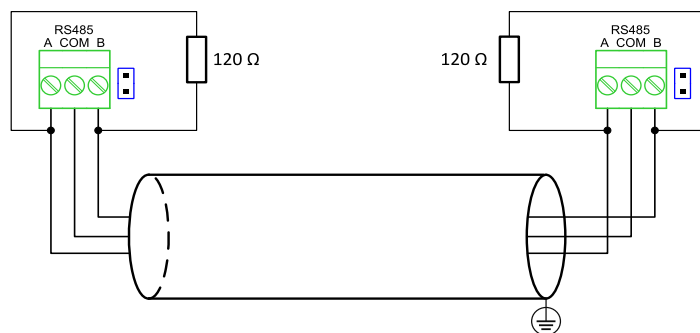


Image 4.38 RS485 wiring for shorter distances

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

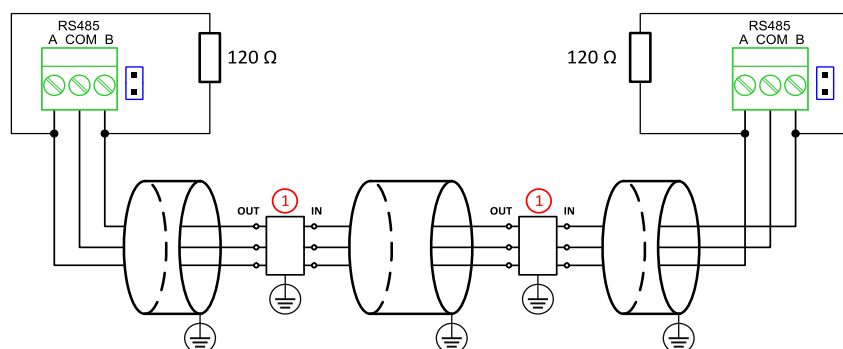


Image 4.39 RS485 wiring for longer distances

① Recommended PT5HF-5DC-ST<sup>2</sup>

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

<sup>1</sup>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)

<sup>2</sup>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

### 4.4.11 USB

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

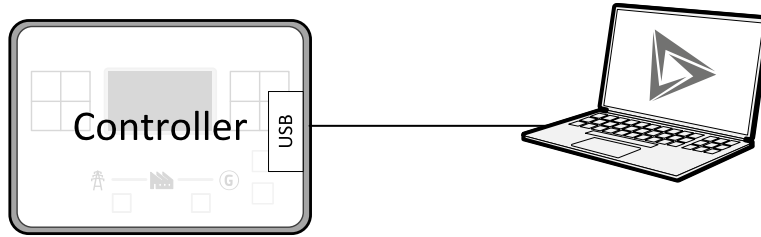
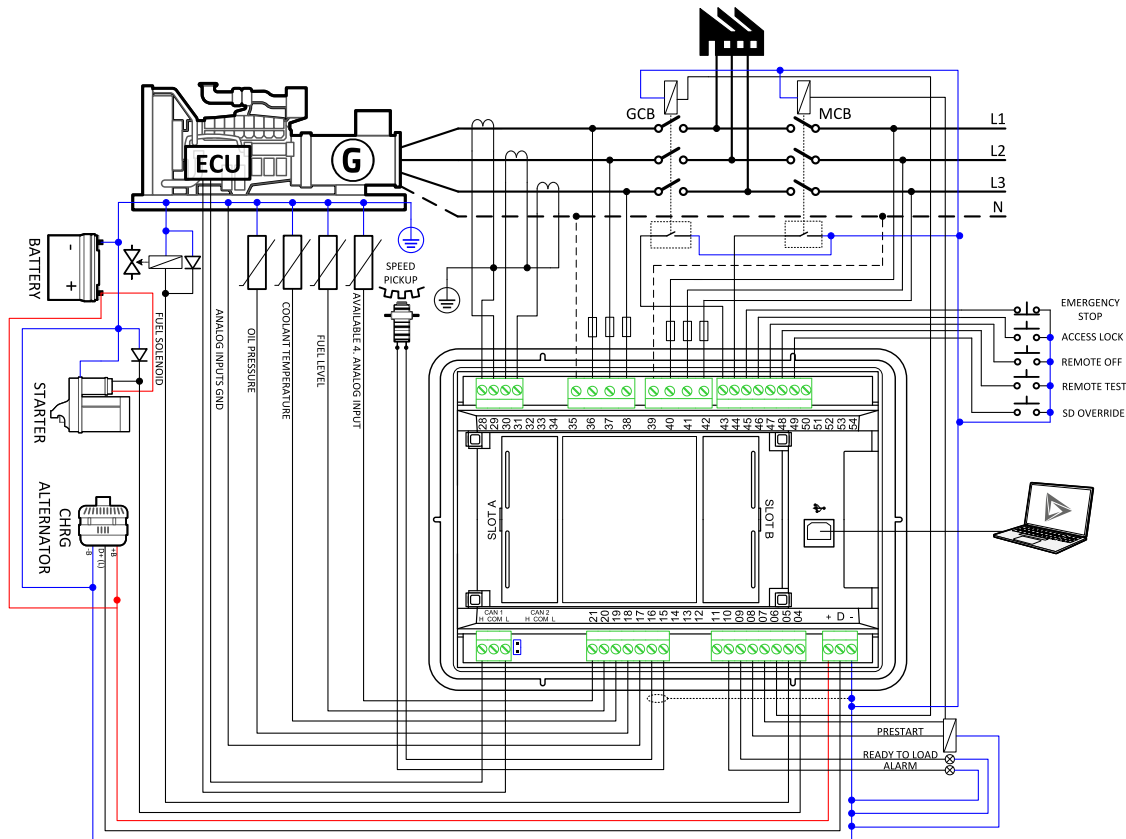


Image 4.40 USB connection

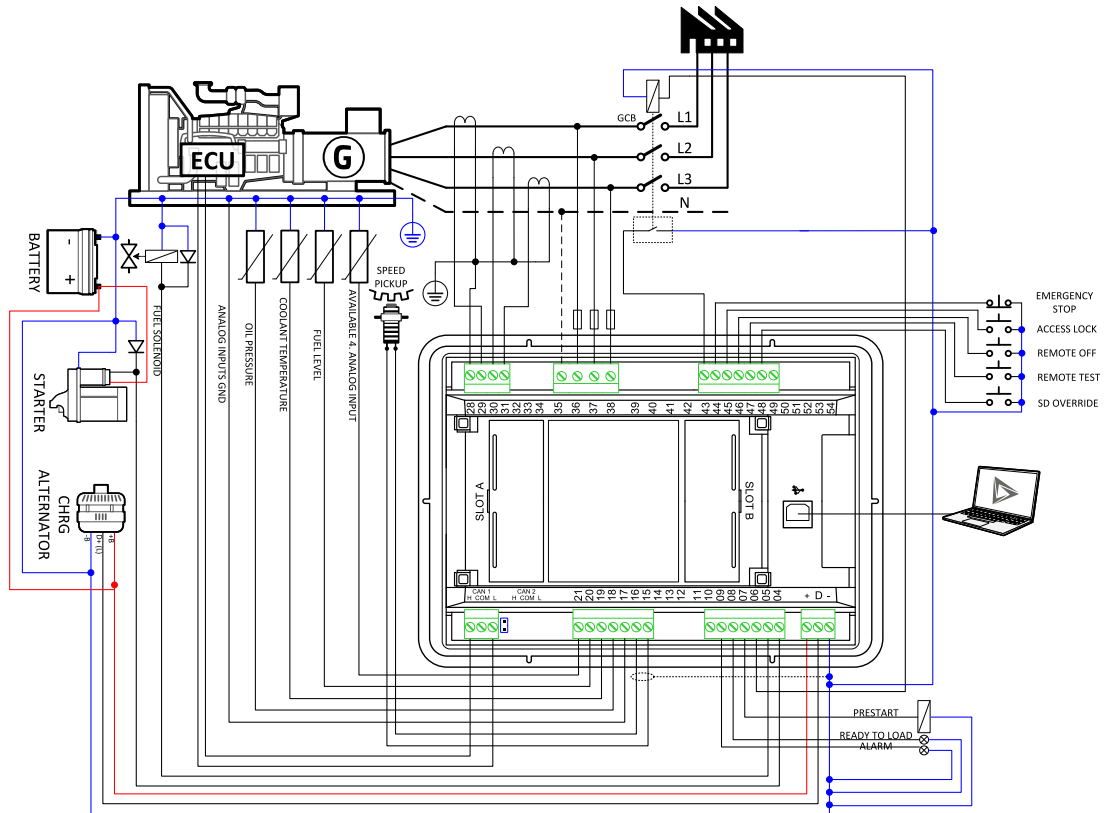
Controller can be also powered by USB (only for service purpose like a uploading firmware, change of configuration etc.).

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

### 4.4.12 Example of AMF Wiring



### 4.4.13 Example of MRS Wiring



## 4.4.14 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  $\Omega$ . In the case of tri-state, values lower than 10  $\Omega$  and values over 2400  $\Omega$  are evaluated as sensor failure (short or open circuit).

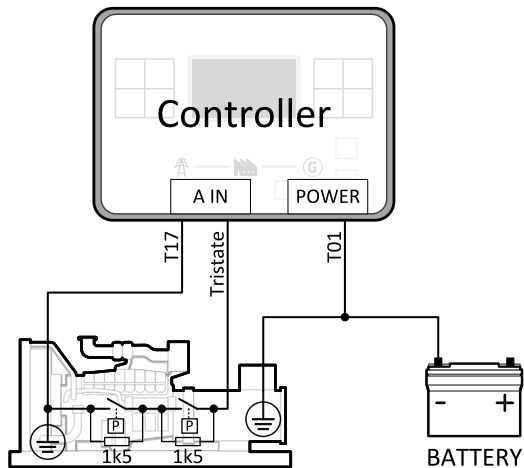


Image 4.41 Analog inputs as tristate

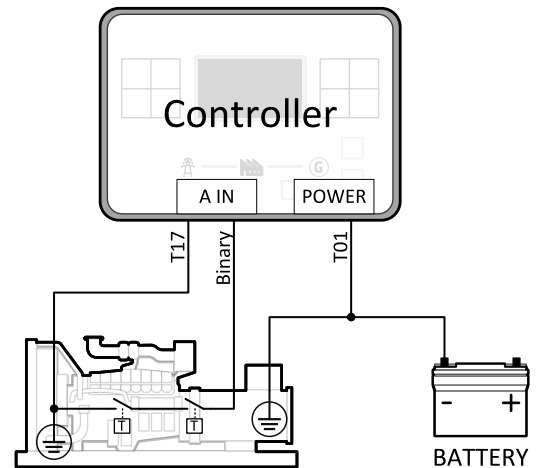


Image 4.42 Analog inputs as binary

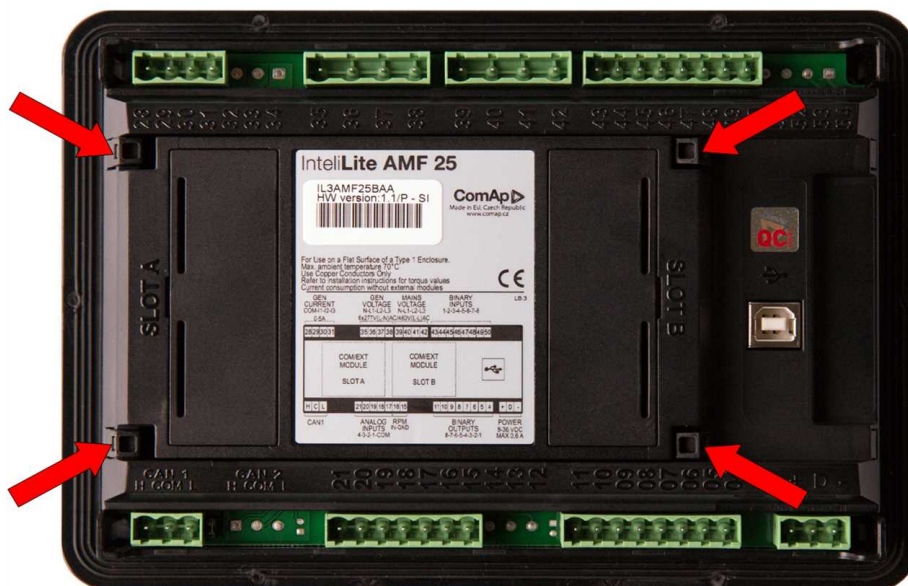
**Note:** The name, sensor characteristic and alarm types for each analog input have to be assigned during configuration.

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

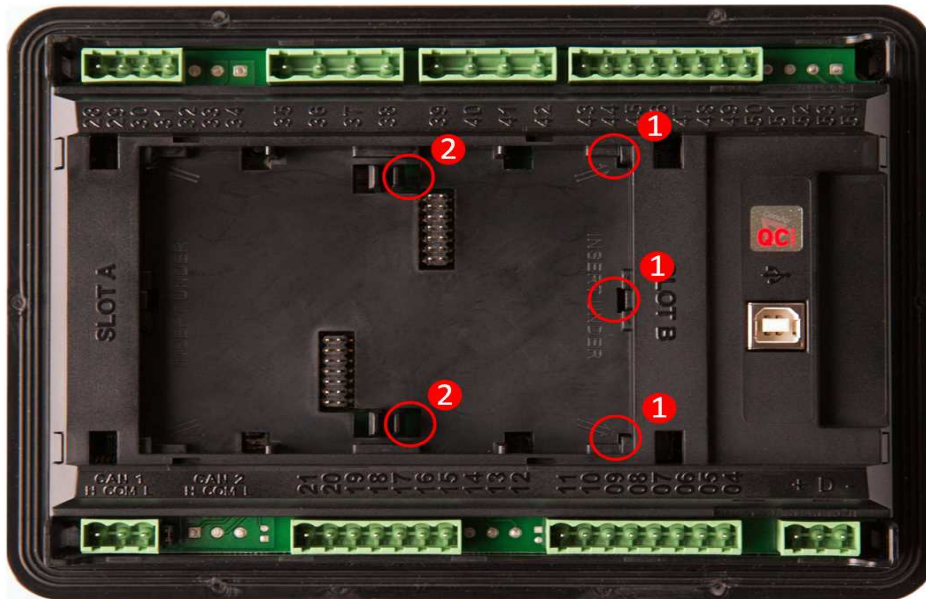
## 4.5 Plug-in module installation

### 4.5.1 Installation

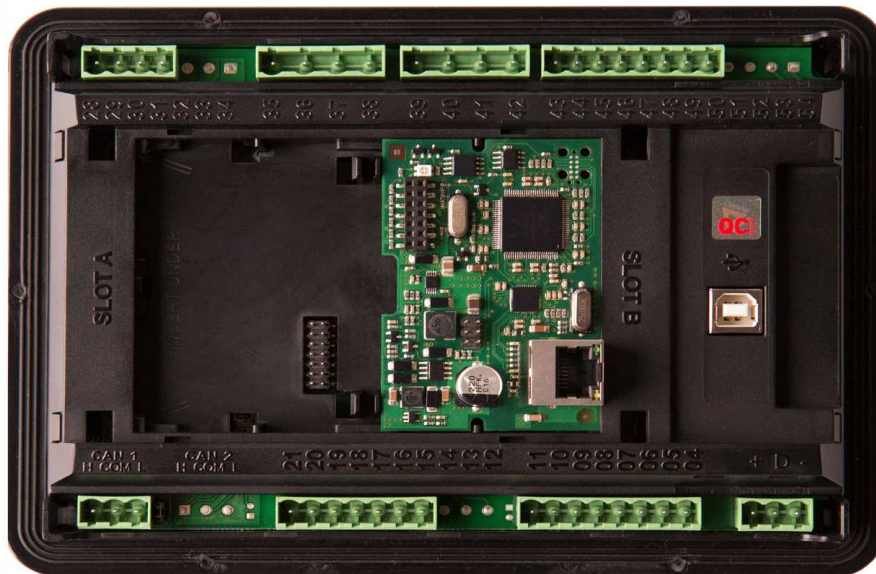
Remove the back cover. To do this, press four holders which are located in corners.



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



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



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



## 4.6 Maintenance

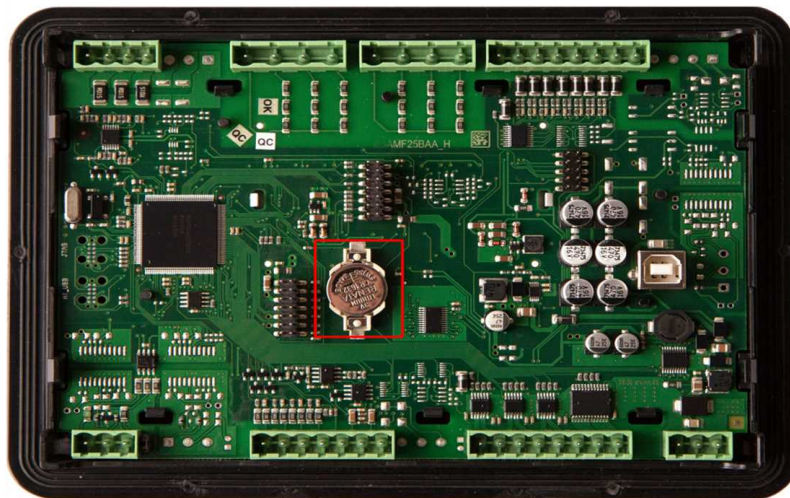
### 4.6.1 Backup battery replacement

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

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



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



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

🔍 **back to Installation and wiring**



# 5 Controller setup

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## 5.1 Default configuration

### 5.1.1 Binary inputs

Number	Description	Configured function
<b>BIN1</b>	Generator circuit breaker feedback	<b>GCB FEEDBACK (PAGE 434)</b>
<b>BIN2</b>	Mains circuit breaker feedback	<b>MCB FEEDBACK (PAGE 438)</b>
<b>BIN3</b>	Emergency stop button	<b>EMERGENCY STOP (PAGE 432)</b>
<b>BIN4</b>	Access lock keyswitch	<b>NOT USED (PAGE 439)</b>
<b>BIN5</b>	Switch controller to OFF mode	<b>REMOTE OFF (PAGE 441)</b>
<b>BIN6</b>	Switch controller to TEST mode	<b>REMOTE TEST (PAGE 443)</b>
<b>BIN7</b>	Suppression of alarms	<b>SD OVERRIDE (PAGE 443)</b>

### 5.1.2 Binary outputs

Number	Description	Function
<b>BOUT1</b>	Starter motor control	<b>STARTER (PAGE 484)</b>
<b>BOUT2</b>	Fuel solenoid valve	<b>FUEL SOLENOID (PAGE 464)</b>
<b>BOUT3</b>	Indication of breaker state	<b>GCB CLOSE/OPEN (PAGE 465)</b>
<b>BOUT4</b>	Indication of breaker state	<b>MCB CLOSE/OPEN (PAGE 474)</b>
<b>BOUT5</b>	Activation of any devices before start	<b>PRESTART (PAGE 481)</b>
<b>BOUT6</b>	Gen-set can be connected to load	<b>READY TO LOAD (PAGE 482)</b>
<b>BOUT7</b>	Indication of unconfirmed alarm	<b>ALARM (PAGE 455)</b>

### 5.1.3 Analog inputs

Number	Configured sensor	Function
<b>AIN1</b>	VDO 10 Bar	<b>OIL PRESSURE (PAGE 514)</b>
<b>AIN2</b>	VDO40-120°C	<b>COOLANT TEMP (PAGE 511)</b>
<b>AIN3</b>	VDOLevel %	<b>FUEL LEVEL (PAGE 512)</b>

## 5.2 Controller configuration and PC tools connection

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5.2.2 RS232/RS485 .....	61
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### 🔍 back to Controller setup

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

### 5.2.1 USB

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

#### Connection using IntelliConfig

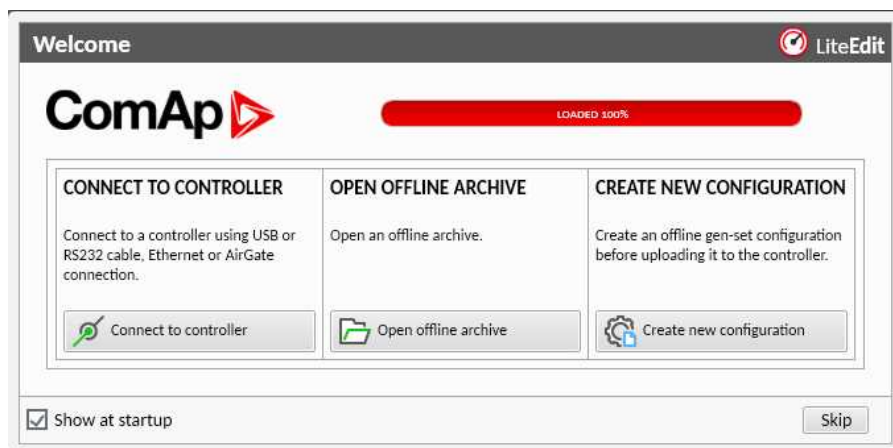


Image 5.1 First screen of IntelliConfig - select connect to controller



Image 5.2 Second screen of IntelliConfig - select detected controllers

## Connection using WinScope

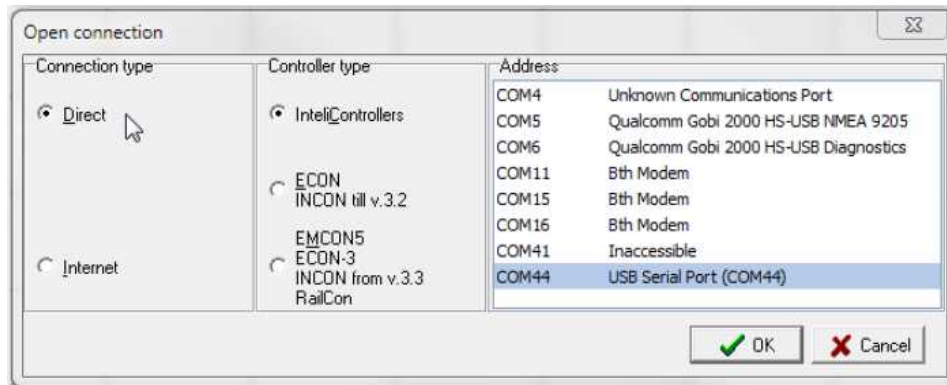


Image 5.3 WinScope screen - select direct connection

### 5.2.2 RS232/RS485

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

- ▶ **COM1 Mode (page 282) = Direct**
- ▶ has to be set to the same value as in the PC tool

## Connection using IntelliConfig

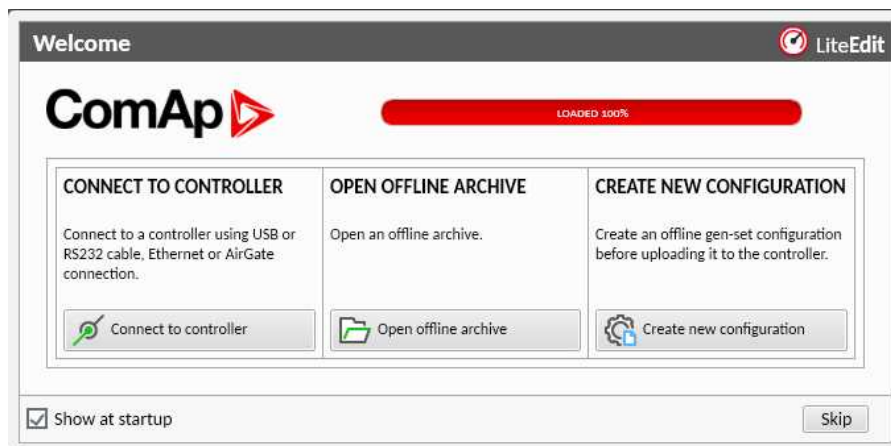


Image 5.4 First screen of IntelliConfig - select connect to controller

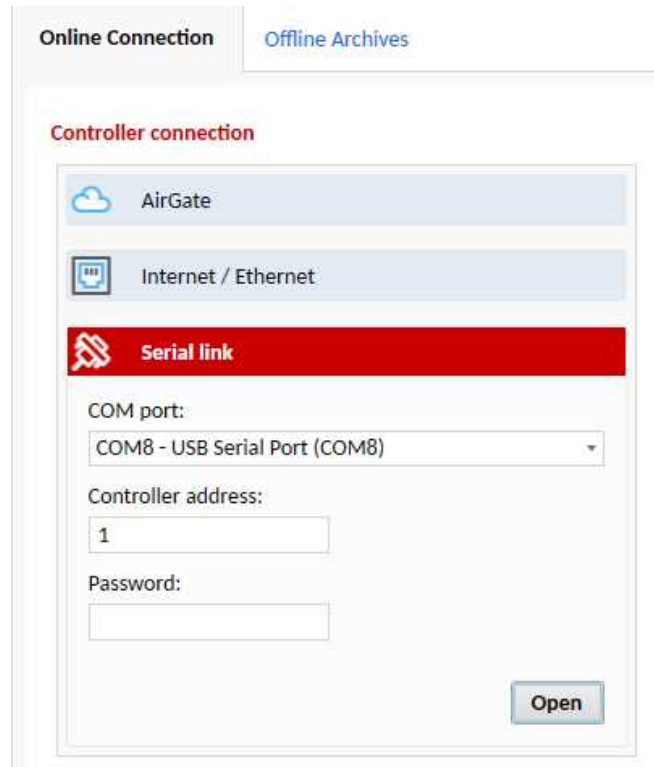


Image 5.5 Second screen of IntelIconfig - select Serial link

## Connection using WinScope

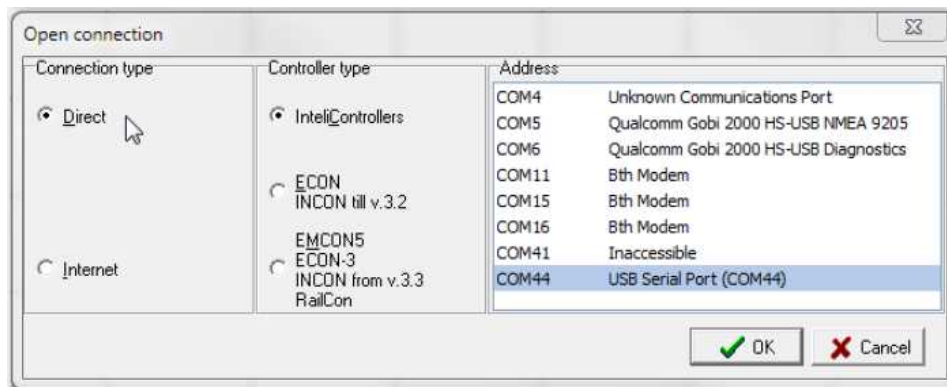


Image 5.6 WinScope screen - select direct connection

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

### 5.2.3 Ethernet

It is possible to connect to the controller using ethernet port.

#### Direct connection

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

- ▶ **Controller Address (page 181)** has to be set to the same value as in the PC tool
- ▶ **IP Address Mode (page 296)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED
- ▶ **IP Address (page 296)** is either set automatically or it can be adjusted to a specific requested value
- ▶ **Subnet Mask (page 297)** is either set automatically or it can be adjusted to a specific requested
- ▶ **Gateway IP (page 297)** can be set here when it is used

## Connection using IntelliConfig

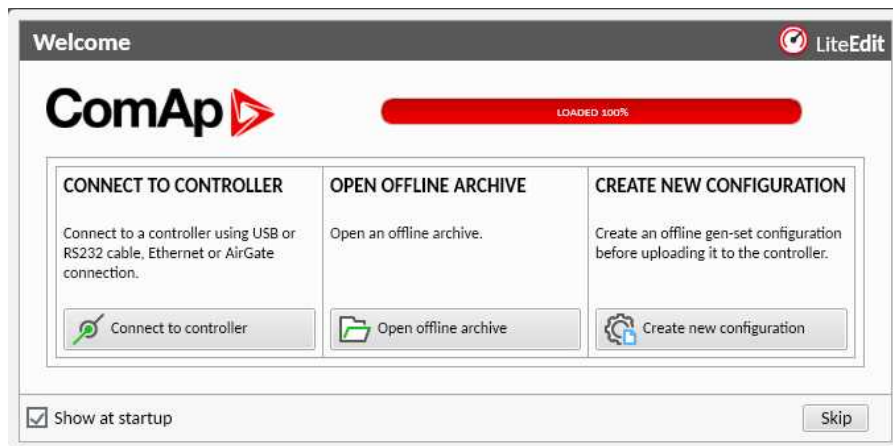


Image 5.7 First screen of IntelliConfig - select connect to controller

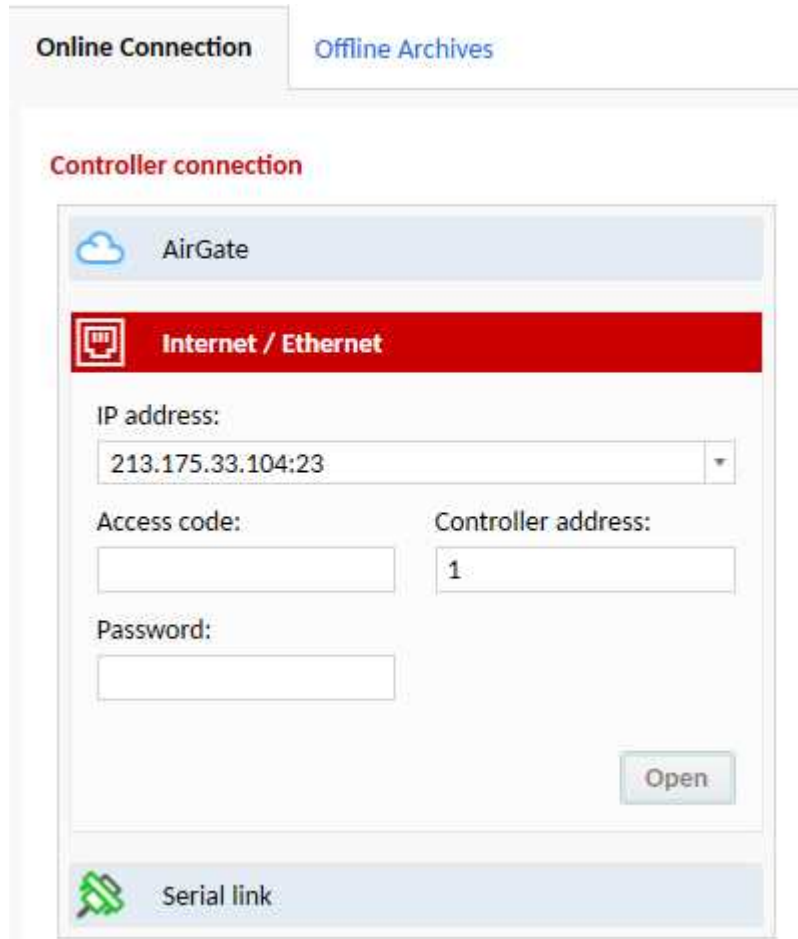


Image 5.8 Second screen of IntelIconfig - select Internet/Ethernet

### Connection using WinScope

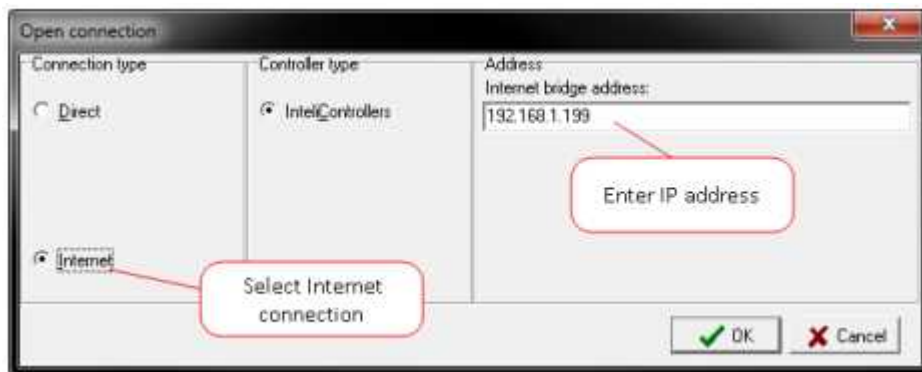


Image 5.9 WinScope screen

## 5.3 Operator Guide

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## 5.3.1 Front panel elements

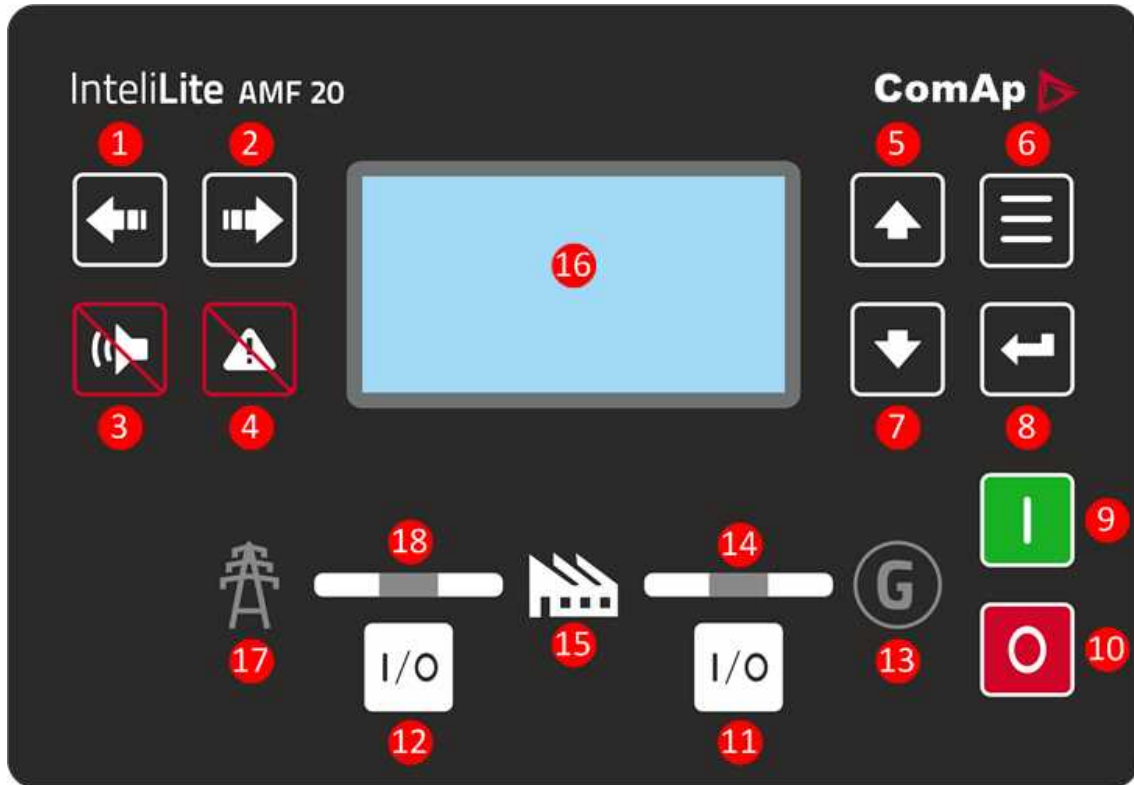














Image 5.10 Operator interface of AMF20

Control buttons		
Position	Picture	Description
1		<p><b>LEFT</b> 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.</p> <p><i>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.</i></p>
2		<p><b>RIGHT</b> 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.</p> <p><i>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.</i></p>
3		<p><b>HORN RESET</b> button. Use this button to deactivate the horn output without acknowledging the alarms.</p>

4		<b>FAULT RESET</b> 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		<b>UP</b> button. Use this button to move up or increase value.
6		<b>PAGE</b> button. Use this button to switch over display pages.
7		<b>DOWN</b> button. Use this button to move down or decrease value.
8		<b>ENTER</b> button. Use this button to finish editing a setpoint or moving right in the history page.
9		<b>START</b> button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.
10		<b>STOP</b> 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		<b>GCB</b> button. Works in MAN and TEST modes only. Press this button to open or close the GCB.
12		<b>MCB</b> button. Works in MAN and TEST modes only. Press this button to open or close the MCB.

#### Indicators and others

Position	Description
13	<b>GENERATOR</b> status indicator. There are two states - Gen-set OK (indicator is green) and Gen-set failure (indicator is red). Green LED is on if the generator voltage is present and within limits. Red LED starts flashing when gen-set failure occurs. After <b>FAULT RESET</b> button is pressed, goes to steady light (if an alarm is still active) or is off (if no alarm is active).
14	<b>GCB ON</b> . Green LED is on if GCB is closed. It is driven by GCB CLOSE/OPEN output or by GCB feedback signal.
15	<b>LOAD</b> . Green LED is ON if load is supplied by mains or by generator. It means, that Gen-set or mains is OK and proper circuit breaker is closed.
16	Graphic B/W display, 132x64 pixels.
17	<b>MAINS</b> status indicator. There are two states - Mains OK (indicator is green) and Mains failure (indicator is red). Green LED is on, if mains is present and within limits. Red LED starts blinking when the mains failure is detected and after the gen-set has started and connected to the load it lights permanently until the mains failure disappears.
18	<b>MCB ON</b> . Green LED is on if MCB is closed. It is driven by MCB CLOSE/OPEN output or by MCB feedback signal.

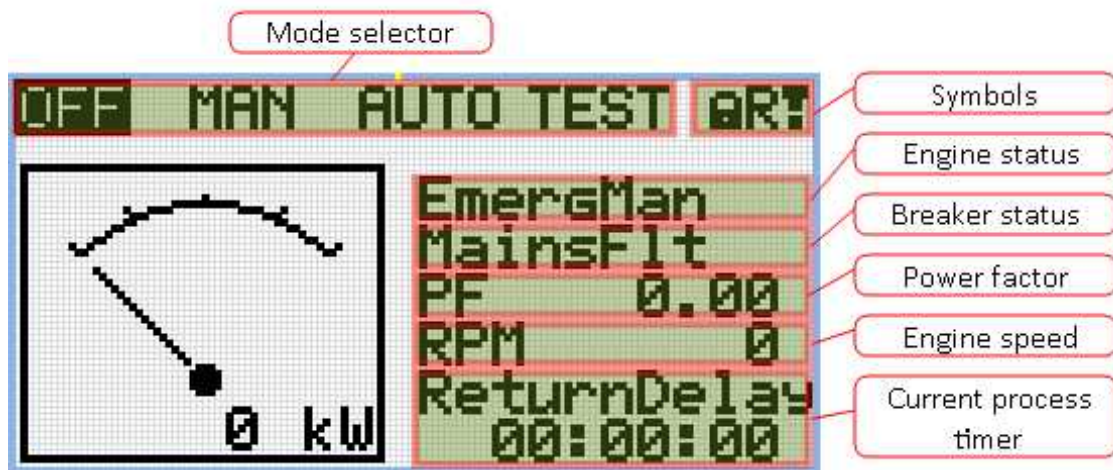


### 5.3.2 Display screens and pages structure

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

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

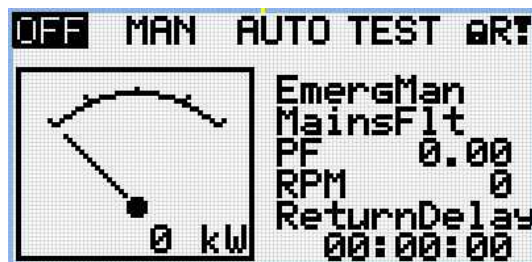
#### Main Screen



#### Symbols

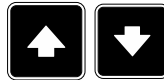
- ▶ Padlock - active when LBI ACCESS LOCK is active
- ▶ R - active when there is active remote connection to controller
- ▶ Exclamation mark - active when there is any alarm in alarmlist

#### Measurement Screens



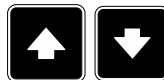
**Note:** Use Up and Down button to move between measurement pages.

Generator			
L1N	230V	L1L2	400V
L2N	230V	L2L3	400V
L3N	230V	L3L1	400V
Generator Freq			50.0Hz



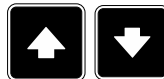
**Note:** Use Up and Down button to move between measurement pages.

Generator Current	
L1	130A
L2	130A
L3	130A



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

Mains			
L1N	230V	L1L2	400V
L2N	230V	L2L3	400V
L3N	230V	L3L1	400V
Mains Frequency			50.0Hz



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

Analog Inputs 1/2	
Oil Pressure	#####Bar
Coolant Temp	##### °C
Fuel Level	#####%

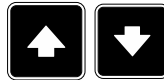


**Note:** Use Up and Down button to move between measurement pages.

```

Analog Inputs 2/2
Not Used
-----
BatteryVoltage 23.8V
-----

```

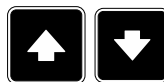


**Note:** Use Up and Down button to move between measurement pages.

```

Binary Inputs 1/2
00000000
1 Input 0
2 Input 0
3 Input 0
4 Input 0
5 Input 0

```



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

```

Binary Inputs 2/2
00000000
6 Input 0
7 Input 0
8 Input 0

```



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

```

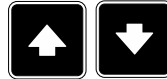
Binary Outputs 1/2
00000000
1 Output 0
2 Output 0
3 Output 0
4 Output 0
5 Output 0

```



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

Binary Outputs 2/2		
00000000		
6	Output	0
7	Output	0
8	Output	0



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

EM-BIOS-EFCP 1/2		
00101010		
Earth Fault		0.00A
<hr/>		
IN:	Input	1
	Not Used	0
OUT:	Output	1



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

EM-BIOS-EFCP 2/2		
00101010		
IN:	Input	0
OUT:	Output	1
OUT:	Output	0
OUT:	Output	1
OUT:	Output	0



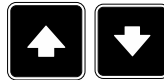
**Note:** Use Up and Down button to move between measurement pages.

Gen-Set Power			
	kW	PF	kVA
L1	0	0.00C	0
L2	0	0.00C	0
L3	0	0.00C	0
Σ	0	0.00C	0



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

ECU Values	
Fuel Rate	#####l/h
CoolantTemp	#####°C
IntakeTemp	#####°C
Oil Press	#####bar
Boost Press	#####bar
Load	#####%



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

Statistics 1/3	
Genset kWh	0
Genset kVarh	0
Mains kWh	0
Mains kVarh	0
Run Hours	0
Num Starts	0



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

Statistics 2/3	
Num E-Stops	0
Shutdowns	0
Maintenance 1	0
Maintenance 2	0
Maintenance 3	0
Rental Timer 1	0



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

Statistics 3/3	
Rental Timer 2	000
Ex. Timer 1	00:00:00
Ex. Timer 2	00:00:00

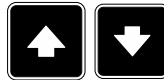


**Note:** Use Up and Down button to move between measurement pages.



```

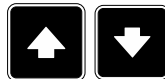
CM-4G-GPS 1/2
Cell Signal Lev 93%
Cell ErrorRate 12%
Cell Status /
Cell Diag Code 12
Operator T-Mobile CZ
Connection Type 4G
    
```



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

```

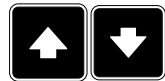
CM-4G-GPS 2/2
Latitude 0.1234
Longitude 0.1234
Altitude 123m
HomePosDist 123km
Satelites 1
    
```



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

```

CM-GPRS
Cell Signal Lev 93%
Cell ErrorRate 12%
Cell Status /
Cell Diag Code 12
Operator T-Mobile CZ
    
```



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

```

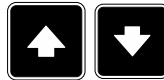
CM-Ethernet
Current IP Address
123.123.123.123
ETH Interface Status
Connected
    
```











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

```

AirGate
CM-4G-GPS
AirGate ID: ABABCABCAB
AirGate Diag: 0
CM-Ethernet
AirGate ID: ABABCABCAB
AirGate Diag: 0
    
```



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

Aftertreatment			
			
			



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

```

Plug-in Modules
Slot A:Disabled
Module
-----
Slot B:Disabled
Module
    
```



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

```

AlarmList 4
*Emergency Stop
*Wrn Oil Pressure
Wrn Fuel Level
*ECU
  L12345/12/123/123
    
```

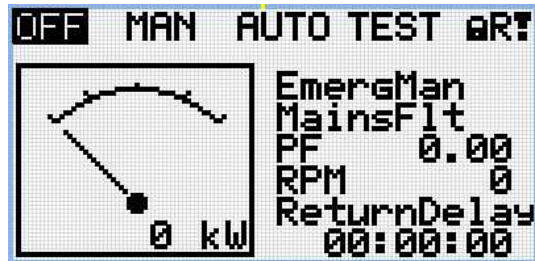


**Note:** Use Up and Down button to move between measurement pages.

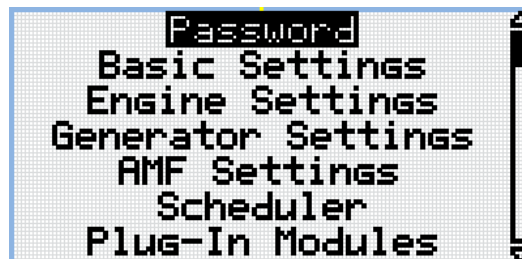
**Note:** From all of these pages it is possible to switch seamlessly to the setpoint group page by pressing Page button.

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

## Setpoint Screens



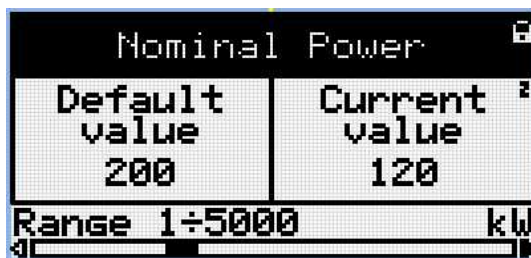
**Note:** From all measurement pages we can fluently go to the setpoint group page by pressing Page button.



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



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

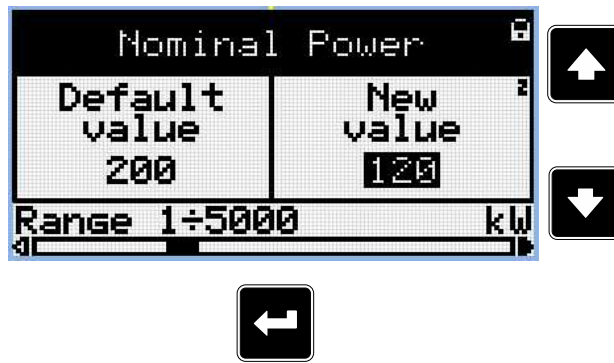


**Note:** Use Left and Right button to select required setpoint.



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





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

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



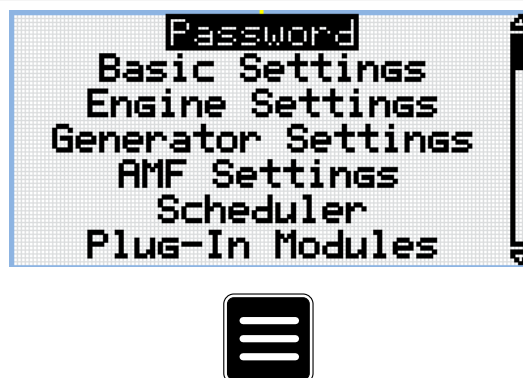
*Note: Use Page button to discard changes, to set setpoint to previous value and to return to the list of setpoints of selected group.*

**IMPORTANT: Cannot change setpoint? Setpoints marked with an padlock are password protected. Enter password as described in the chapter Password (page 80).**

## History Log



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



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

No.	Reason
-001	GCB Closed
-002	MCB Opened
-003	MCB Closed
-004	GCB Opened
-005	GCB Closed
11:05:45	15/03/2014



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



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

Time	Date
14:01:43AM	15/03/2014
11:05:45AM	15/03/2014
11:01:43AM	15/03/2014
11:04:43AM	14/03/2014
14:41:43AM	11/03/2014
-002	MCB Opened



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



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

RPM	Pwr	Q
1500	15.0	15.0
0	0.0	0.0
0	0.0	0.0
1500	15.0	15.0
1500	15.0	15.0
-002	MCB Opened	



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



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

PF	LChr	GFra
0.75	C	50.0
0.00	C	0.0
0.00	C	0.0
0.73	C	50.0
0.74	C	50.0
-002	MCB Opened	



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



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

Ug1	Ug2	Ug3
230	230	230
0	0	0
0	0	0
230	230	230
230	230	230
-002 MCB Opened		



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



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

Ug12	Ug23	Ug31
230	230	230
0	0	0
0	0	0
230	230	230
230	230	230
-002 MCB Opened		



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



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

IL1	IL2	IL3
30	30	30
0	0	0
0	0	0
30	30	30
30	30	30
-002 MCB Opened		



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



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

Um1	Um2	Um3
230	230	230
0	0	0
0	0	0
230	230	230
230	230	230
-002 MCB Opened		



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



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

Um12	Um23	Um31
230	230	230
0	0	0
0	0	0
230	230	230
230	230	230



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



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

FC	FMI
0	0
0	0
0	0
0	0
0	0



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



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

MFra	UBat	OilP
50.0	23.2	3.2
0.0	0.0	0.0
0.0	23.2	0.0
50.0	23.3	3.2
50.0	23.3	3.2



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



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

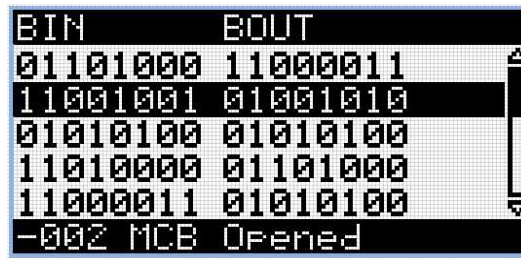
EngT	FLvl	Ain4
30.0	50	00.0
22.0	20	00.0
23.0	30	00.0
23.0	30	00.0
23.0	50	00.0



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



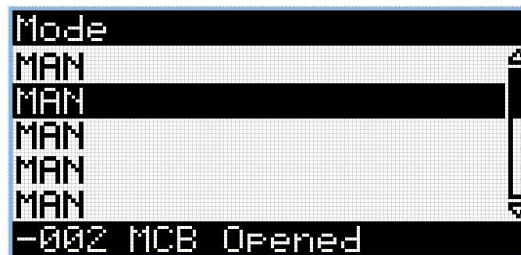
**Note:** Use Enter button to move to the next page of history log.



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



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



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

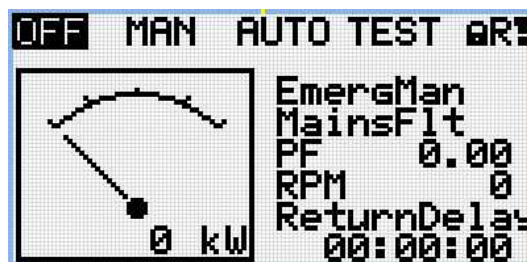


*Note: Use Enter button to move to the first page of history log.*

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

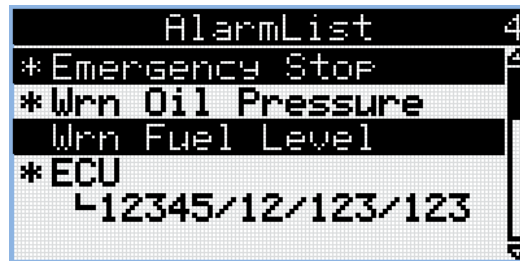
*Note: This is only basic history record. There can be some additional screens in case that in controller is extension module or ECU is configured. Also it depends on connection type.*

### 5.3.3 Browsing alarms



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



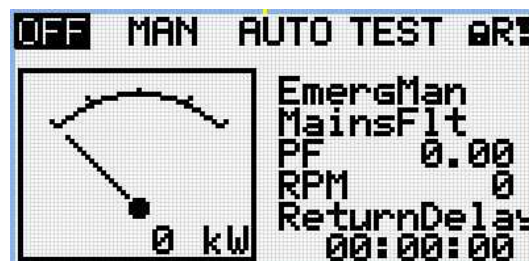


- ▶ Active alarms are displayed as white text on black background. It means the alarm is still active, i.e. the appropriate alarm conditions are still present.
- ▶ Inactive alarms are displayed as black text on white background. It means the alarm is no more active, i.e. the appropriate alarm conditions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

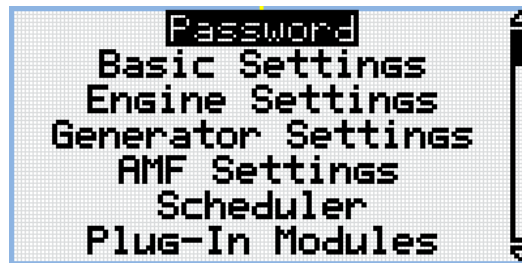


### 5.3.4 Password

#### Enter password



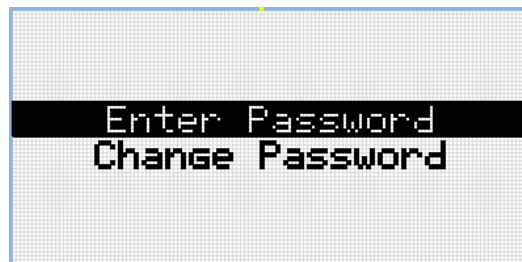
**Note:** From all measurement pages we can fluently go to the setpoint group page by pressing Page button.



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



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



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



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



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



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

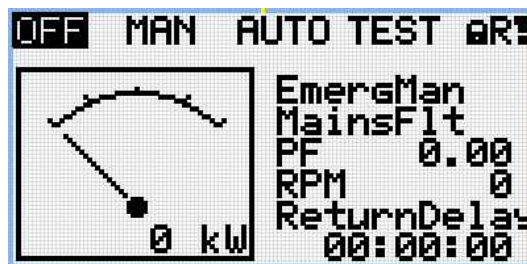


**Note:** Use Enter button to confirm the password or Page button to cancel entering the password.

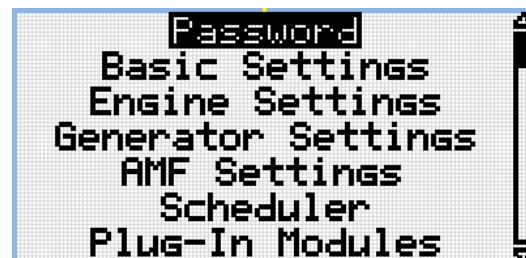


**Note:** In case that invalid password is entered, the controller shows Invalid password screen. Use Page button to go back to menu.

### Change password



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



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



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

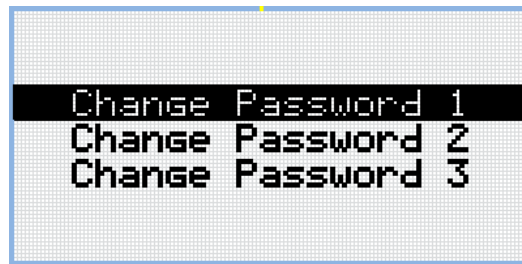


**Note:** Use Up and Down button to select Change Password.



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





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



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



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



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



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



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



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

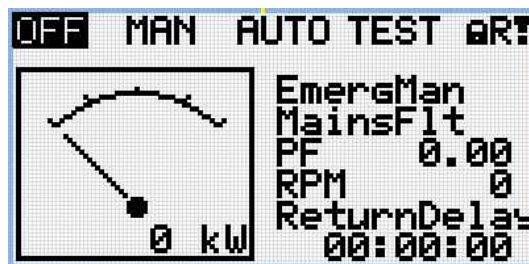


**Note:** After setting new password again use Enter button to confirm adjusted password or Page button to discard changes and to cancel changing password.

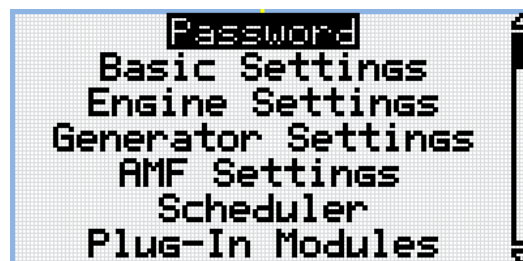


**Note:** Before changing the password controller has to be unlocked. In case that controller is locked, the controller shows Password required screen. In that case the password has to be entered before changing the password.

## Log out from controller



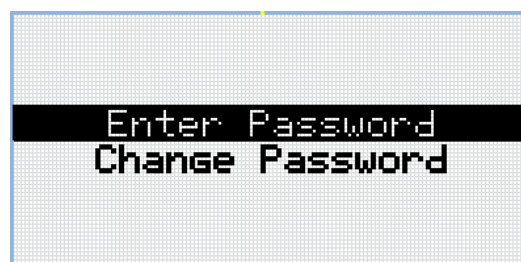
**Note:** From all measurement pages we can fluently go to the setpoint group page by pressing Page button.



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



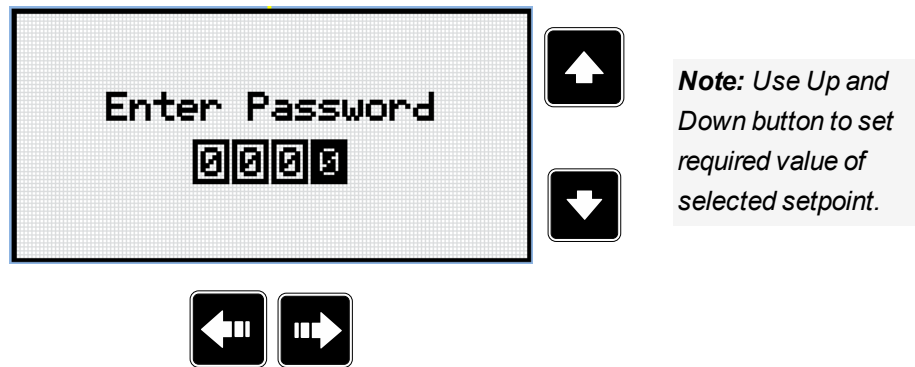
**Note:** Use Enter button to enter setpoint group Password.



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



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



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

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



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

## Lost Password

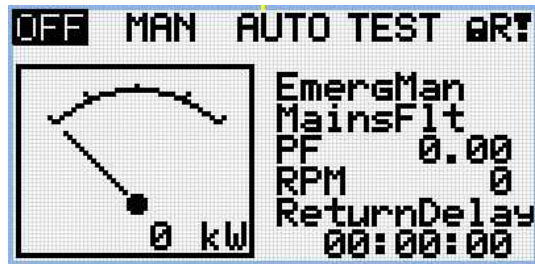
**IMPORTANT:** Display the information screen containing the serial number and password decode number as described in the chapter Information screen (page 86) and send them to your local distributor.

## Password break protection

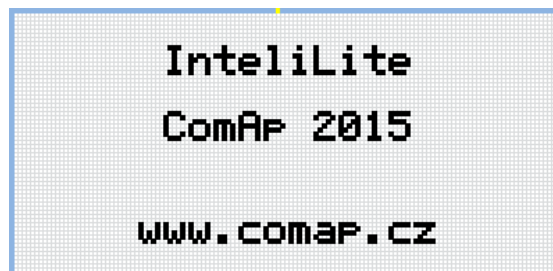
The controller password is protected against breaking by brute force. The protection works at every controller interface separately.

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

### 5.3.5 Information screen



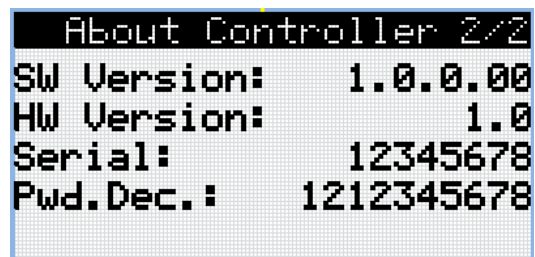
**Note:** On Main measurement screen press Enter and Page button together. Enter button has to be pressed first.



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

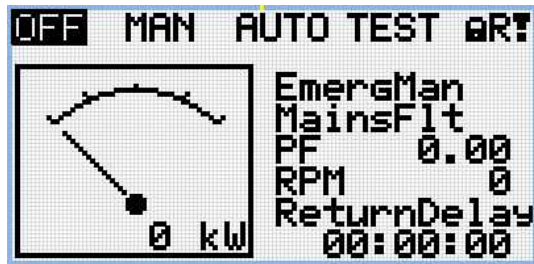


**Note:** Use Page button to move to the next page.

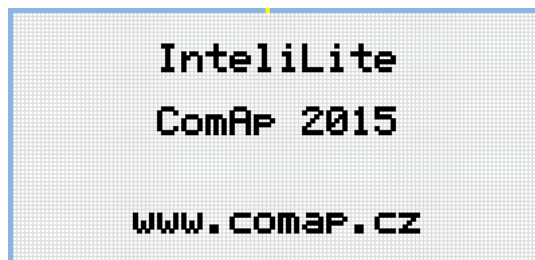


**Note:** Use Up button to move back to main measurement screen.

### 5.3.6 Language selection



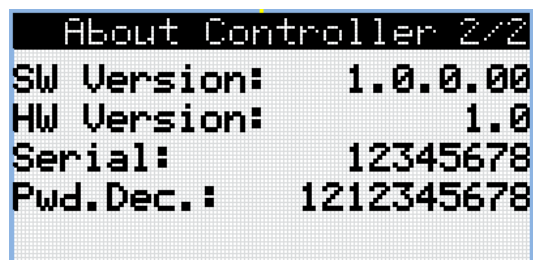
**Note:** On Main measurement screen press Enter and Page button together. Enter button has to be pressed first.



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



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



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

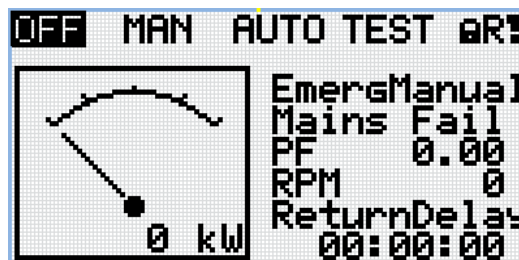


**Note:** Use Up and down button to select required language.



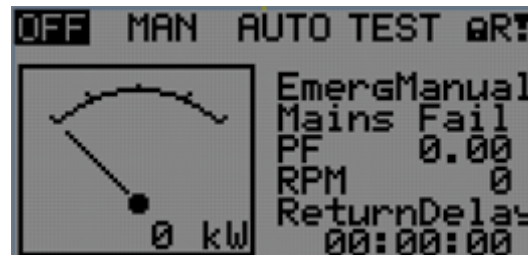
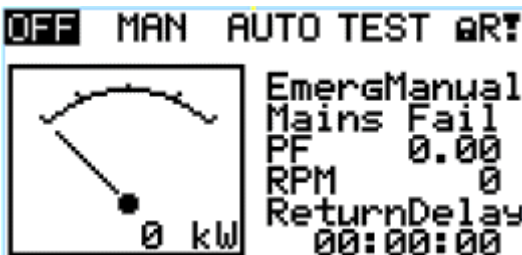
**Note:** Use Enter button to confirm selected language.

### 5.3.7 Display contrast adjustment



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

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



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

 back to Controller setup

## 5.4 Remote Display

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

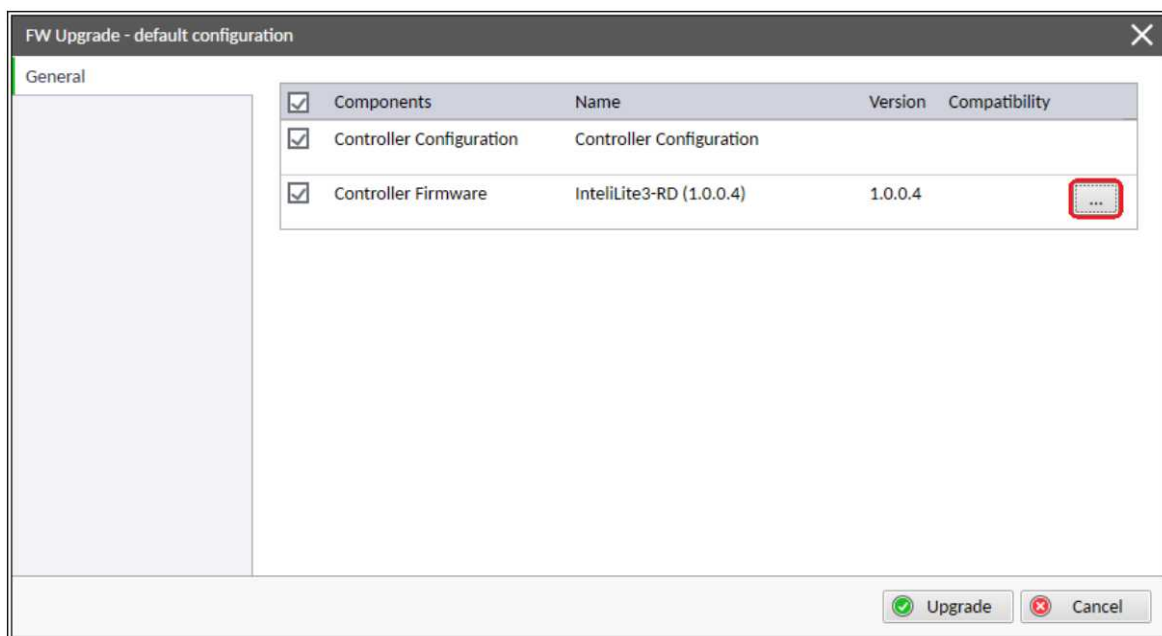
## 5.4.1 General description

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

## 5.4.2 IL3-RD Firmware installation

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

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



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

**Note:** When IL3-RD firmware is uploaded to controller there is only possible connect IntelliConfig using USB connection. IntelliConfig 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 IntelliConfig Global Guide for details about firmware uploading to controller.

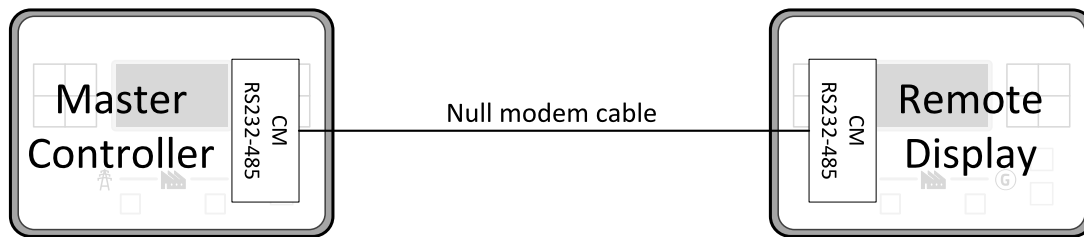
## 5.4.3 Wiring

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



## 5.4.4 Interconnection variants

### RS232

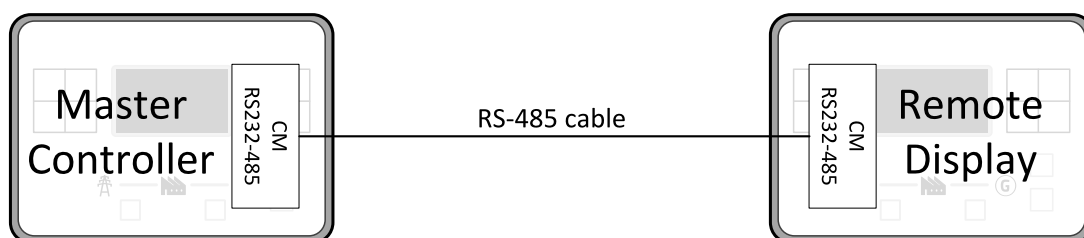


It is necessary to use CM-RS232-485 communication module on both Master controller and Remote display. COM 1 communication channel is used with these settings:

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

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

### RS485



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

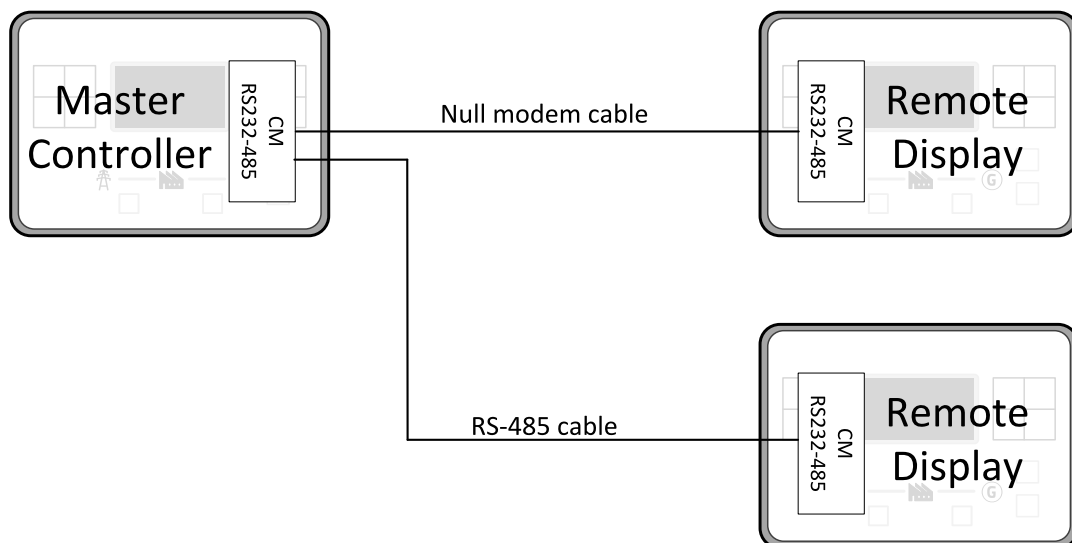
- ▶ COM 2 Mode: Direct
- ▶ COM 2 Communication Speed: 57600 or 115200 bps
- ▶ Controller Address: 1 – 32

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



## RS232 + RS485

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



### 5.4.5 Connection process

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

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

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

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

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

### 5.4.6 Connection troubleshooting

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

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

## 5.4.7 Function description

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

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

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

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

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

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

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

## 5.4.8 Firmware compatibility

### Remote Display

Remote Display FW is possible to upload into following controllers:

- ▶ IntelliLite AMF25
- ▶ IntelliLite AMF20
- ▶ IntelliLite MRS16
- ▶ IntelliLite MRS11
- ▶ IntelliLite 9

### Remote Display vs. Master controller

Remote Display	Master controller			
	RD FW ver.	IntelliLite (all versions)	IntelliLite 9	IntelliGen 200
1.0.0		FW ver. 1.5.x	FW ver. 1.1.x	FW ver. 1.1.x
		FW ver. 1.6.x		FW ver. 1.2.x
		FW ver. 1.7.x		FW ver. 1.3.x
		FW ver. 1.8.x		

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### 5.5.1 Start-stop sequence

State	Condition of the transition	Action	Next state
Ready	Start request	<b>PRESTART (PAGE 481)</b> on <b>Prestart Time (page 188)</b> counter started	Prestart
	RPM > 2 or Oil pressure > <b>Starting Oil Pressure (page 189)</b> or Generator voltage > 10V or D+ voltage is higher than <b>D+ Threshold (page 202)</b>		Stop (Stop fail)
	OFF Mode selected or Shutdown alarm active		Not Ready
Not Ready	RPM < 2, Oil pressure not detected, Generator voltage < 10V, D+ not Active no shutdown alarm active, other than OFF Mode selected		Ready

Prestart	Prestart time elapsed	FUEL SOLENOID (PAGE 464) on, STARTER (PAGE 484) on, Maximum Cranking Time (page 187) counter started	Cranking
Cranking	RPM > Starting RPM	STARTER (PAGE 484) off, PRESTART (PAGE 481) off	Starting
	D+ input activated or oil pressure detected or Generator voltage > 25% Nominal voltage	STARTER (PAGE 484) off, PRESTART (PAGE 481) off	Cranking
	Maximum Cranking Time (page 187), 1st attempt	STARTER (PAGE 484) off, FUEL SOLENOID (PAGE 464) off, STOP SOLENOID (PAGE 485) on, Cranking Fail Pause (page 187) timer started	Crank pause
	Maximum Cranking Time (page 187) elapsed, last attempt	STARTER (PAGE 484) off, PRESTART (PAGE 481) off	Shutdown (Start fail)
Crank pause	Cranking Fail Pause (page 187) elapsed	STARTER (PAGE 484) on, FUEL SOLENOID (PAGE 464) on, STOP SOLENOID (PAGE 485) off, Maximum Cranking Time (page 187) counter started	Cranking
Starting	Idle Time (page 195) elapsed	Minimal Stabilization Time (page 197) and Maximal Stabilization Time (page 198) counter started	Running
	any shutdown condition	FUEL SOLENOID (PAGE 464) off, STOP SOLENOID (PAGE 485) on	Shutdown
	all cranking attempts elapsed	FUEL SOLENOID (PAGE 464) off, STOP SOLENOID (PAGE 485) on	Shutdown (Start fail)
Running	Stop request	READY TO LOAD (PAGE 482) off, Cooling Time (page 199) counter started	Cooling
	RPM = 0 or any other shutdown condition	READY TO LOAD (PAGE 482) off, FUEL SOLENOID (PAGE 464) off	Shutdown
	GCB CLOSE/OPEN (PAGE 465) closed		Loaded
Loaded	GCB CLOSE/OPEN (PAGE 465) opened		Running
	RPM = 0 or any other shutdown condition	FUEL SOLENOID (PAGE 464) off, STOP SOLENOID (PAGE 485) on, READY TO LOAD (PAGE 482) off,	Shutdown
Cooling	Cooling Time (page 199) elapsed	FUEL SOLENOID (PAGE 464) off, STOP SOLENOID (PAGE 485) on	Stop
	RPM = 0 or any other shutdown condition	FUEL SOLENOID (PAGE 464) off, STOP SOLENOID (PAGE 485) on	Shutdown

	Start request	<b>READY TO LOAD (PAGE 482)</b> on	Running
Stop	RPM = 0, Oil pressure not detected, Generator voltage < 10V, D+ not active		Ready
	If at least one of engine running indication is detected when <b>Stop Time (page 199)</b> elapsed.		Stop (Stop fail)

**Note:** If all generator parameters are OK and **Minimal Stabilization Time (page 197)** 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 in any time by stop request

## 5.5.2 AMF sequence

State	Condition of the transition	Action	Next state
Mains operation	Mains failed or <b>MCB FEEDBACK (PAGE 438)</b> dropout, <b>MCB Opens On (page 229) = Mains Fail</b>	<b>MCB CLOSE/OPEN (PAGE 474)</b> off, <b>Emergency Start Delay (page 222)</b> timer started	Mains failure
	Mains failed or <b>MCB FEEDBACK (PAGE 438)</b> dropout, <b>MCB Opens On (page 229) = Gen Run</b>	<b>Emergency Start Delay (page 222)</b> timer started	Mains failure
Mains failure	Mains voltage and frequency OK, <b>MCB Opens On (page 229) = Mains Fail</b>	After elapsing <b>MCB Close Delay (page 224)</b> <b>MCB CLOSE/OPEN (PAGE 474)</b> on	Mains operation
	Mains voltage and frequency OK, <b>MCB Opens On (page 229) = Gen Run</b>	None	Mains operation
	<b>Emergency Start Delay (page 222)</b> elapsed, <b>MCB Opens On (page 229) = Mains Fail</b>	Engine start sequence performed, then <b>GCB CLOSE/OPEN (PAGE 465)</b> on	Island operation
	<b>Emergency Start Delay (page 222)</b> elapsed, <b>MCB Opens On (page 229) = Gen Run</b>	Engine start sequence performed, then <b>MCB CLOSE/OPEN (PAGE 474)</b> off, time delay <b>Transfer Delay (page 223)</b> performed and <b>GCB CLOSE/OPEN (PAGE 465)</b> on	Island operation
Island operation	Mains voltage and frequency OK	<b>Mains Return Delay (page 222)</b> timer started	Mains return
Mains return	Mains failed		Island operation
	<b>Mains Return Delay (page 222)</b> elapsed	<b>GCB CLOSE/OPEN (PAGE 465)</b> off, then after <b>Transfer Delay (page 223)</b> <b>MCB CLOSE/OPEN (PAGE 474)</b> on and then engine stop sequence performed	Mains operation

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

**Note:** If during start-up sequence mains returns, then MCB is reclosed with delay **MCB Close Delay** (page 224)(if opened, depending on **MCB Opens On** (page 229) 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 223).

## 5.5.3 Operating Modes

Selecting the operating mode is done through Left  and Right  buttons on the front panel or by changing the **Controller mode** (page 180) 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 441)
- ▶ **Remote TEST** (page 443)
- ▶ **Remote MAN** (page 441)
- ▶ **Remote AUTO** (page 440)



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

### OFF

No start of the gen-set is possible. Controller stays in Not ready status and cannot be started any way. The MCB is closed permanently (**MCB Opens On** (page 229) = GENRUN) or is open or closed according to whether the mains is present or not (**MCB Opens On** (page 229) = 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

The engine can be started and stopped manually using the Start  and Stop  buttons (or external buttons wired to the appropriate binary inputs) in MAN mode. When the engine is running, GCB can be closed. Also MCB can be closed and opened manually using the MCB button, regardless of whether the mains are 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

The controller does not respond to 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 then the engine will be running at least for the time which is defined in **Mains Return Delay (page 222) setpoint**, even if the mains would return in the meantime.

## TEST

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 223)** the GCB will be closed and the gen-set will supply the load. After the mains have recovered, the delay **Mains Return Delay (page 222)** will count down and if it elapses and the mains is still ok, the controller will transfer the load back to the mains after **Transfer Delay (page 223)** and the gen-set will remain running unloaded again until the mode is changed.

### Remote test on load

When binary input is closed, the controller automatically transfers load from the mains to the gen-set. See LBI REM TEST ON LOAD (PAGE 442).

## 5.5.4 Engine start

### Diesel engine

- ▶ After the command for start is issued (pressing Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), outputs **PRESTART (PAGE 481)** and **GLOW PLUGS (PAGE 470)** are energized for time period given by the setpoints **Prestart Time (page 188)** and **Glow Plugs Time (page 189)**.
- ▶ After **Prestart Time (page 188)** and **Glow Plugs Time (page 189)**, the output **FUEL SOLENOID (PAGE 464)** is energized and after **Fuel Solenoid Lead (page 195)** the starter of motor is activated by energizing the output **STARTER (PAGE 484)**.
- ▶ When one or more of following conditions are met, the starter output is de-energized:
  - The engine speed exceeds the value of **Starting RPM (page 188)**, or
  - One of **Additional running engine indications (page 118)** signals becomes active.
- ▶ The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 188)**, after that it is considered as started and the Idle period will follow.
- ▶ The maximum duration that the output **STARTER (PAGE 484)** is energized is determined by the setpoint **Maximum Cranking Time (page 187)**. If the engine does not start within this period, the output **STARTER (PAGE 484)** is de-energized and a pause with length determined by **Cranking Fail Pause (page 187)** will follow. **PRESTART (PAGE 481)** and **GLOW PLUGS (PAGE 470)** 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 186)**.
- ▶ Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 473)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 195)**. When controller is in the MAN mode, it is possible to finish the **Idle Time (page 195)** count down by pushing the Start button.
- ▶ After the idle period has finished, the output **IDLE/NOMINAL (PAGE 473)** is activated and the start-up sequence is finished. The **Stabilization (page 99)** phase follows.

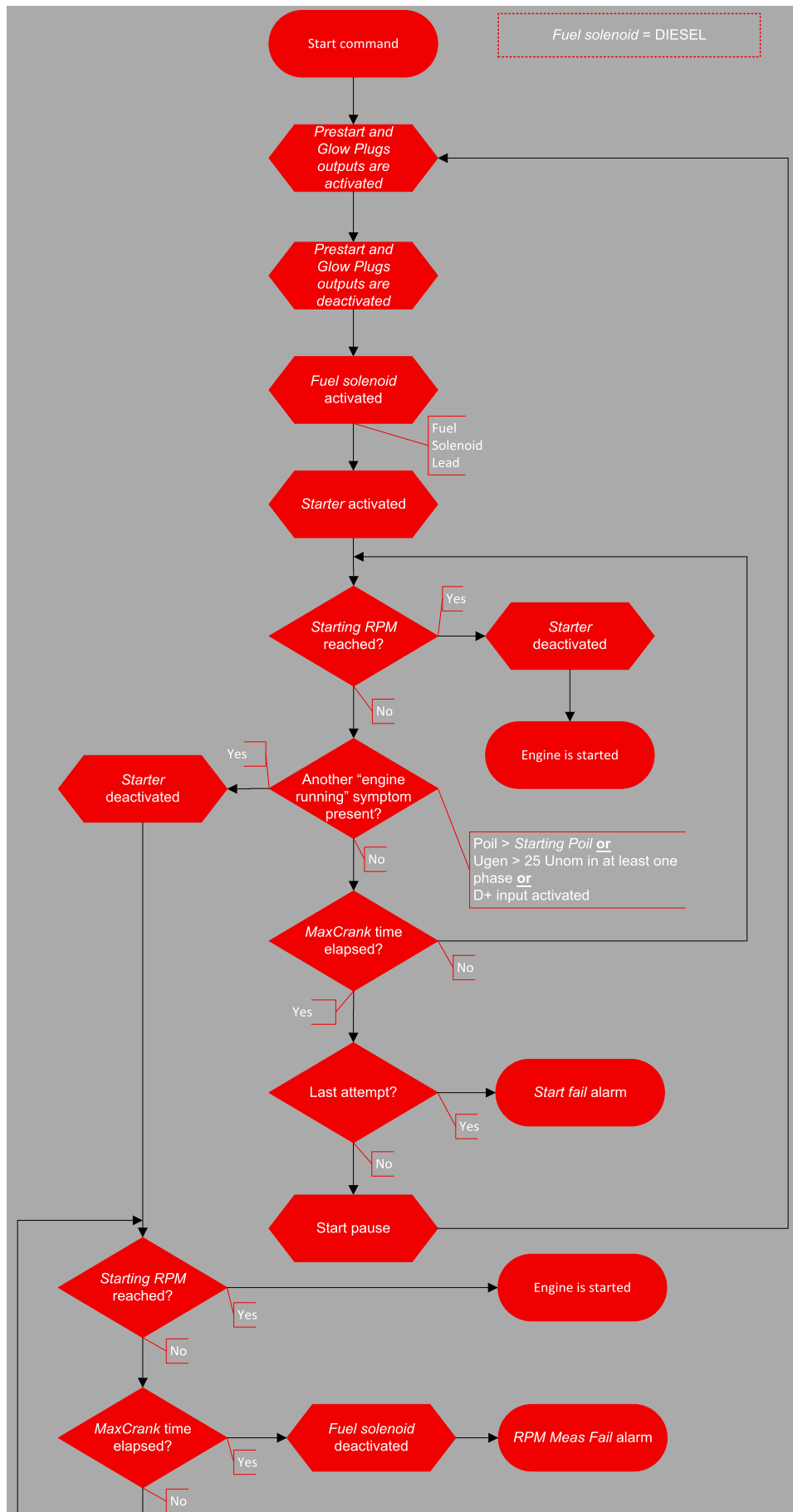


Image 5.11 Flowchart of start of diesel engine



## 5.5.5 Stabilization

When the **Engine start (page 97)** sequence is finished, the gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

- ▶ **Minimal Stabilization Time (page 197)** 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 198)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated) but, opposite to the previous timer, the GCB can be closed if generator voltage and frequency are within limits.

In situations where the GCB is closed automatically (AUTO, TEST modes), the closing of GCB will occur in the first moment when the generator voltage and frequency will get into limits and the **Minimal Stabilization Time (page 197)** has already elapsed.

In the event that the generator voltage or frequency are not within limits within the **Maximal Stabilization Time (page 198)** 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 216)**.

**Note:** The value of the **Minimal Stabilization Time (page 197)** setpoint has to be lower than the value of **Maximal Stabilization Time (page 198)** setpoint.

## 5.5.6 Connecting to load

When the **Stabilization (page 99)** 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 197)** timer has elapsed.
- ▶ The gen-set voltage and frequency are within limits.

## 5.5.7 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 has to be pressed)

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

- ▶ GCB is opened and the gen-set stops supply the load.
- ▶ After GCB is opened, the gen-set cools down and a stop.

## 5.5.8 AMF operation

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

(PAGE 404) or MAINS FAIL BLOCK (PAGE 437).

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

## Mains failure detection

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

- ▶ The mains voltage is out of the limits given by the setpoints **Mains Undervoltage (page 225)** and **Mains Overvoltage (page 224)** for a time period longer than **Mains < > Voltage Delay (page 225)**.
- ▶ The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 226)** and **Mains Overfrequency (page 225)** for a time period longer than **Mains < > Frequency Delay (page 226)**.
- ▶ The MCB close command was not successful and the alarm **Wrn MCB Fail (page 534)** was not reset.
- ▶ Phase rotation is incorrect.

## Healthy mains detection

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

- ▶ The mains voltage is within the limits given by the setpoints **Mains Undervoltage (page 225)** and **Mains Overvoltage (page 224)**.
- ▶ The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 226)** and **Mains Overfrequency (page 225)**.
- ▶ The alarm **Wrn MCB Fail (page 534)** is not active (if MCB feedback is active). This condition is not required if MCB is open (MCB feedback is inactive).
- ▶ Phase rotation is correct.

## The AMF procedure

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

- ▶ If the setpoint **MCB Opens On (page 229)** is set to Mains Fail, the MCB is opened
- ▶ The timer for automatic start of the gen-set **Emergency Start Delay (page 222)** 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 404)** or **MAINS FAIL BLOCK (PAGE 437)**.

- ▶ If the setpoint **MCB Opens On (page 229)** is set to Gen Run, the MCB is opened once the generator voltage is within limits (after **Minimal Stabilization Time (page 197)** 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 223)** elapses, the GCB is closed and the gen-set begins to supply the load.
- ▶ After the mains restored to normal, the timer **Mains Return Delay (page 222)** begins to count down.
- ▶ Maximum time between closing of MCB and opening GCB is given by the setpoint **Transfer Delay (page 223)**. After GCB is opened, the gen-set cools down and a stop.

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

## 5.5.9 Engine cool down and stop

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

- ▶ Duration of the cool down phase is determined by the setpoint **Cooling Time (page 199)**.
- ▶ 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 199)**.
- ▶ The cool down can be finished manually in MAN mode by pressing the STOP button.
- ▶ If a new start request comes, the cool down will be interrupted and the gen-set will go back to the stabilization phase. If the cooling was at nominal speed, the stabilization timers will not count down again so the GCB is ready to be closed (after 2 seconds delay).

When the cool down is finished, the output **FUEL SOLENOID (PAGE 464)** is de-energized and **STOP SOLENOID (PAGE 485)** is energized. The engine will stop within the time period determined by the setpoint **Stop Time (page 199)**. If the engine does not stop within this time, the alarm **Wrm Stop Fail (page 536)** will be issued.

The output **STOP SOLENOID (PAGE 485)** is energized until the engine is stopped, but at least for the duration of **Stop Time (page 199)**. If the **Stop Time (page 199)** has elapsed and the engine has still not stopped, the **STOP SOLENOID (PAGE 485)** is de-energized for 5 s and then energized again for **Stop Time (page 199)** and this repeats until the engine is stopped.

### Stopped gen-set evaluation

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

- ▶ The engine speed is lower than 2 RPM.
- ▶ The generator voltage in all phases is lower than 10 V.
- ▶ None of **Additional running engine indications (page 118)** signals is active.

## 5.5.10 Alarm management

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

- ▶ One alarm of any type can be assigned to each binary input.
- ▶ Two alarms (one yellow and one red type) can be assigned to each analog input.
- ▶ There are also **Built-in alarms (page 105)** with fixed alarm types.
- ▶ Each alarm is written to the **Alarmlist (page 105)**.
- ▶ Each alarm causes a record to be written into the history log.
- ▶ Each alarm activates the Alarm and Horn output.
- ▶ Each alarm can cause sending of a SMS message or an email.

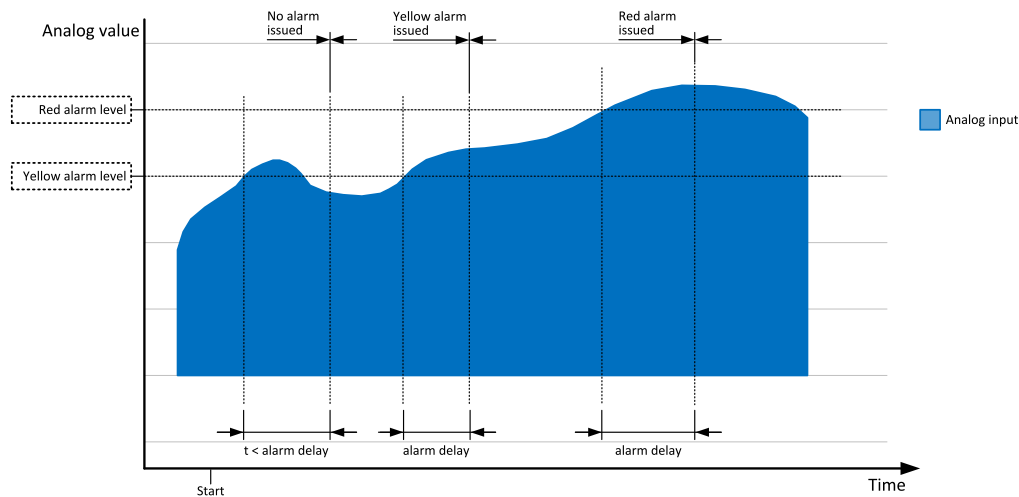


Image 5.12 Analog input alarm evaluation principle

## Alarm handling

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

- ▶ The alarm is evaluated all the time when the controller is switched on.
- ▶ The alarm is evaluated only when the engine is running. This type should be used for e.g. oil pressure. These alarms begin to be evaluated after the engine has been started with the delay given by the setpoint **Protection Hold Off (page 198)**.
- ▶ 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 198)** has elapsed or the GCB has been closed. They remain evaluated until cooling has finished. Only Generator under/overvoltage and Generator under/overfrequency belong to this category. This category is not configurable to binary and analog input alarms.

If an alarm is being evaluated and the appropriate alarm condition is fulfilled, the delay of evaluation will start to run. The delay is adjustable by a setpoint (in the case of built-in alarms, analog input alarms) or is adjusted via configuration window in IntelliConfig (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 432)**, all active alarms change to confirmed state. Confirmed alarms will disappear from the Alarmlist as soon as the respective condition dismisses. If the condition is dismissed before acknowledging the alarm, the alarm will remain in the Alarmlist as Inactive.

**Note:** The input **SD OVERRIDE (PAGE 443)** can be used for temporary disabling of red alarms to shutdown the engine. This input may be used in situations where providing the power is extremely important – e.g. if the gen-set drives pumps for fire extinguishers (sprinklers).

## Alarm states

An alarm can have following states:

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



Image 5.13 Alarm List

## Alarm types - Level 1

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

### Warning (Wrn)

The alarm appears in the Alarmlist and is recorded into the history log. Activates the output **AL COMMON WRN** (PAGE 449) as well as the standard alarm outputs (**HORN** (PAGE 472) and **ALARM** (PAGE 455)).

### Alarm indication only

The alarm indication only alarm does not perform any actions regarding gen-set control. Alarm is only displayed in alarmlist.

### History record only (HistRecOnl)

The event is recorded into the history. Standard alarm outputs (**HORN** (PAGE 472) and **ALARM** (PAGE 455)) are not activated.

## Alarm types - Level 2

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

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

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

### Shutdown (Sd)

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

shutdown alarm in the alarmlist. Activates the output **AL COMMON SD** (PAGE 449) as well as the standard alarm outputs (**HORN** (PAGE 472) and **ALARM** (PAGE 455)).

### Breaker open and cool down (BOC)

The event appears in the alarmlist and is recorded into the history log. It causes immediate opening of the GCB and then the standard stop sequence with cooling follows. The gen-set cannot be started again while there is a BOC alarm in the alarmlist. Activates the output **AL COMMON BOC** (PAGE 448) as well as the standard alarm outputs (**HORN** (PAGE 472) and **ALARM** (PAGE 455)).

### Sensor fail detection (FLS)

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the **Alarmlist** (page 105). The valid range is defined by the most-left (RL) and most-right (RH) points of the sensor characteristic  $\pm 12.5\%$  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.

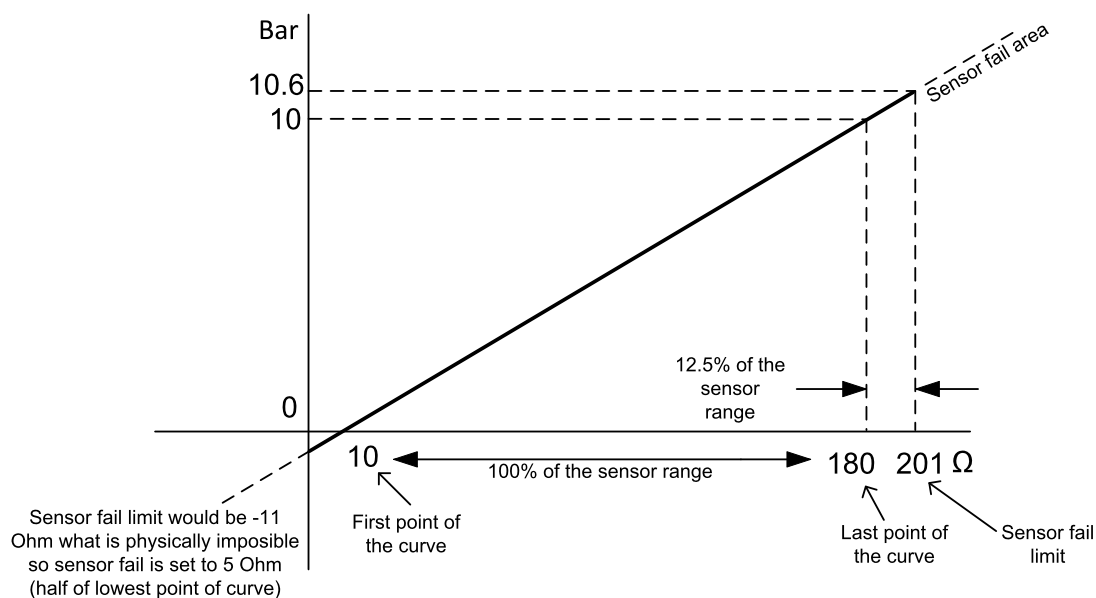


Image 5.14 Sensor fail detection principle

### Remote alarm messaging

If communication plug-in module is connected to the controller, the controller can send SMS messages and emails at the moment when a new alarm appears in the **Alarmlist** (page 105) or new event is written in **History log** (page 107). The message will contain a copy of the **Alarmlist** (page 105) or reasons from **History log** (page 107). To enable this function, adjust setpoints **Event Message** (page 293), **Wrn Message** (page 293), **BOC Message** (page 293) and **Sd Messages** (page 294) to ON. Also enter a valid GSM phone number or email address to the setpoints **Telephone Number 1** (page 291), **Email Address 1** (page 291).

The list of all supported terminals shows the table below:

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

## Alarmlist

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

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

Alarmlist contains three types of alarms:

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

### Controller built-in alarms

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

### User configured alarms

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

### ECU alarms

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

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

## Built-in alarms

Events specification	Protection type	Description
Analog Input 1 Wrm	WRN	Value measured on analog input 1 is </> than <b>Analog Protection 1 Wrm (page 229)</b> setpoint.
Analog Input 1 Sd	SD	Value measured on analog input 1 is </> than <b>Analog Protection 1 Sd (page 230)</b> setpoint.
Analog Input 2 Wrm	WRN	Value measured on analog input 2 is </> than <b>Analog Protection 2 Wrm (page 231)</b> setpoint.
Analog Input 2 Sd	SD	Value measured on analog input 2 is </> than <b>Analog Protection 2 Sd (page 231)</b> setpoint.

Events specification	Protection type	Description
Analog Input 3 Wrn	WRN	Value measured on analog input 3 is </> than <b>Analog Protection 3 Wrn (page 232)</b> setpoint.
Analog Input 3 Sd	SD	Value measured on analog input 3 is </> than <b>Analog Protection 3 Sd (page 233)</b> setpoint.
Wrn Battery Voltage	WRN	Battery voltage is out of limits given by <b>Battery Undervoltage (page 212)</b> and <b>Battery Overvoltage (page 213)</b> setpoints.
Binary input		Configurable Warning/BOC/Shutdown alarms on the binary inputs.
Sd Battery Flat	SD	If the controller switches off during starting sequence ( <b>STARTER (PAGE 484)</b> output is active) it doesn't try to start again and activates this protection (controller assumes bad battery condition).
Sd Start Fail	SD	Gen-set start failed. All crank attempts were tried without success.
Parameters Fail	NONE	Wrong check-sum of parameters. Happens typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters, change value of at least one parameter.
Sd Gen Lx >V BOC Gen Lx <V (where x=1,2,3)	SD BOC	The generator voltage is out of limits given by Gen <V BOC and Gen >V Sd setpoints.
BOC Gen >, <Frequency	BOC	The generator frequency is out of limits given by <b>Generator Overfrequency BOC (page 219)</b> and <b>Generator Underfrequency BOC (page 220)</b> setpoints.
BOC Overload	BOC	The load is greater than the value given by <b>Overload BOC (page 216)</b> setpoint.
Sd Overspeed	SD	The protection comes active if the speed is greater than <b>Overspeed Sd (page 203)</b> setpoint.
Sd Underspeed	SD	During starting of the engine when the RPM reach the value of <b>Starting RPM (page 188)</b> setpoint the starter is switched off and the speed of the engine can drop under <b>Starting RPM (page 188)</b> again. Then the Underspeed protection becomes active. Protection evaluation starts 5 seconds after reaching <b>Starting RPM (page 188)</b> .
Emergency Stop	SD	If the input Emergency Stop is opened shutdown is immediately activated.
GCB Fail	SD	Failure of generator circuit breaker.
MCB Fail	WRN	Failure of mains circuit breaker.
Sd RPM Measurement Fail	SD	Failure of magnetic pick-up sensor for speed measurement. This alarm appears, if starter was disengaged for other reason than overcrossing <b>Starting RPM (page 188)</b> (like oil pressure or D+) and at the end of timer <b>Maximum Cranking Time (page 187)</b> there are no RPMs > <b>Starting RPM (page 188)</b> detected.
Wrn Stop Fail	WRN	Gen-set stop failed. See description at Gen-set Operation States chapter.



Events specification	Protection type	Description
Wrm Maintenance 1	WRN	The period for servicing is set by the <b>Maintenance Timer 1 (page 211)</b> setpoint. The protection comes if counter reaches zero.
Wrm Maintenance 2	WRN	The period for servicing is set by the <b>Maintenance Timer 2 (page 212)</b> setpoint. The protection comes if counter reaches zero.
Wrm Maintenance 3	WRN	The period for servicing is set by the <b>Maintenance Timer 3 (page 212)</b> setpoint. The protection comes if counter reaches zero.
Charge Alternator Fail	WRN	Failure of alternator for charging the battery.
Sd Override	WRN	The protection is active if the output Sd Override is closed.
Mains CCW Rot	WRN	Mains voltage phases are not wired correctly. MCB closing is prohibited by chontrroller.
Generator CCW Rot	WRN	Genset voltage phases are not wired correctly. GCB closing is prohibited by chontrroller.

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

## 5.5.11 History log

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

Each record has the same structure and contains:

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

### Record structure

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

Generator Voltage	Vg1	Generator voltage Ph1
Generator Voltage	Vg2	Generator voltage Ph2
Generator Voltage	Vg3	Generator voltage Ph3
Generator Voltage	Vg12	Generator voltage Ph12
Generator Voltage	Vg23	Generator voltage Ph23
Generator Voltage	Vg31	Generator voltage Ph31
Generator Current	Ig1	Generator current Ph1
Generator Current	Ig2	Generator current Ph2
Generator Current	Ig3	Generator current Ph3
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 Frequency	Mfrq	Mains Frequency
Voltage Battery	VBat	Voltage of battery
Analog Input 1	Ain1	Analog input 1
Analog Input 2	Ain2	Analog input 2
Analog Input 3	Ain3	Analog input 3
Analog Input 4	Ain4	Analog input 4
Binary Inputs	BIN	Controller binary inputs
Binary Outputs	BOUT	Controller binary outputs
Controller Mode	Mode	Controller mode

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

## 5.5.12 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 kept to when designing the wiring of power switches:

- ▶ The control outputs must be configured and wiring of the power switches must be provided in such a way, that the controller has full control over the breakers – i.e. the controller can open and close the breaker at any time.
- ▶ The breaker must respond within max. 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 internal delay for another closing of breaker. Delay is 6 seconds - 5 seconds for OFF coil and 1 second for UV coil. After these 6 seconds, breaker can be closed again. For opening of breaker there is no delay.

## Breaker control outputs

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

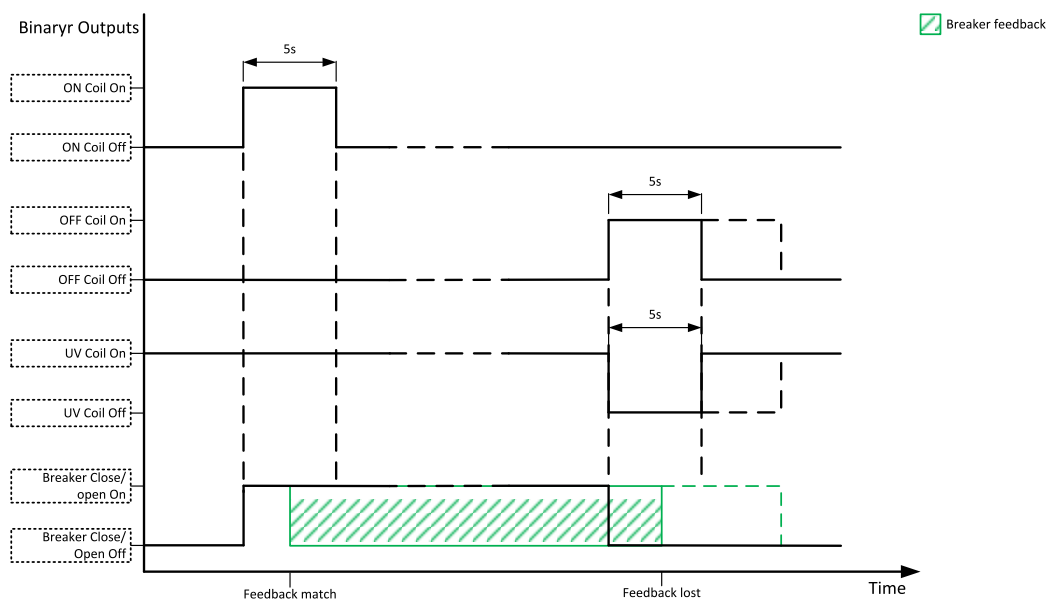


Image 5.15 Breaker control outputs

## 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 474) closes. This behavior is called “negative logic” and can be adjusted by the setpoint **MCB Logic** (page 227). The negative logic will prevent accidental opening of the MCB when the controller is switched off.
- ▶ If a contactor is used on the MCB position, it will open itself immediately after the mains have failed, because it will lose power for the coil. That is why the following adjustment is necessary to prevent triggering

the **Wrn MCB Fail (page 534)** alarm: **MCB Opens On (page 229) = Mains Fail, Mains < > Voltage Delay (page 225) ≤ 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 229) = Gen Run** will prevent triggering the **Wrn MCB Fail (page 534)** alarm.

## Breaker fail detection

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

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

**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 fail detection – see following diagrams.

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

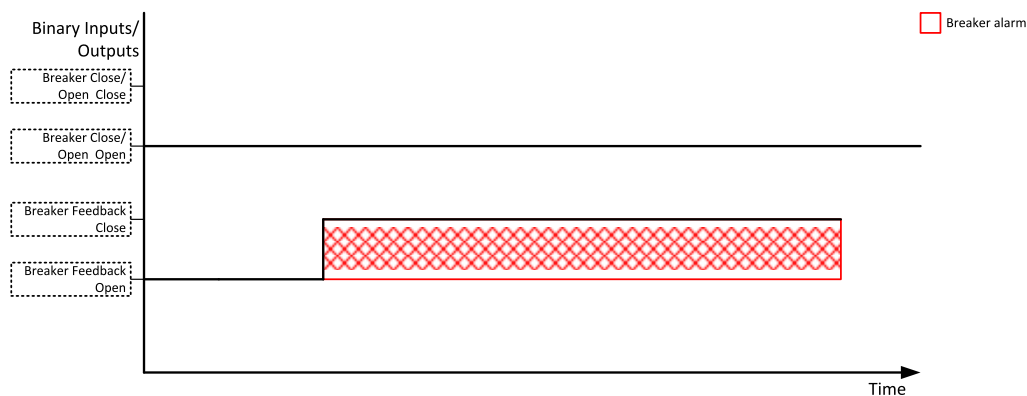


Image 5.16 Breaker fail - breaker close/open in steady position - open

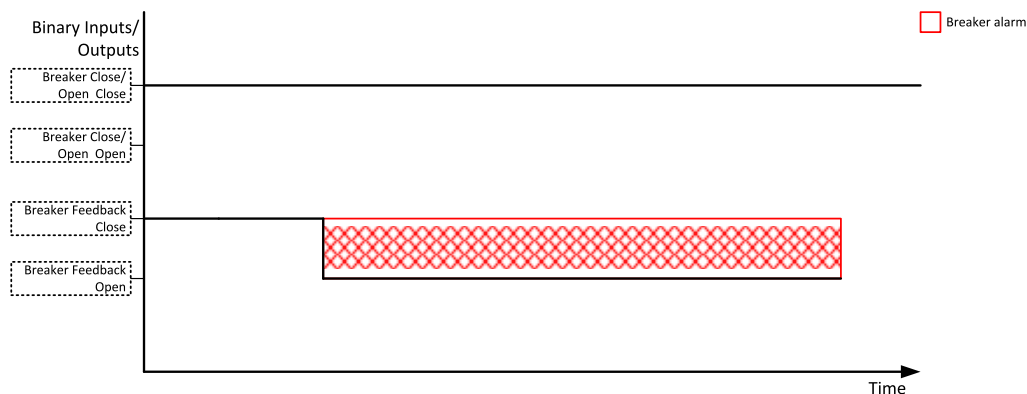


Image 5.17 Breaker fail - breaker close/open in steady position - close

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

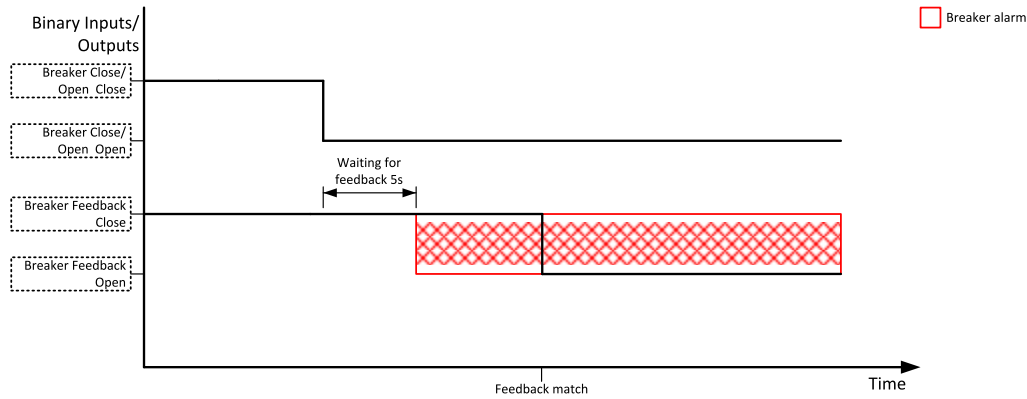


Image 5.18 Breaker fail - breaker close/open opens

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

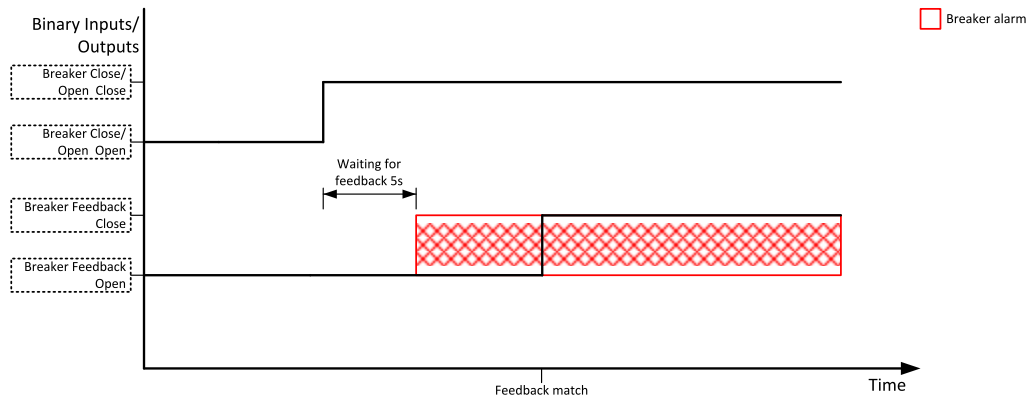


Image 5.19 Breaker fail - breaker close/open closes

### 5.5.13 Exercise timer

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

Related setpoints for timer 1 are:

- ▶ **Timer 1 Function (page 261)**
- ▶ **Timer 1 Day (page 266)**
- ▶ **Timer 1 Repetition (page 262)**
- ▶ **Timer 1 Repeated Day In Week (page 267)**
- ▶ **Timer 1 First Occur. Date (page 263)**
- ▶ **Timer 1 Repeat Day In Month (page 267)**
- ▶ **Timer 1 First Occur. Time (page 263)**
- ▶ **Timer 1 Repeat Week In Month (page 268)**
- ▶ **Timer 1 Duration (page 263)**
- ▶ **Timer 1 Refresh Period (page 265)**
- ▶ **Timer 1 Repeated (page 264)**
- ▶ **Timer 1 Weekends (page 266)**
- ▶ **Timer 1 Repeat Day (page 267)**

### Available modes of timer:

<b>Once</b>	This is a single shot mode. The timer will be activated only once at preset date/time for preset duration.
<b>Daily</b>	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.
<b>Weekly</b>	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.
<b>Monthly</b>	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.
<b>Short period</b>	The timer is repeated with adjusted period (hh:mm). The timer duration is included in the period.

### Once mode

#### Set-up via IntelliConfig

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

**Note:** First of all function of timer has to be adjusted via setpoint *Timer 1 Function* (page 261).

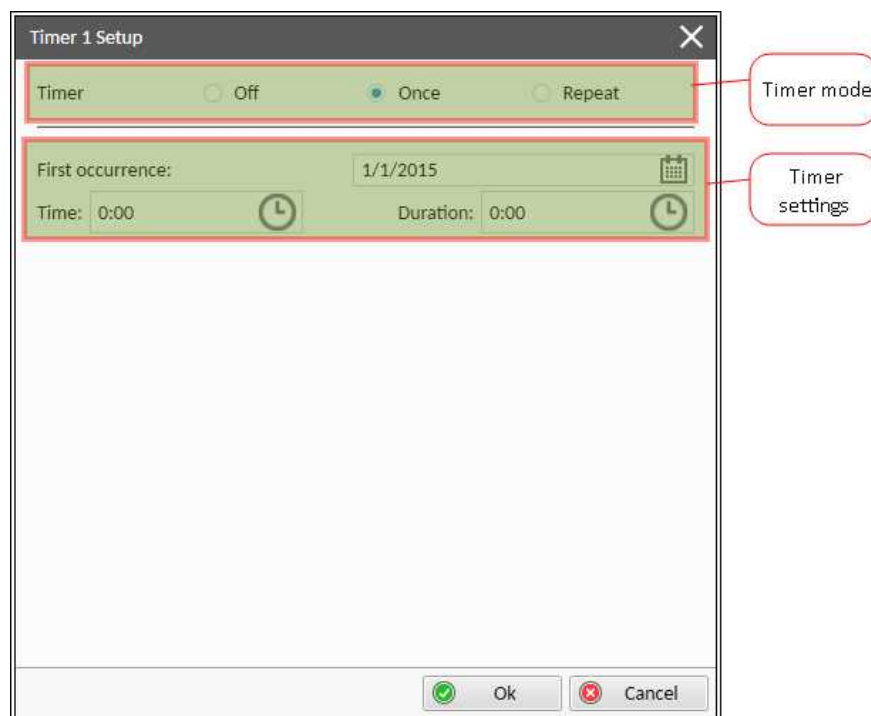


Image 5.20 Once mode - IntelliConfig

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 261) setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition** (page 262) setpoint select

Once mode. Than adjust **Timer 1 First Occur. Date** (page 263), **Timer 1 First Occur. Time** (page 263) and **Timer 1 Duration** (page 263).

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

## Daily mode

### Set-up via IntelliConfig

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

**Note:** First of all function of timer has to be adjusted via setpoint **Timer 1 Function** (page 261).

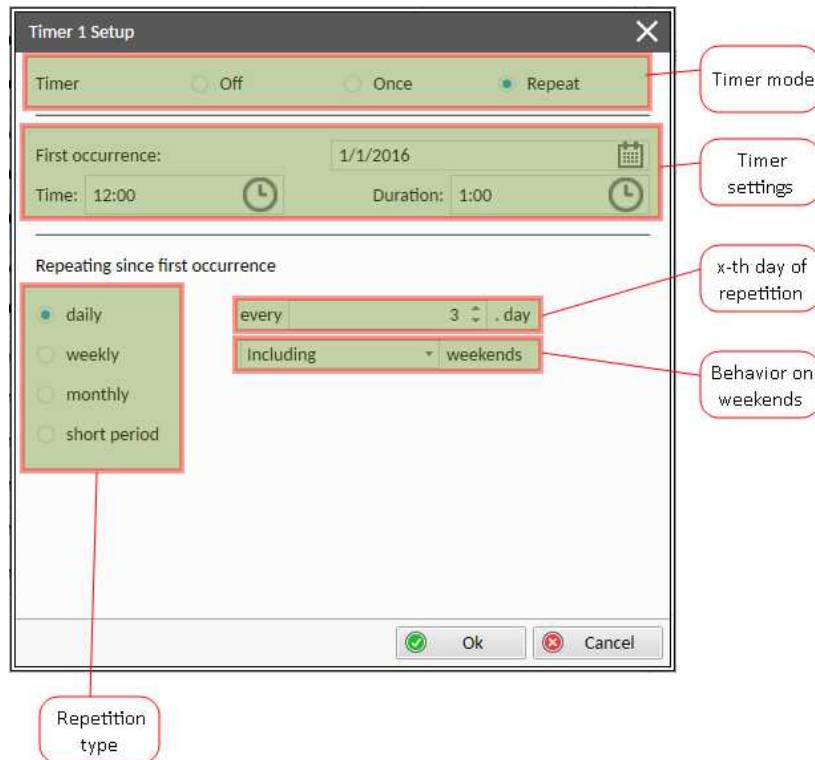


Image 5.21 Daily mode - IntelliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the x-th day of repetition (**Timer 1 Refresh Period** (page 265)) and behavior of timer on weekends (**Timer 1 Weekends** (page 266)).

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

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function** (page 261) setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition** (page 262) setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date** (page 263), **Timer 1 First Occur. Time** (page 263) and **Timer 1 Duration** (page 263). In setpoint **Timer 1 Repeated** (page 264) select Daily and adjust **Timer 1 Refresh Period** (page 265) (x-th day of repetition) and **Timer 1 Weekends** (page 266) (behavior of timer on weekends).

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

## Weekly mode

### Set-up via IntelliConfig

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

**Note:** First of all function of timer has to be adjusted via setpoint *Timer 1 Function* (page 261).

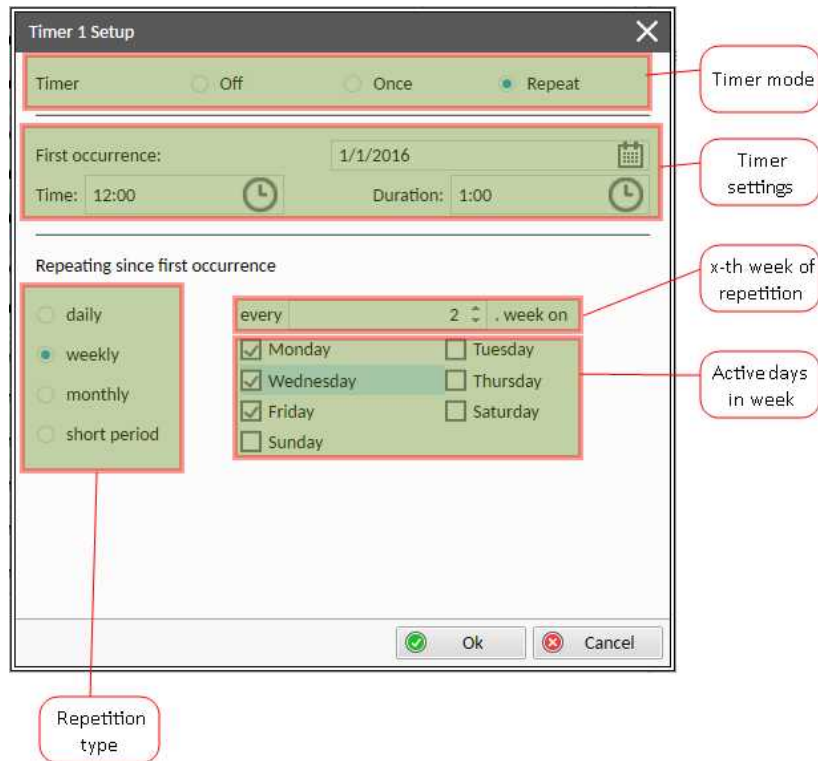


Image 5.22 Weekly mode - IntelliConfig

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 x-th week of repetition (**Timer 1 Refresh Period** (page 265)) and days when timer should be active (**Timer 1 Day** (page 266)).

**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 261) setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition** (page 262) setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date** (page 263), **Timer 1 First Occur. Time** (page 263) and **Timer 1 Duration** (page 263). In setpoint **Timer 1 Repeated** (page 264) select Weekly and adjust **Timer 1 Day** (page 266) (days when timer should be active) and **Timer 1 Refresh Period** (page 265) (x-th week of repetition).

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

## Monthly mode

### Set-up via IntelliConfig

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



**Note:** First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 261)**.

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

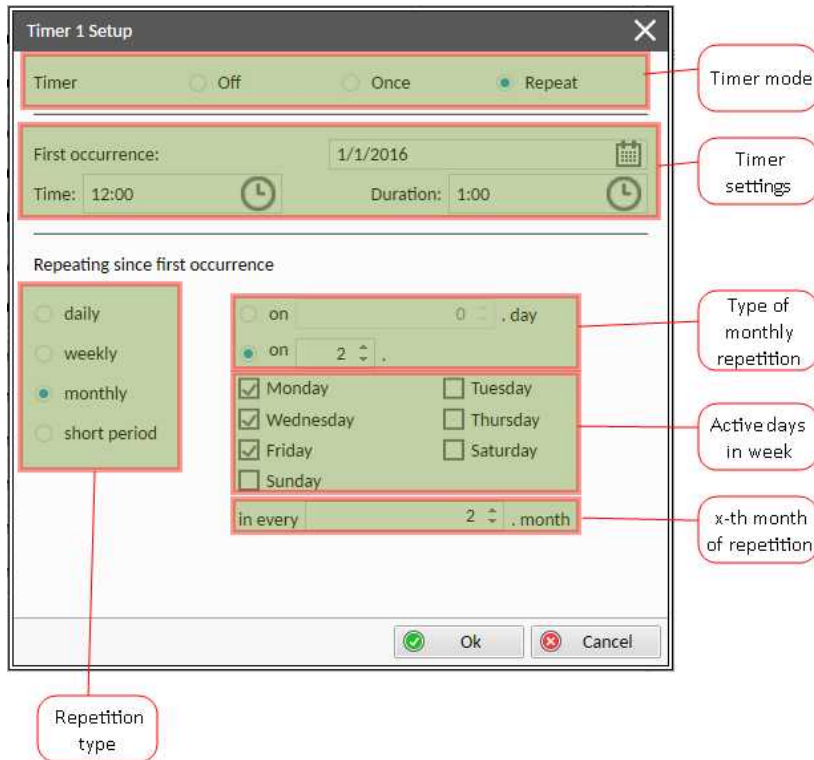


Image 5.23 Monthly mode - IntelConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the type of monthly repetition and the x-th day of repetition (**Timer 1 Repeat Day In Month (page 267)**). Than select the x-th month of repetition.

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

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

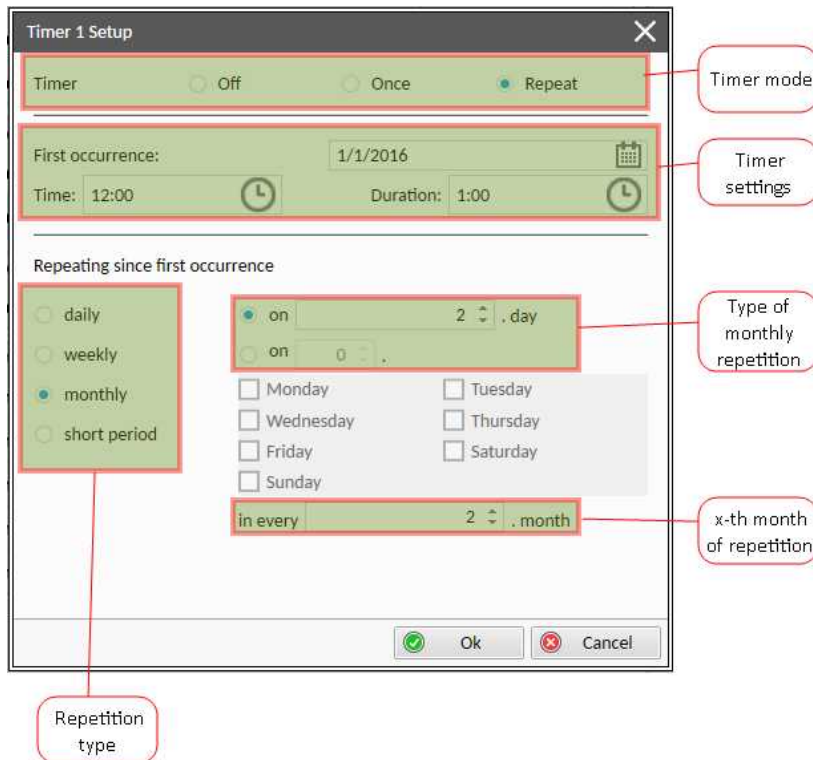


Image 5.24 Monthly mode - IntelConfig

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 x-th week of repetition and days in week. Then select the x-th month of repetition.

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

### Set-up via controller interface

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 261)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 262)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 263)**, **Timer 1 First Occur. Time (page 263)** and **Timer 1 Duration (page 263)**. In setpoint **Timer 1 Repeated (page 264)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 267)**, **Timer 1 Refresh Period (page 265)** (x-th month of repetition) and **Timer 1 Repeat Day In Month (page 267)** (concrete day in repeated months).

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 261)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 262)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 263)**, **Timer 1 First Occur. Time (page 263)** and **Timer 1 Duration (page 263)**. In setpoint **Timer 1 Repeated (page 264)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 267)**, **Timer 1 Refresh Period (page 265)** (x-th month of repetition), **Timer 1 Repeated Day In Week (page 267)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 268)** (concrete week in repeated months).

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

## Short period mode

### Set-up via IntelliConfig

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

**Note:** First of all function of timer has to be adjusted via setpoint *Timer 1 Function* (page 261).

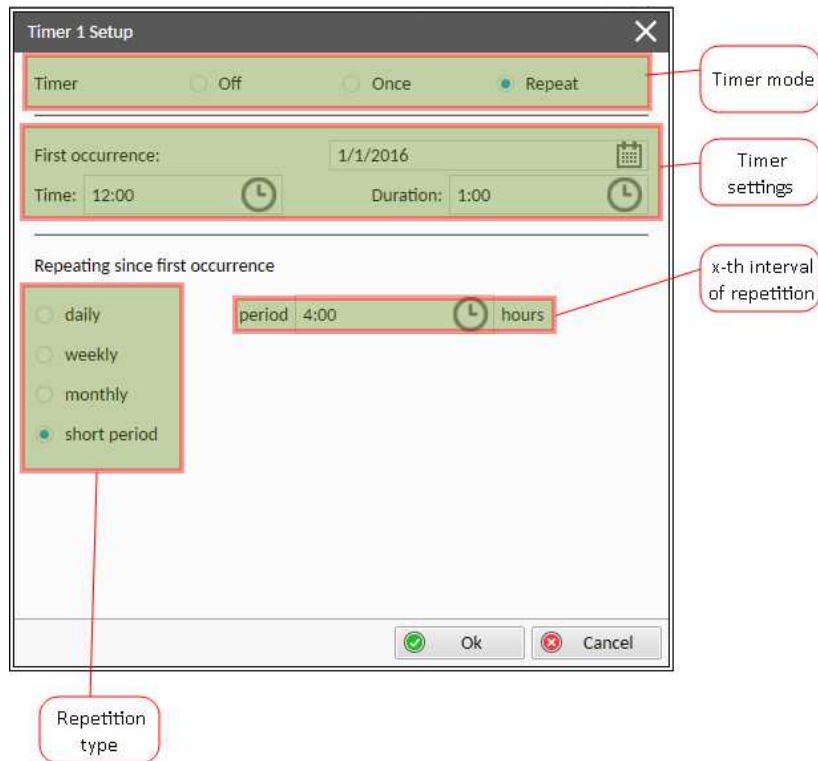


Image 5.25 Short period mode - IntelliConfig

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 again activated every 4th hour for 1 hour.

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function** (page 261) setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition** (page 262) setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date** (page 263), **Timer 1 First Occur. Time** (page 263) and **Timer 1 Duration** (page 263). In setpoint **Timer 1 Repeated** (page 264) select Short Period and adjust **Timer 1 Refresh Period** (page 265) (interval of repetition).

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

## 5.5.14 Service timers

### Running hours counters

Service timers are used as maintenance interval counters. Counters can be set by setpoints - **Maintenance Timer 1** (page 211), **Maintenance Timer 2** (page 212) and **Maintenance Timer 3** (page 212). All of them

work the same way - their values are decremented every hour when the gen-set is running.

Actual value of counters is located either as the same setpoints **Maintenance Timer 1 (page 211)**, **Maintenance Timer 2 (page 212)** and **Maintenance Timer 3 (page 212)** or as values **Maintenance 1 (page 383)**, **Maintenance 2 (page 383)** and **Maintenance 3 (page 384)**.

When the value of counter reaches 0, the alarm **Wrn Maintenance 1 (page 533)** or **Wrn Maintenance 2 (page 534)** or **Wrn Maintenance 3 (page 534)** is active until the respective counter is readjusted back to nonzero value.

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

### 5.5.15 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 202)** of battery voltage. Connect this input to the D+ (L) terminal of the charging alternator and enable the D+ function by the setpoint **D+ Function (page 201)**. 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 189)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.
- ▶ Binary input **OIL PRESSURE (PAGE 439)** is in logical 0.
- ▶ At least one phase of generator voltage is >25% of nominal voltage.

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

### 5.5.16 Voltage phase sequence detection

Controller detects phase sequence voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is fix defined phase sequence in controller L1, L2, L3. When the phases are connected in different order (e.g. L1,L3,L2 or L2,L1,L3) following alarms are detected:

- ▶ **Generator CCW Rotation (page 538)**
- ▶ **Mains CCW Rotation (page 538)**

## 5.5.17 Gen-set operation states

### Engine state machine

<b>Init</b>	Autotest during controller power on.  <b>Note:</b> 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 IntelliConfig.
<b>Not ready</b>	Gen-set is not ready to start.  <b>Example:</b> When shutdown alarm is active or unit is in OFF mode.
<b>Prestart</b>	Prestart sequence in process, <b>PRESTART (PAGE 481)</b> output is closed.  <b>Example:</b> Usually used for preheating or processes executed prior gen-set start.
<b>Cranking</b>	Engine is cranking, <b>STARTER (PAGE 484)</b> output is closed
<b>Pause</b>	Pause between start attempts.
<b>Starting</b>	Starting speed is reached and the Idle timer is running.
<b>Running</b>	Gen-set is running at nominal speed.
<b>Loaded</b>	Gen-set is running at nominal speed and <b>GCB CLOSE/OPEN (PAGE 465)</b> is closed.
<b>Stop</b>	Stop.  <b>Example:</b> Automatic or manual stop command was issued, engine is stopping.
<b>Shutdown</b>	Shut-down alarm activated.
<b>Ready</b>	Gen-set is ready to run.
<b>Cooling</b>	Gen-set is cooling before stop.
<b>EmergMan</b>	<b>EMERGENCY MAN (PAGE 432)</b> gen-set operation.  <b>Example:</b> Used for bypass the controller and engine manual start.

### Engine started conditions

- ▶ Engine speed (RPM) > **Starting RPM (page 188)** or
- ▶ Oil pressure > **Starting Oil Pressure (page 189)** or
- ▶ Binary input **OIL PRESSURE (PAGE 439)** is in logical 0 or
- ▶ D+ terminal active (reached **D+ Threshold (page 202)** of supply voltage) for minimum 1 s or
- ▶ Generator voltage > 25% of **Nominal Voltage Ph-N (page 177)** or **Nominal Voltage Ph-Ph (page 177)** (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 188)**.

### Engine running conditions

- ▶ Engine speed (RPM) > **Starting RPM (page 188)** or
- ▶ Oil pressure > **Starting Oil Pressure (page 189)** or
- ▶ Binary input **OIL PRESSURE (PAGE 439)** is in logical 0 or
- ▶ Generator voltage > 25% of **Nominal Voltage Ph-N (page 177)**

## Still engine conditions

- ▶ Engine speed (RPM) < **Starting RPM (page 188)** or
- ▶ Oil pressure < **Starting Oil Pressure (page 189)** or
- ▶ Binary input **OIL PRESSURE (PAGE 439)** is in logical 1 or
- ▶ Generator voltage < 50 V (any phase)

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

When any engine running conditions are appeared on still engine than the **Wrm Stop Fail (page 536)** is activated with following delay:

- ▶ for generator voltage from 10 V to < 50 % of nominal voltage, Wrm Stop Fail has delay 1 s
- ▶ for generator voltage > 50 % of nominal voltage, Wrm Stop Fail has delay 200 ms
- ▶ Oil pressure > **Starting Oil Pressure (page 189)**, Wrm Stop Fail has delay 1 s
- ▶ Binary input **OIL PRESSURE (PAGE 439)** is in logical 0, Wrm Stop Fail has delay 1 s
- ▶ for detected RPM, there is no delay.

## Stop engine conditions

If no engine running conditions are validated than the controller will wait extra 12 s before leaving the Machine state Stop and than it will release the **STOP SOLENOID (PAGE 485)** output.

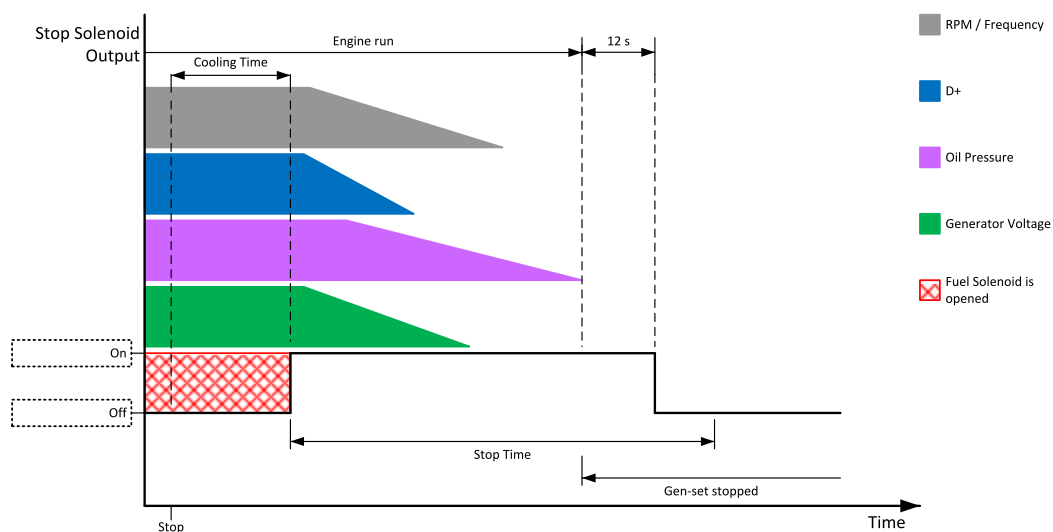


Image 5.26 Engine stops in **Stop Time (page 199)**

When the total time of stopping will exceed setpoint **Stop Time (page 199)** than the **Wrm Stop Fail (page 536)** and binary outputs are activated. The controller will continuously try to stop the engine.

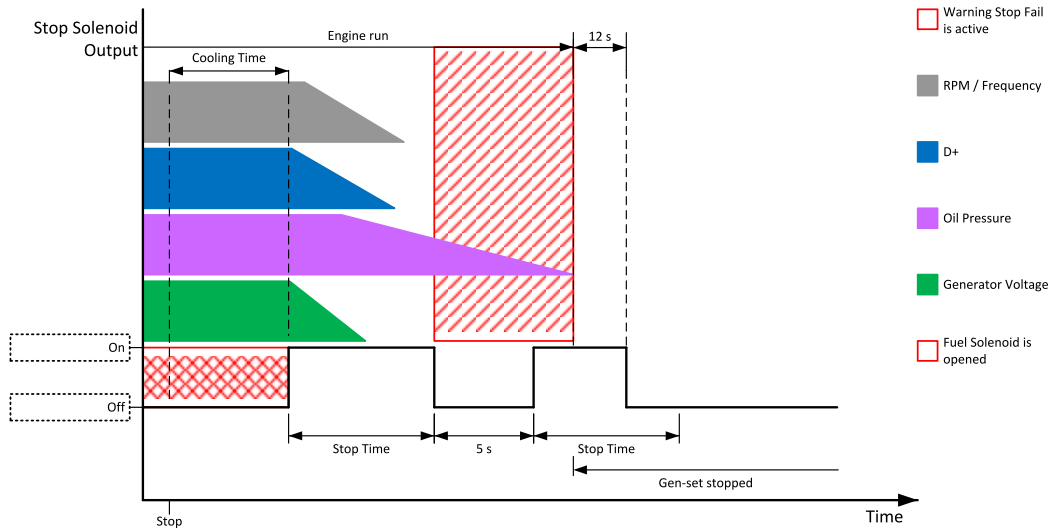


Image 5.27 Engine stops after first **Stop Time** (page 199)

## Electric state machine

<b>MainsOper</b>	Mains is present and all its values are within limits. <span style="color: blue;">■</span> <b>Example:</b> MCB is closed, GCB is opened
<b>MainsFlt</b>	Mains fails
<b>IslOper</b>	Island operation <span style="color: blue;">■</span> <b>Example:</b> MCB is opened, GCB is closed
<b>MainsRet</b>	Mains recover
<b>BrksOff</b>	GCB, MCB opened

## 5.5.18 Sensor curves

### Default sensor curves

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

Curve	Min [Ohm]	Max [Ohm]	Units
VDO 10 Bar 0-2400ohm	0	2400	Bar
VDO40-120°C0-2400ohm	0	2400	°C
VDOLevel%0-2400ohm	0	2400	%
General line 1	0	1000	ohm
General line 2	0	1000	ohm
General line 3	0	1000	ohm
General line 4	0	1000	ohm
General line 5	0	1000	ohm

General line 6	0	1000	ohm
General line 7	0	1000	ohm
General line 8	0	1000	ohm
General line 9	0	1000	ohm
General line 10	0	1000	ohm
General line 11	0	1000	ohm
General line 12	0	1000	ohm
General line 13	0	1000	ohm

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

**IMPORTANT:** For right behavior of function, curve for this analog input has to be in percentage.

🔍 back to Functions

### 5.5.19 PLC

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

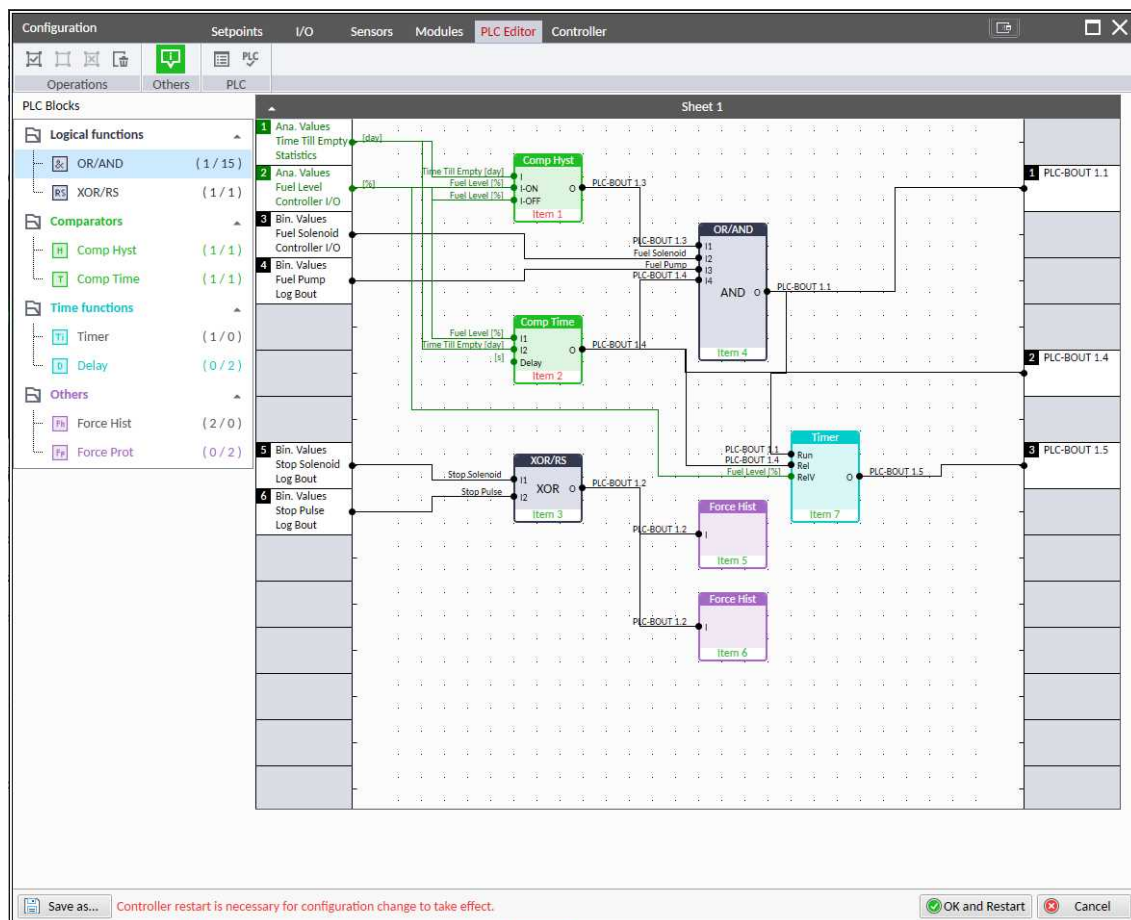


Image 5.28 PLC Editor main page



## List of available PLC blocks

PLC block	Number of blocks
OR/AND	4
XOR/RS	0
Comparator with hysteresis (Comp Hyst)	1
Comparator with delay (Comp Time)	1
Timer	1
Delay	1
Force history record (Force Hist)	1
Force protection (Force Prot)	1

## Working with the editor

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

- ▶ Adjust the sheet to your needs. See **Working with sheets (page 123)** for more information.
- ▶ Add PLC blocks into the sheets. See **Adding PLC blocks (page 124)** for more information.
- ▶ Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 125)** for more information.
- ▶ Create connections between inputs, blocks and outputs. See **Creating wires (page 127)** for more information.
- ▶ Adjust properties of the blocks. See **List of PLC blocks (page 516)** for more information about blocks.

## Working with sheets

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

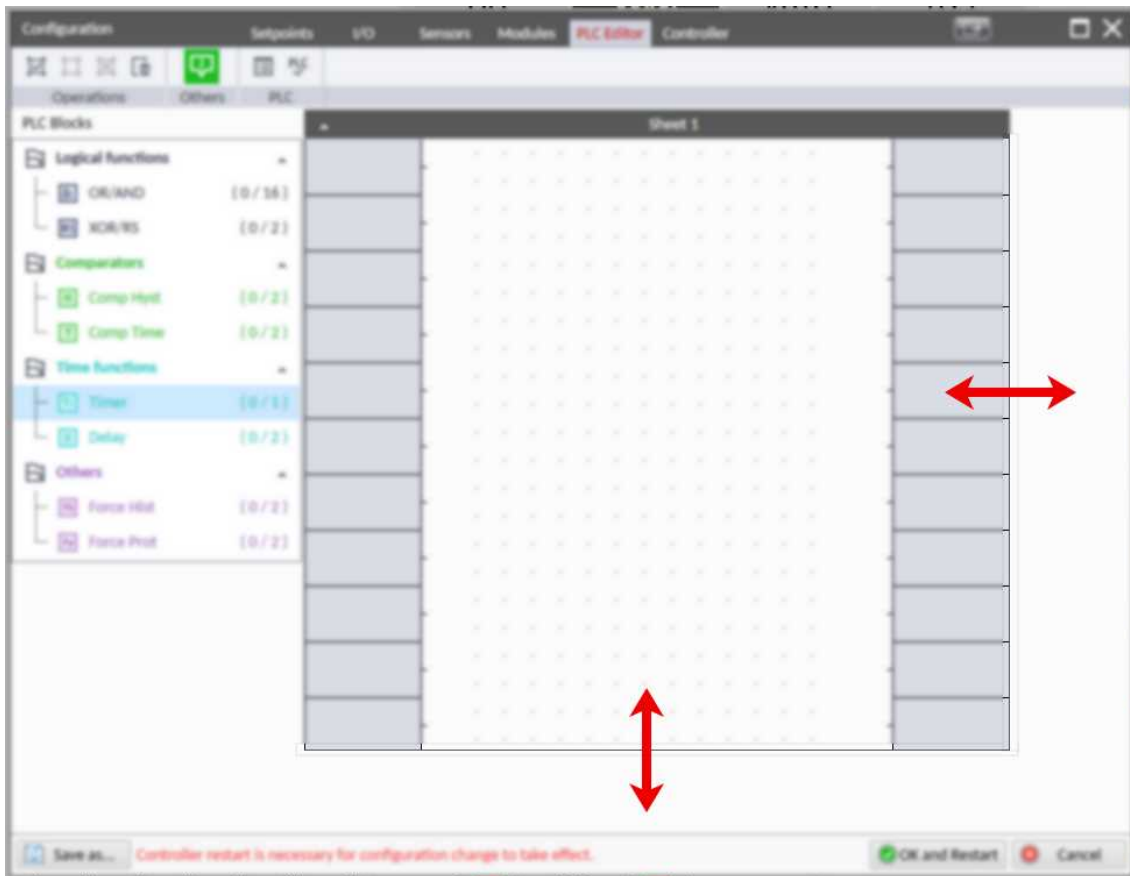


Image 5.29 Adjusting PLC sheet

## Adding PLC blocks

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

- ▶ Select required block from the list of available PLC blocks at the left and drag it into the sheet.
- ▶ Double-click on the block and adjust properties of the block. See **List of PLC blocks (page 516)** for more information about blocks.
- ▶ Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs (page 125)** for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

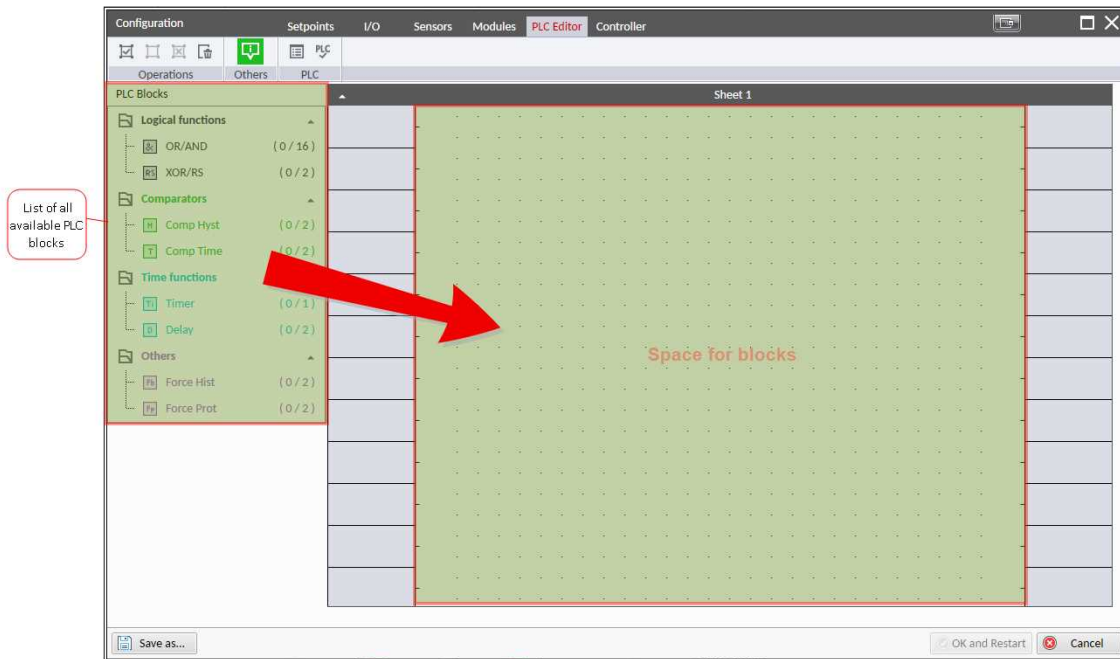


Image 5.30 Adding PLC blocks

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

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

### Define inputs and outputs

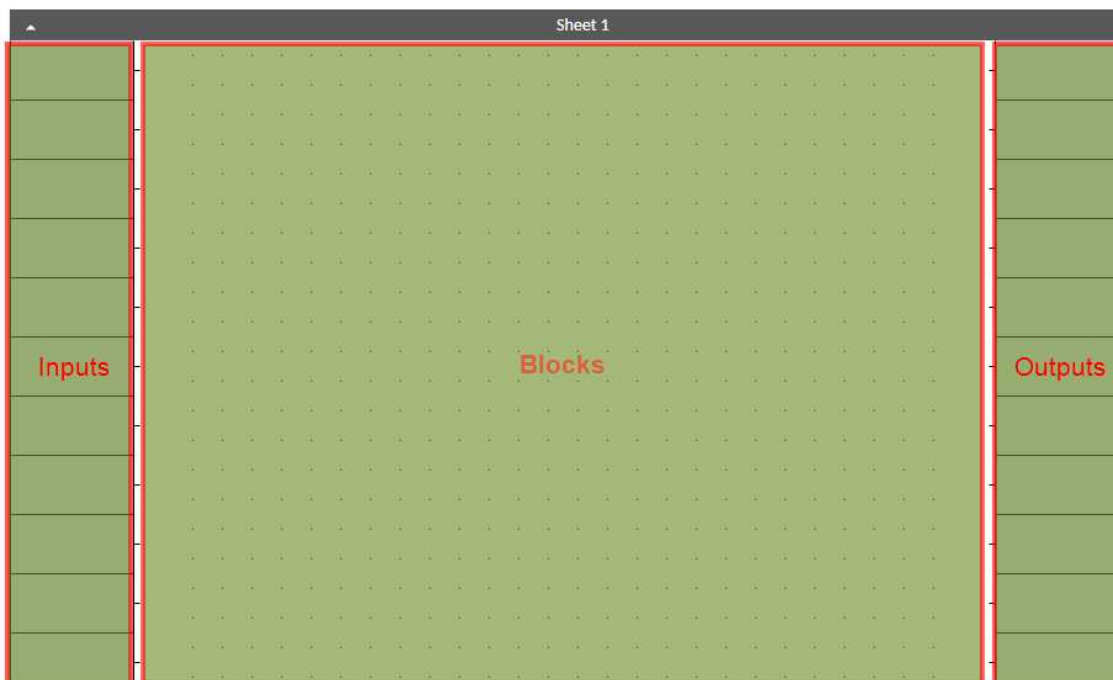


Image 5.31 Blank sheet of PLC editor

### Inputs

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

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

PLC Setpoint name:	Dimension:	Resolution:	Low limit:	High limit:	Apply
<input type="text"/>	<input type="text"/>	1	0	0	

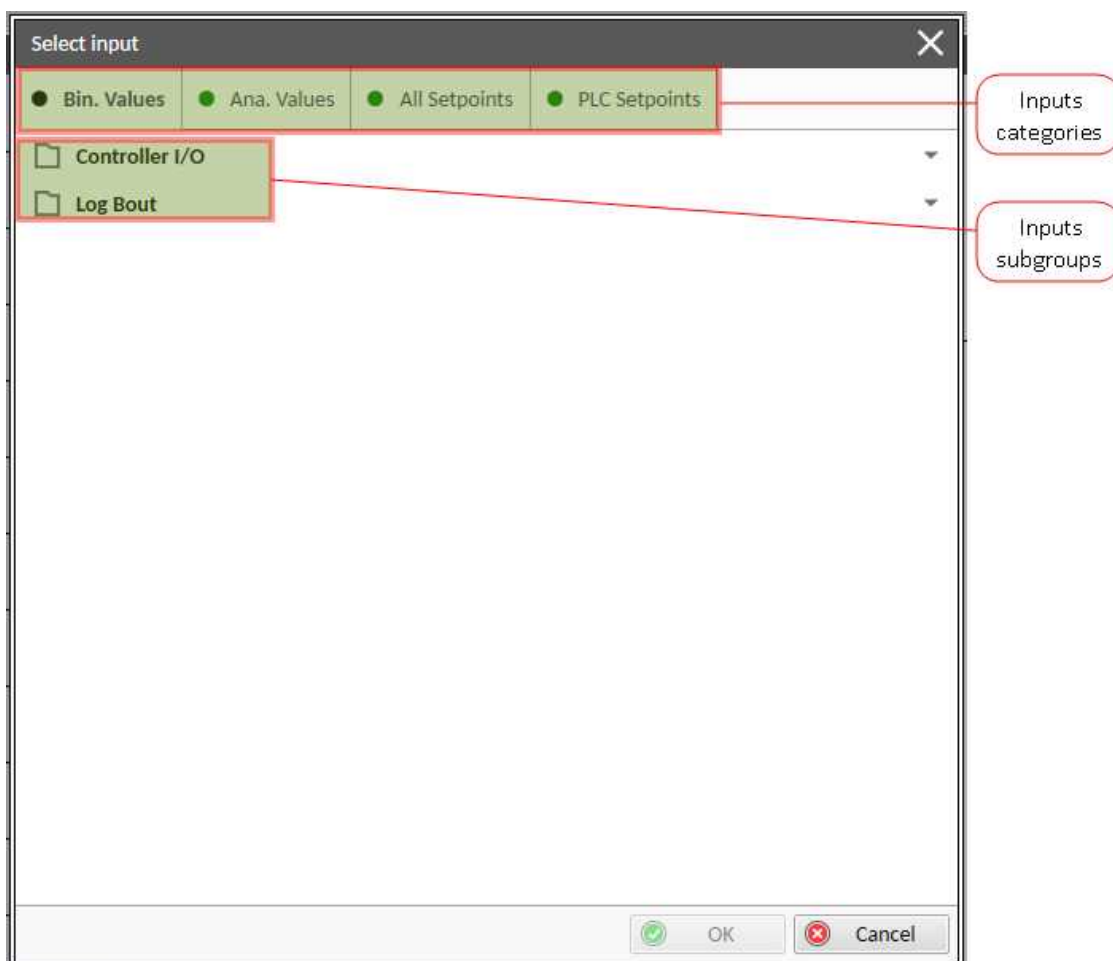


Image 5.32 PLC inputs

## Outputs

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

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

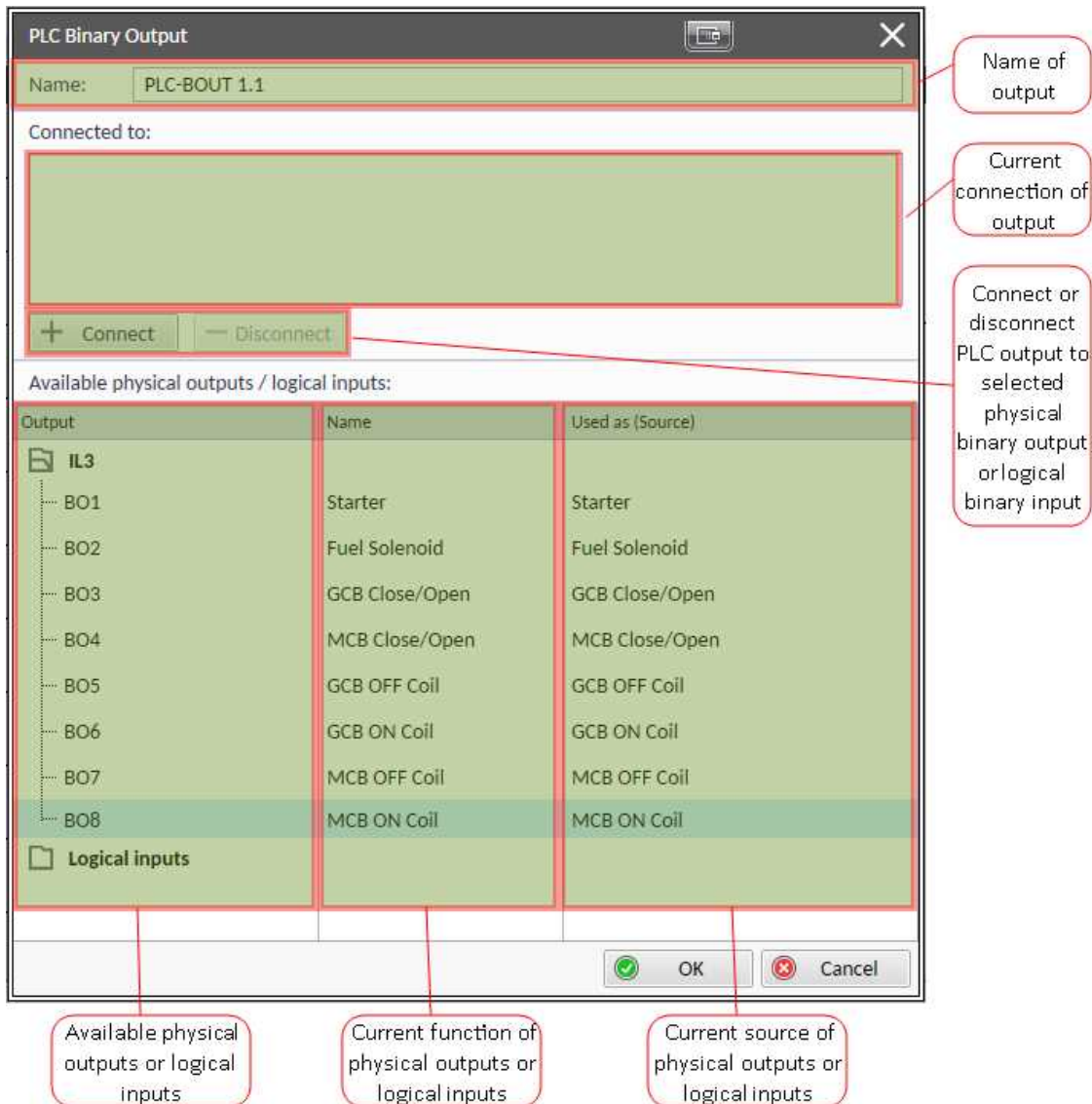


Image 5.33 PLC outputs

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

## Creating wires

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

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

Follow the procedure below to create wire.

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

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

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

## PLC logic execution rules

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

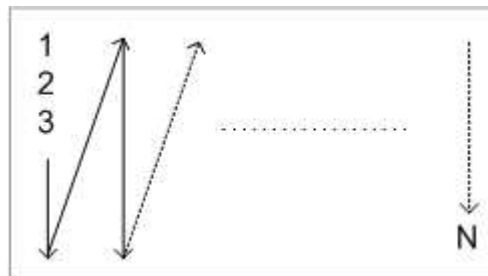
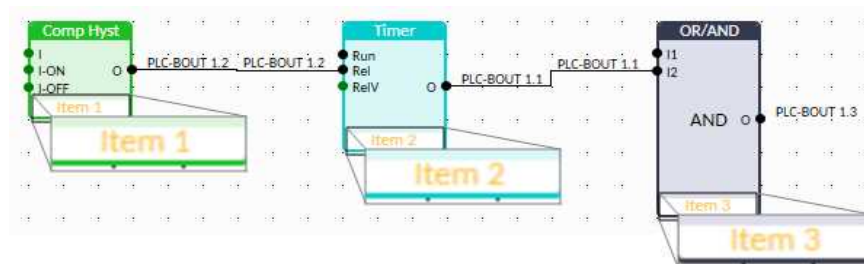
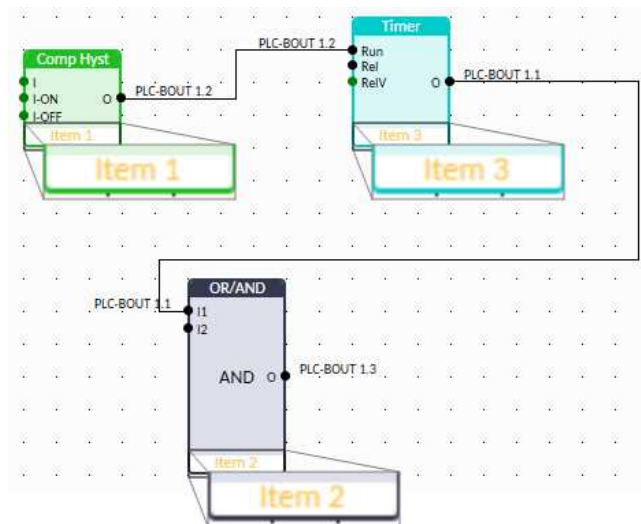


Image 5.34 PLC execution logic

**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 IntelliConfig page to see you PLC. Active inputs and outputs have blue color. Also wires with active signals have blue color.

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

## 5.5.20 Tier 4 Final

Tier 4 Final support generally provides monitoring and control of after-treatment system installed on generators engine. The requirements are defined as:

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

## Providing Aftertreatment status information

### After-Treatment screen

This screen is shown with configured ECU which supports Tier 4 Final. After-Treatment screen is automatically shown, once any of selected lamps gets active or change status. Deactivating of the lamp will not trigger showing the screen. The screen is then shown until operator switch it to another one. Alarmlist screen has lower

priority so even new alarm appears, After-treatment screen is still displayed. To avoid displaying blank screen, inactive lamps are represented by "dotted" icons. For no active lamp the screen shows all dotted icons. Please see examples below:

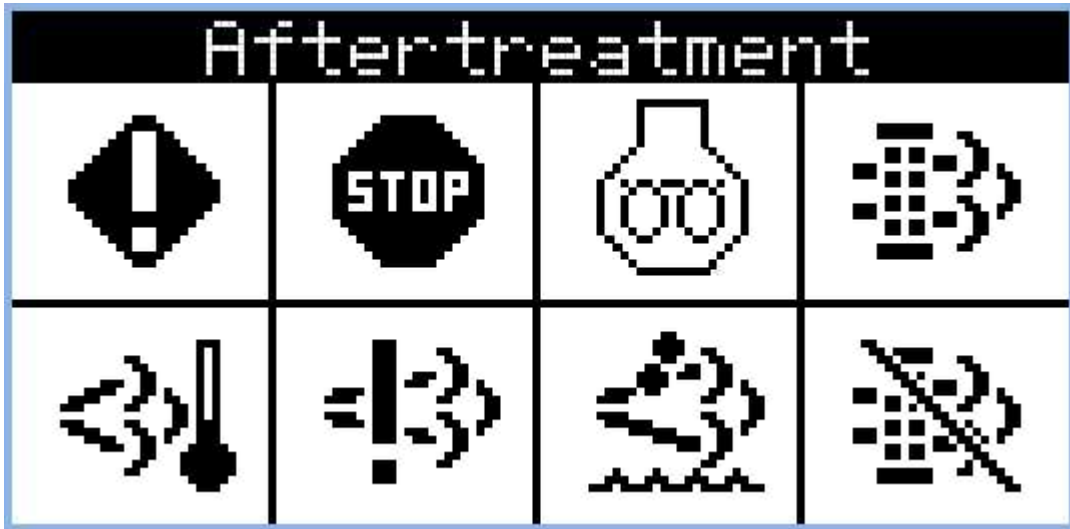


Image 5.35 Example of active Tier 4 Final screen

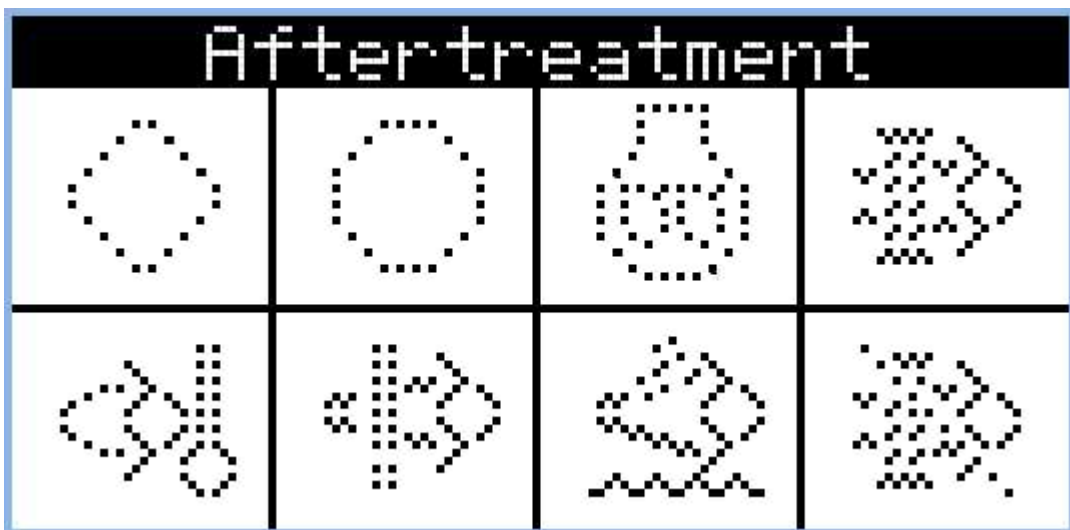


Image 5.36 Example of inactive Tier 4 Final screen

















### Universal lamps (icons)

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

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

**Note:** Lamp icon blinking is defined as displaying active lamp icon and inverse colored active lamp icon in required frequency.



Lamp name	Active icon	Inactive icon	Notes
Amber warning lamp			<b>Note:</b> This value can light or blink on both frequencies.
Red stop lamp			<b>Note:</b> This value can light or blink on both frequencies.
Engine wait to start lamp			
DPF/SCR lamp command			<b>Note:</b> DPF = Diesel Particulate Filter; SCR = Selective Catalytic Reduction. This lamp also activates alarm <b>After-Treatment</b> (page 536).
Exhaust system high temperature lamp command			<b>Note:</b> This lamp also activates alarm <b>After-Treatment</b> (page 536).
Malfunction indicator lamp			<b>Note:</b> This value can light or blink on both frequencies. This lamp also activates alarm <b>After-Treatment</b> (page 536).
Fluid tank low level indicator			<b>Note:</b> This lamp also activates alarm <b>After-Treatment</b> (page 536).
DPF regeneration inhibited			<b>Note:</b> Indicates the state of diesel particulate filter active regeneration inhibition. This lamp also activates alarm <b>After-Treatment</b> (page 536).

## Analog values

Supported analog values:

- ▶ DPFashLoad (page 367)
- ▶ DPFSootLoad (page 367)
- ▶ DEF Level (page 367)

## Control of After-Treatment regeneration function

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

- ▶ FORCE REGENERATION (PAGE 433)
- ▶ REGENERATION INHIB (PAGE 440)

### 5.5.21 Alternate configuration

In controller are 3 sets of configuration.

Configuration set 1	Configuration set 2	Configuration set 3
Nominal Power Split Phase 1 (page 272)	Nominal Power Split Phase 2 (page 276)	Nominal Power Split Phase 3 (page 280)
Nominal Power 1 (page 272)	Nominal Power 2 (page 276)	Nominal Power 3 (page 280)
Nominal RPM 1 (page 271)	Nominal RPM 2 (page 275)	Nominal RPM 3 (page 279)
Nominal Frequency 1 (page 270)	Nominal Frequency 2 (page 274)	Nominal Frequency 3 (page 278)
Nominal Voltage Ph-N 1 (page 271)	Nominal Voltage Ph-N 2 (page 275)	Nominal Voltage Ph-N 3 (page 279)
Nominal Voltage Ph-Ph 1 (page 271)	Nominal Voltage Ph-Ph 2 (page 275)	Nominal Voltage Ph-Ph 3 (page 279)
Nominal Current 1 (page 270)	Nominal Current 2 (page 274)	Nominal Current 3 (page 278)
Connection Type 1 (page 268)	Connection type 2 (page 272)	Connection type 3 (page 276)
ECU Speed Adjustment 1 (page 281)	ECU Speed Adjustment 2 (page 281)	ECU Speed Adjustment 3 (page 282)

Configuration sets can be changed via logical binary inputs **ALTERNATE CONFIG 2 (PAGE 404)** and **ALTERNATE CONFIG 3 (PAGE 404)**. Configuration set 1 is active when there is no input activated. In case that inputs **ALTERNATE CONFIG 2 (PAGE 404)** and **ALTERNATE CONFIG 3 (PAGE 404)** are active at the same time, the configuration set 3 is taken into account.

ALTERNATE CONFIG 2 (PAGE 404)	ALTERNATE CONFIG 3 (PAGE 404)	Active configuration set
0	0	1
1	0	2
0	1	3
1	1	3

**IMPORTANT: If LBO ECU POWER RELAY (PAGE 462) is used, change of alternate configuration can be made only in prestart phase. So prestart has to be set up for enough long time.**

## 5.5.22 ECU Frequency selection

Setpoint *ECU Freq Select* is no longer in use. However **ECU Frequency Select** (page 370) value was kept and the value can be calculated from **Nominal Frequency** (page 178) setpoint. Sequence for frequency change is executed automatically (engine must be in still condition and ECU is powered on – ECU Power Relay is not configured) in following steps:

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

This sequence does not control LBO **ECU POWER RELAY** (PAGE 462) anyhow.

**Note:** *If LBO ECU POWER RELAY (PAGE 462) is used, this change can be made only in prestart phase. So prestart has to be set up for enough long time.*

## 5.5.23 Cybernetic security

The cybernetic security is formed by:

- ▶ Hardening the storage of a credentials
- ▶ Protection against a brute-force attack to the password
- ▶ Secure method to reset the password
- ▶ A new technology of encryption of the remote communication
- ▶ Web interface can be disabled

**IMPORTANT:** Due to this, we do not recommend performing a rollback from FW 1.8.0 to FW version 1.7.2 or older.

### Hardening the storage of a credentials

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

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

## Protection against the brute force attack

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

- ▶ If the invalid password is entered 5 times, the controller gets blocked for entering password for a while.
- ▶ Each further entering of the invalid password cause the consequent blocking time is increased.
- ▶ If the invalid password is entered repeatedly the controller gets blocked for entering the password permanently and the password must be reset to a default value as described below.

**Note:** Blocking of the controller for entering the password have no influence to controller/genset operation

**Note:** Permanent blocking cannot occur accidentally, just by user mistake. It can be practically triggered only by a focused activity.

## Resetting the administrator password

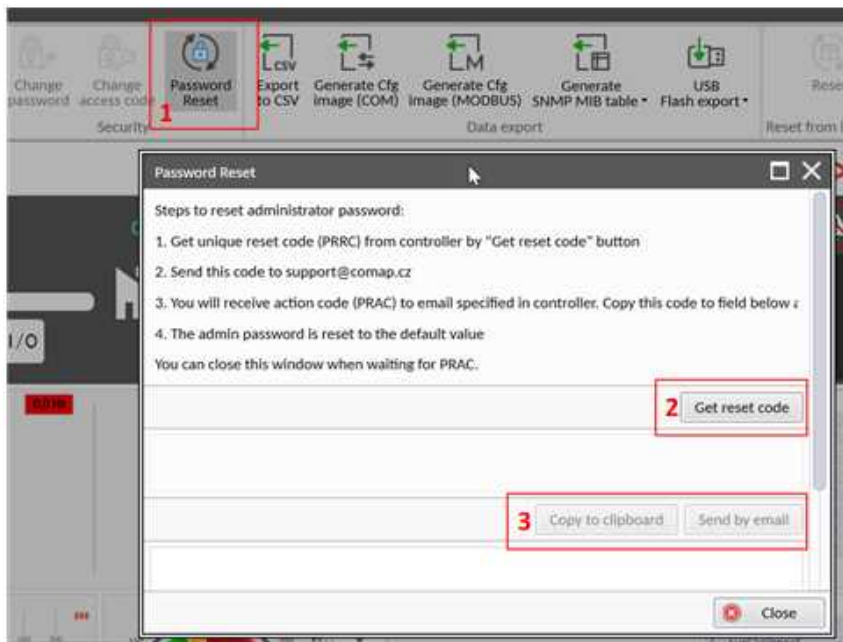
If the administrator password is lost or controller is permanently locked due to brute-force attack protection, proceed according to a procedure described below:

**IMPORTANT:** There is a backup e-mail address defined in the controller to which and only which ComAp will send the “password reset action code”. Please be sure, that you have adjusted this e-mail address correctly. Use IntelliConfig to adjust the backup e-mail address



## Reset password procedure

1. Connect IntelliConfig. You may connect remotely if you know Access Code.
2. Get the password reset request code and send it via e-mail to support@comap-control.com



- Once you receive the reply from ComAp, copy the code from the e-mail (all characters inside the box as indicated below)



Dear customer,

ComAp has received your request for resetting the password in the controller IG500, serial number FF110336. Please perform following steps to finish the action.

- 1) Connect your PC application to the controller
- 2) Copy the action code stated below to the clipboard
- 3) Paste the clipboard content into the appropriate field in the PC application and press the "Reset" button. Password will be reset to the default value.
- 4) Adjust and remember new password

Code:

```
ADgjZi2EcREqKq7Dyw/K0eyEURVny3veXPVcsMuKZpw8hcImRqxyso7/LGec9y
QVthRMC53dZ2SLPHqa50qVdpjuNuzLImdK5iDA5J13VIH20rW8eInUxj3+qWPa
pADf7nPC9B+t40IXChFPns6Rd4ey1VeAbj+7aca9iyhGUK8cN5V0eFN7+byWND
c7nO+KPop1eoQCgRdMh8AiH60ut7ME2u+qU3FOMG165tmqFGXESCu3cQ+FcsF3
Sxs43QAnYw3sSRPZa57JStdEB3Nk13oonXh7Bv/gfwsUEjvII3s2WsbjQZ4x/a
XBQF+kp159usnz0oXaY+N8RTHd1ynEbyQ=
```

Please note following points:

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

Sincerely

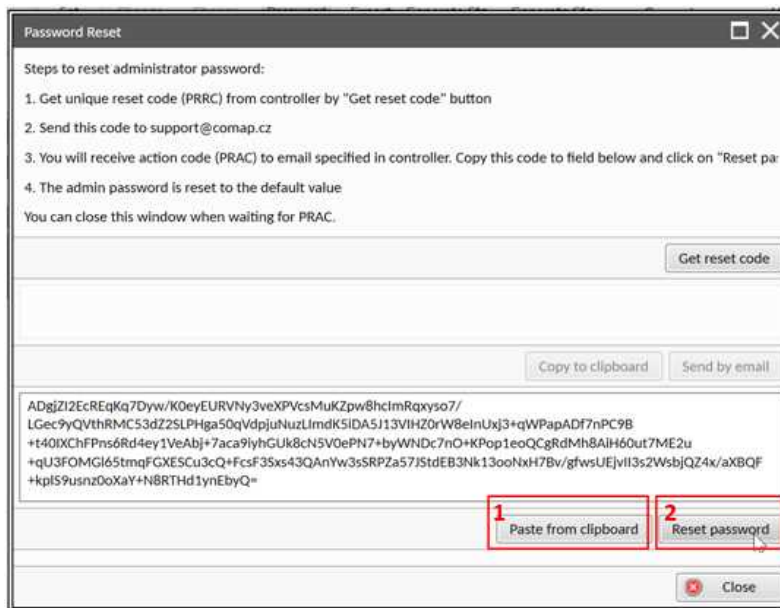
ComAp technical support

If you know the controller mentioned above but have not submitted any request for password reset please contact ComAp technical support [support@comap.cz](mailto:support@comap.cz).

If you do not recognize this activity at all you may ignore this e-mail.

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

4. Paste the code into the password reset window



## Encryption of the communication

New technology "CCS v.1" is used for an authentication and an encryption of the ComAp protocol via Internet/ethernet/AirGate. This technology is based on strong and proven cryptographic algorithms and has passed successfully penetration tests and cybersecurity audit.

## Web interface can be disabled

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

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



# 6 Communication

6.1 PC ..... 138  
 6.2 Connection to 3rd party systems ..... 151

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## 6.1 PC

6.1.1 Direct communication ..... 138  
 6.1.2 Remote communication ..... 140

### 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 56**.

RS232 interface uses **COM1 Mode (page 282)** 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.

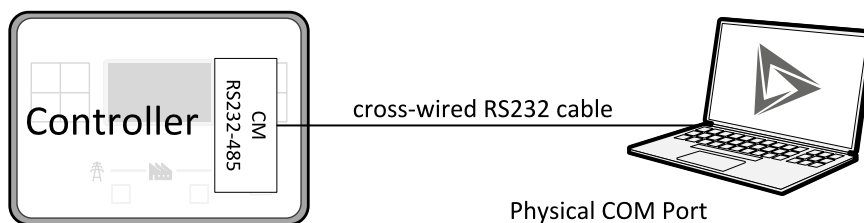


Image 6.1 Cross-wired RS232 cable is used

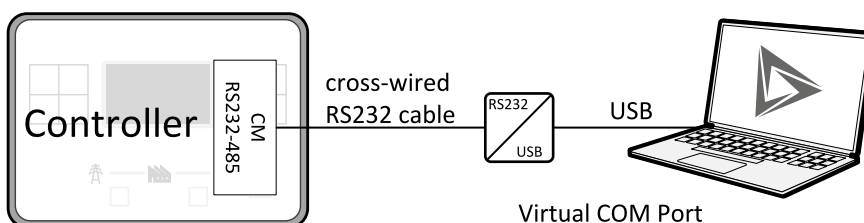


Image 6.2 Cross-wired RS232 cable and USB is used

#### Connection via RS485

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



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 56**.

RS485 interface uses **COM2 Mode (page 284)** port of the controller.

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

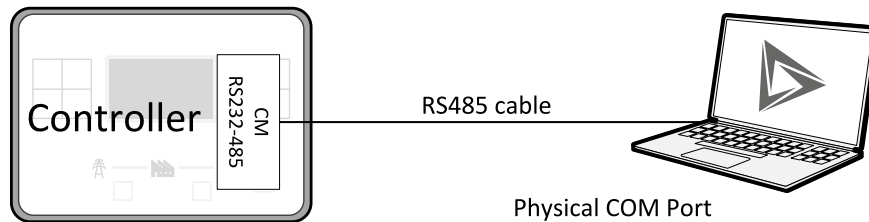


Image 6.3 Plug-in module CM RS232-485 is used

## Connection via Ethernet

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

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 56**.

This connection type is used for communication with the controller from IntelliConfig or any other PC tool. . Only three remote clients can be connected at the same time.

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

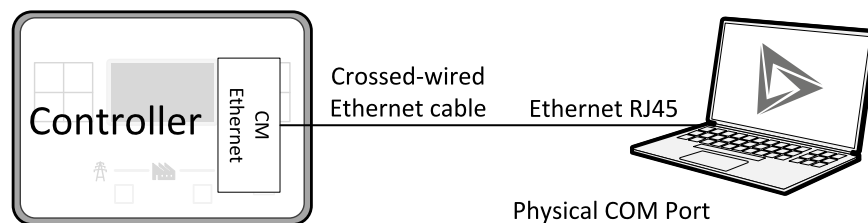


Image 6.4 Ethernet cable is used

## Connection via USB

USB interface uses HID profile.

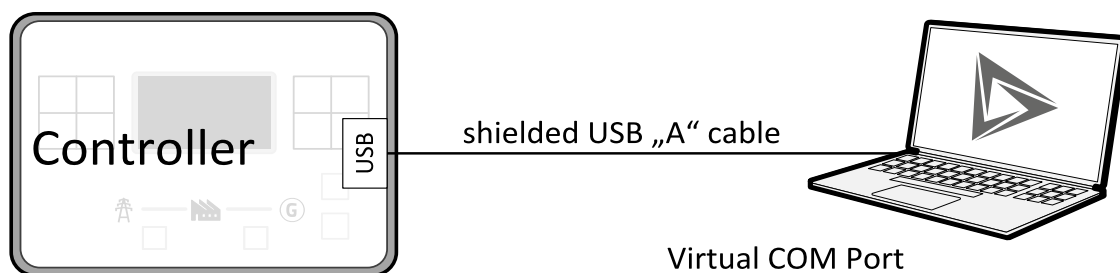


Image 6.5 Shielded USB type A cable is used

 **back to Communication**

## 6.1.2 Remote communication

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

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

### Ethernet LAN connection

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

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

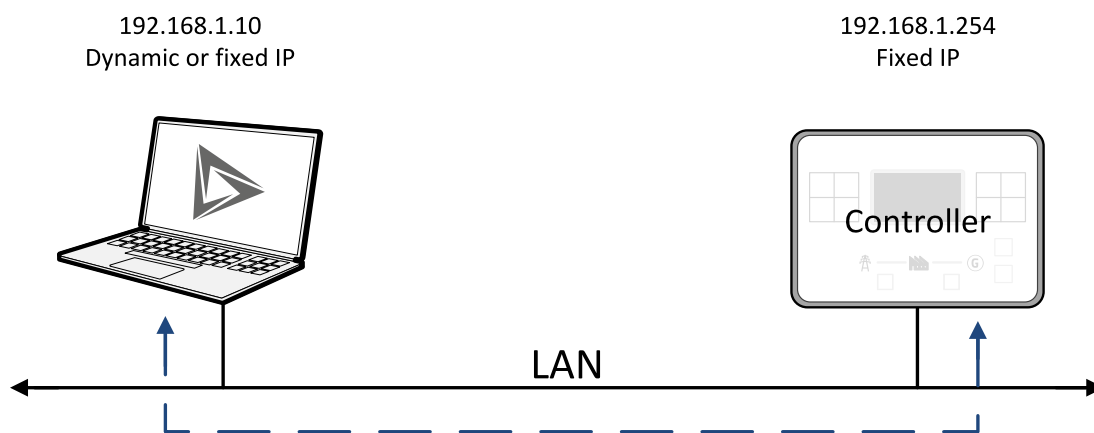


Image 6.6 Ethernet LAN connection

### Setting-up static IP address

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

First way is to switch the CM-Ethernet to manual IP address mode. Adjust the setpoint **IP Address Mode** (page 296) to FIXED. In that case all setpoints of IP settings (**IP Address** (page 296), **Subnet Mask** (page 297), **Gateway IP** (page 297), **DNS IP Address 1** (page 298)) have to be adjusted manually. If this method is used several basic rules should be kept to avoid conflicts with the remaining network infrastructure:

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

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

Next way is to switch the CM-Ethernet to automatic IP address mode. Adjust the setpoint **IP Address Mode** (page 296) to AUTOMATIC. In that case all IP settings are assigned by DHCP server. Then configure the

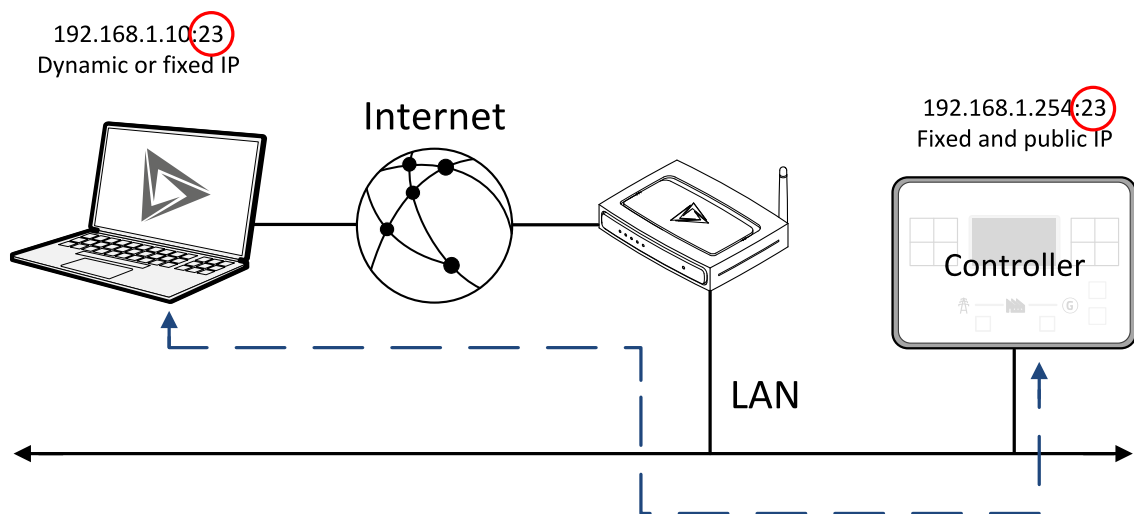
DHCP server to assign always the same IP address (i.e. static IP address) to the particular CM-Ethernet according to its MAC address.

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



## SMS

### Event SMS

The IntelliLite controller equipped with the CM-GPRS or CM-4G-GPS communication module is able to send Event SMS according to the setting of setpoint:

- ▶ **Event Message (page 293)**

**Note:** Firstly setpoint Telephone Number 1 (page 291) has to be adjusted.

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:

- ▶ Genset Name (hh:mm:ss dd.mm.yyyy)
- ▶ hh:mm:ss Mains Fail
- ▶ hh:mm:ss AMF Start
- ▶ hh:mm:ss Load on Genset
- ▶ hh:mm:ss Mains Returned
- ▶ hh:mm:ss Load on Mains
- ▶ hh:mm:ss AMF Stop

### Alarm SMS

The IntelliLite controller equipped with the CM-GPRS or CM-4G-GPS communication module is able to send Alarm SMS according to the setting of setpoints:

- ▶ **Wrn Message (page 293)**
- ▶ **Sd Messages (page 294)**
- ▶ **BOC Message (page 293)**

**Note:** Firstly setpoint Telephone Number 1 (page 291) has to be adjusted.

Message structure:

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

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

### SMS commands

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

# xxxx, yyyy, zzzz, etc.

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

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

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

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

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

**Example:** When the controller, in AUTO mode, with a controller name of “InteliLite-Test”, with the CM-GPRS module and access code “0” receives the SMS:

0 man, start, gcb close, gcb open, stop, auto

Controller mode will be changed to MANUAL mode. The engine will be started and GCB will close. Then GCB will open, the engine will stop and it will go into AUTO mode again.

The controller will send back the SMS (controller will respond to SMS after every command has been finished, not sooner.):

#InteliLite-Test: <OK>, <OK>, <OK>, <OK>, <OK>, <OK>

The value <OK> or <ERROR> means if the command has been performed successfully or not.

## Emails

### Event Email

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

► **Event Message (page 293)**

**Note:** Firstly setpoints *Email Address 1 (page 291)* and *SMTP Sender Address (page 295)* (for CM-Ethernet) have to be adjusted.

**Note:** #*Summer Time Mode (page 260)* and *Time Zone (page 292)* have to be adjusted for correct time in emails.

Message structure:

Controller

---

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

---

Alarm 1

Alarm 2

Alarm 3

Events

---

hh:mm:ss Event 1

hh:mm:ss Event 2

hh:mm:ss Event 3

## Alarm Email

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

- ▶ **Wrn Message (page 293)**
- ▶ **Sd Messages (page 294)**
- ▶ **BOC Message (page 293)**

**Note:** Firstly setpoints *Email Address 1 (page 291)* and *SMTP Sender Address (page 295)* (for CM-Ethernet) have to be adjusted.

**Note:** *#Summer Time Mode (page 260)* and *Time Zone (page 292)* have to be adjusted for correct time in emails.

Message structure:

Controller

---

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

---

Alarm 1

Alarm 2

Alarm 3

History events

---

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

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

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

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

## Web Server

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

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

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

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

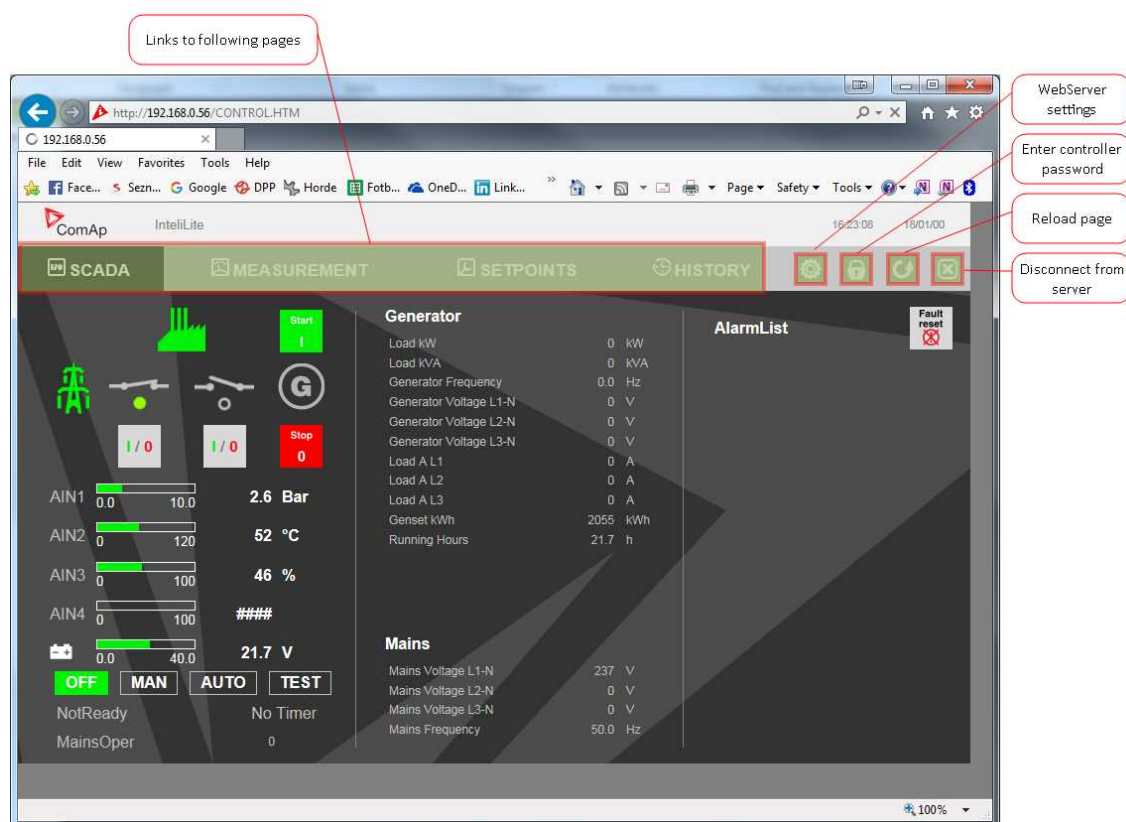


Image 6.7 Web Server main screen



## Scada

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

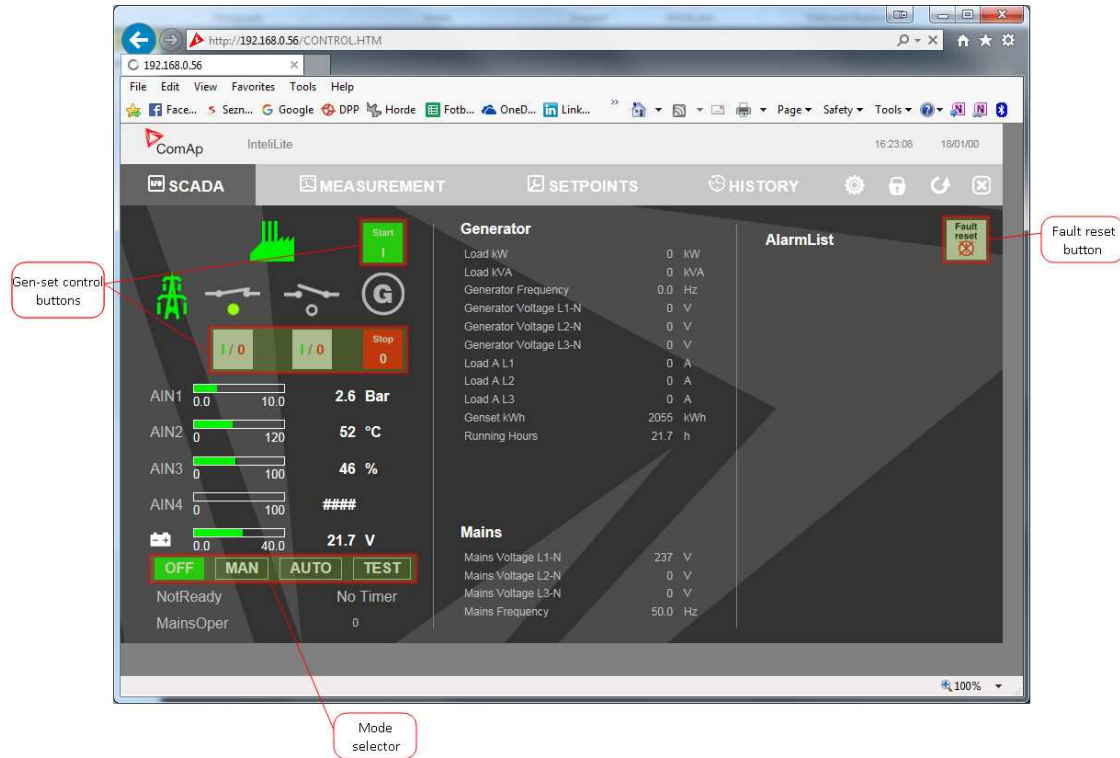


Image 6.8 Web Server - Scada screen

## Measurement

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

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

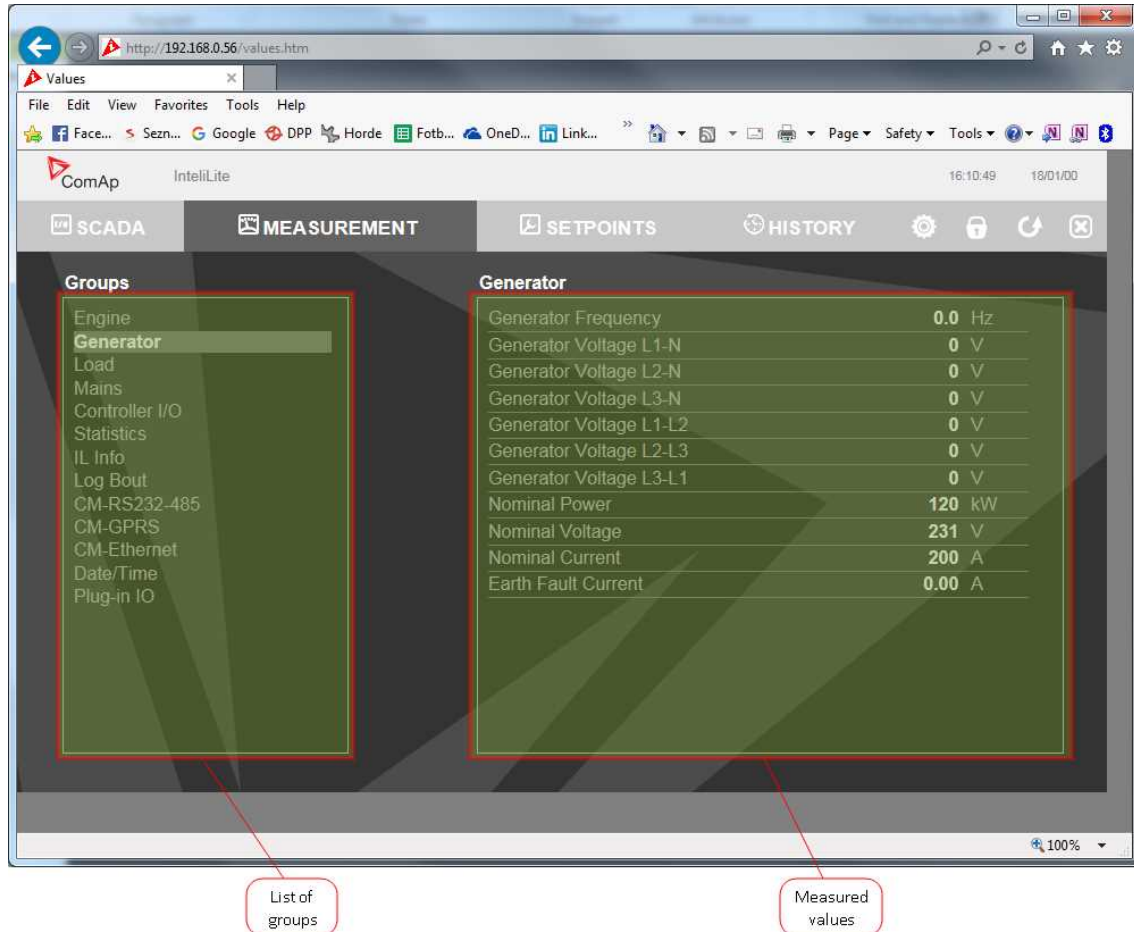


Image 6.9 Web Server - measurement screen

## Setpoints

Click to the SETPOINTS link in the toolbar to display the setpoints page.

Click to the required group name in the left box to display setpoints of the group in the right box.

Click to the required setpoint name or value to change the value. If the respective setpoint is protected by password, which is indicated by a lock icon by the setpoint name, you have to click on the "Controller password" icon located in the toolbar and then enter valid password.

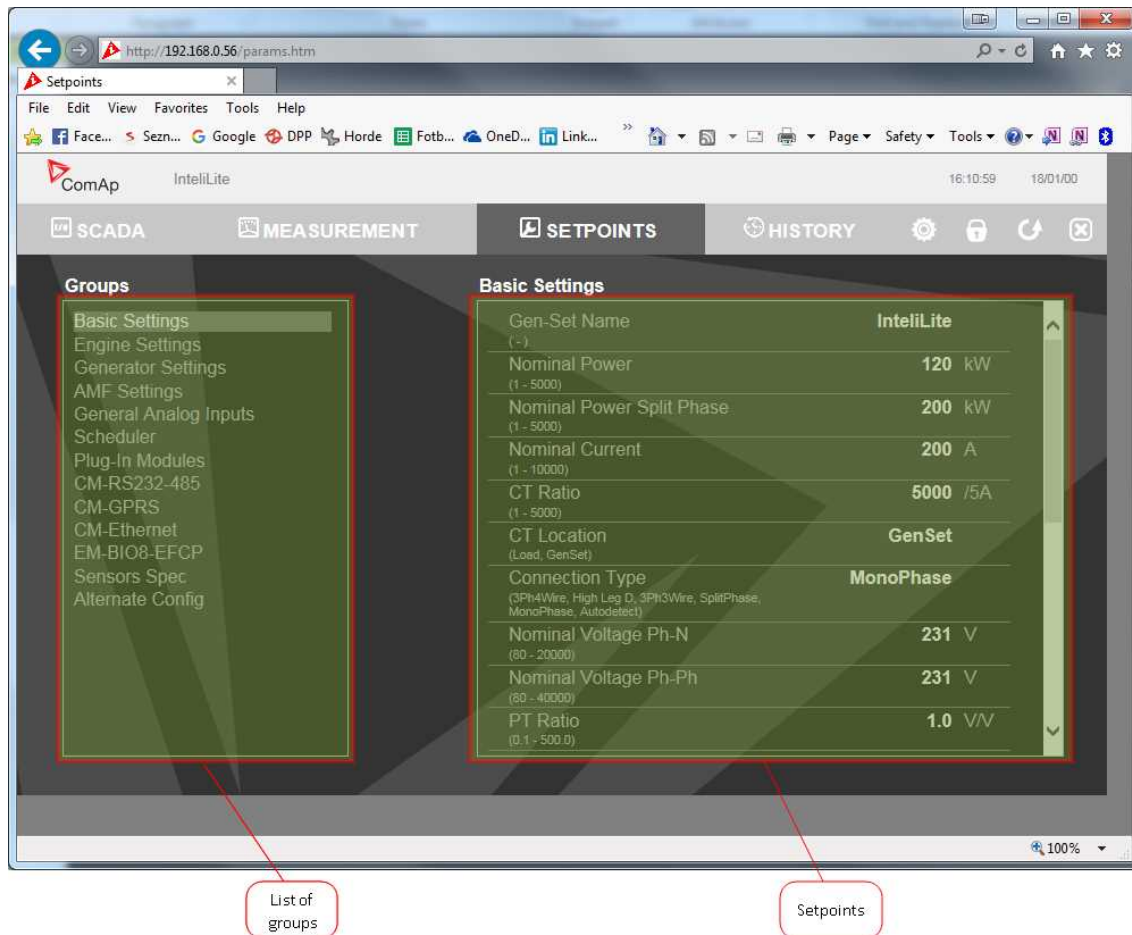


Image 6.10 Web Server - Setpoints screen

## History

Click to the HISTORY link in the toolbar to display the history page.

Use the control buttons to move within the history file.

**Note:** The history page is automatically refreshed every 60 seconds. If a new record appears in the controller, the web page will not show it immediately as e.g. IntelliConfig.

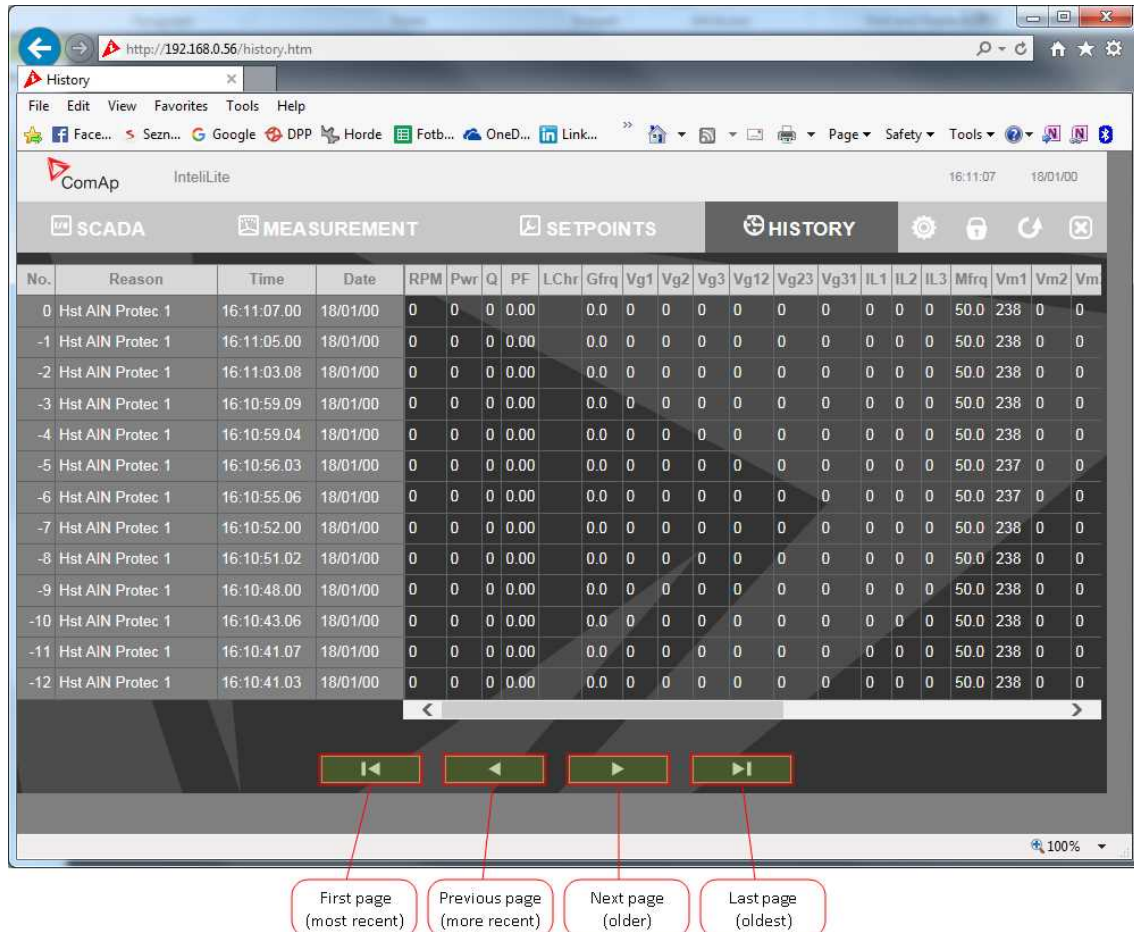


Image 6.11 Web Server - History screen

## Web Server Adjustment

Click to the "Web Server settings" icon in the toolbar to display the settings page.

Select the controller language the web pages will appear in.

Select the rate of automatic refresh of the scada page.

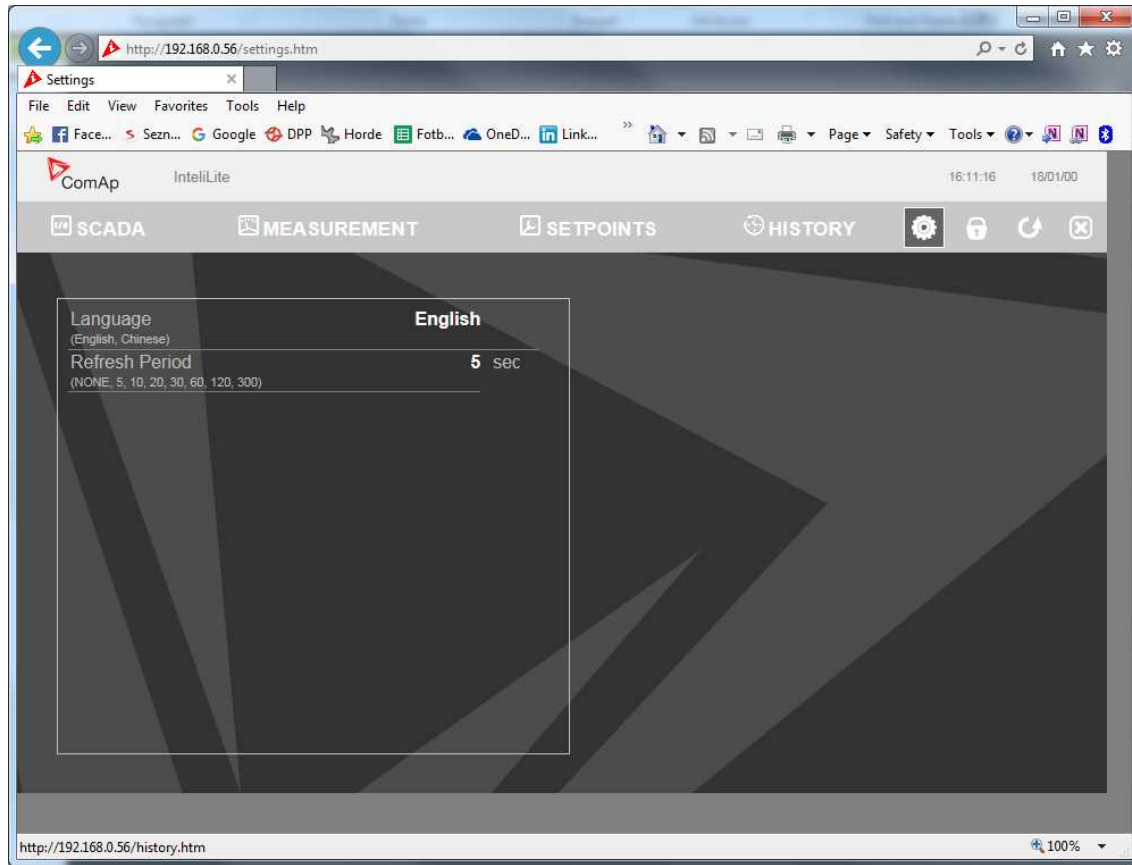


Image 6.12 Web Server - Adjustment screen

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## 6.2 Connection to 3rd party systems

6.2.1 MODBUS-RTU, MODBUS/TCP ..... 151

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### 6.2.1 MODBUS-RTU, MODBUS/TCP

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

- ▶ MODBUS-RTU can be used on serial interfaces (CM-RS232-485 module is required). The MODBUS-RTU server must be activated by switching the setpoint **COM1 Mode (page 282)** or **COM2 Mode (page 284)** into the Modbus position. The serial speed for MODBUS-RTU communication is to be adjusted by the setpoint **COM1 MODBUS Communication Speed (page 283)** or **COM2 MODBUS Communication Speed (page 285)**.

- ▶ MODBUS/TCP can be used on the ethernet interface (CM-Ethernet module is required). Up to 2 clients can be connected simultaneously. The MODBUS/TCP server must be activated by the setpoint **MODBUS Server** (page 299).

MODBUS, MODBUS/TCP protocol can be used simultaneously with Web connection and direct ethernet connection.

**IMPORTANT: Do not write setpoint repeatedly (e.g. power control from a PLC repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory, which can be overwritten up to 10<sup>5</sup> times without risk of damage or data loss, but may become damaged, when the allowed number of writing cycles is exceeded!**

*Note: Modbus-RTU serial communication mode is 8-N-1 - startbit 1, 8 data bits, no parity and 1 stopbit.*

## Address space

The object address space is separated into several areas as described in the table below. The actual mapping of specific controller data objects to specific MODBUS addresses, which depends on configuration, can be exported into a text file from the appropriate controller archive using IntelliConfig. There are several special registers with fixed meaning (reserved registers) which are listed in a separate table in this chapter.

MODBUS address	Meaning	Access	MODICON object type	MODBUS function
0000 .. 0999	Binary objects	Read only	Discrete Inputs	Read: 01, 02
1000 .. 2999	Values	Read only	Input Registers	Read: 03, 04
3000 .. 3999	Setpoints	Read/Write	Holding Registers	Read: 03, 04 Write: 06, 16
4200 .. 7167	Reserved registers	Read/Write, depends on each specific register	Input Registers Holding Registers	Read: 03, 04 Write: 06, 16

## Mapping data types to registers

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

Data type	Meaning	Number of registers	Data mapping
Integer8	1-byte signed integer	1	MSB = sign extension LSB = value
Unsigned8	1-byte unsigned integer	1	MSB = 0 LSB = value
Integer16	2-byte signed integer	1	MSB = value, MSB LSB = value, LSB
Unsigned16	2-byte unsigned integer	1	MSB = value, MSB LSB = value, LSB
Integer32	4-byte signed integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2

Data type	Meaning	Number of registers	Data mapping
			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 mapping
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 ...

\*) 1 .. level 1 (yellow), 2 .. level 2 (red), 3 .. sensor fail

\*\*) Bit0 – alarm is active, Bit1 – alarm is confirmed

\*\*\*) String encoding is UTF-8

## Error codes (exception codes)

Exception code is returned by the controller (server) if the query sent from the client could not be completed 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 a object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- ▶ 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be consequently obtained by reading the registers 4205 – 4206.

## Reserved registers

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



Register addresses	Number of registers	Access	Data type	Meaning
4200 - 4201	2	read/write	Time	RTC Time in BCD code
4202 - 4203	2	read/write	Date	RTC Date in BCD code
4204	1	read/write	Unsigned8	Index of the language that is used for text data provided by MODBUS (e.g. alarmlist messages).
4205 - 4206	2	read	Unsigned32	Last application error. To be read after the device returns the exception code 04. It contains specific information about the error.
4207 - 4208	2	read/write	Unsigned32	Writing: command argument 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:

- (Optional) Write required level of password into the register 44212 (register address 4211). Use function 6. If the password is required or not depends on configuration of access rules. It can be adjusted/modified by IntelliConfig.

2. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
3. Write the command code into the register 44210 (register address 4209). Use function 6.
4. (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
5. If the command was executed the return value is as listed in the table. If the command was accepted but there was an error during execution the return value indicates the reason:
  - a. 0x00000001 – invalid argument
  - b. 0x00000002 – command refused (e.g. controller not in MAN, breaker can not be closed in the specific situation etc.)

Action	Command code	Argument	Return value
Engine start *)	0x01	0x01FE0000	0x000001FF
Engine stop *)	0x01	0x02FD0000	0x000002FE
Fault reset *)	0x01	0x08F70000	0x000008F8
Horn reset *)	0x01	0x04FB0000	0x000004FC
GCB toggle *)	0x02	0x11EE0000	0x000011EF
GCB on	0x02	0x11EF0000	0x000011F0
GCB off	0x02	0x11F00000	0x000011F1
MCB toggle *)	0x02	0x12ED0000	0x000012EE
MCB on	0x02	0x12EE0000	0x000012EF
MCB off	0x02	0x12EF0000	0x000012F0

\*) This action is an equivalent of pressing the front panel button

## MODBUS examples

### Modbus RTU examples

- ▶ Reading of Battery voltage
  - Export table of values from IntelliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
<b>01053</b>	8213	<b>BatteryVoltage</b>	<b>V</b>	Integer	2	<b>1</b>	0	400	Controller I/O

Request: (Numbers in Hex)									
01	03	04	1D	00	01	15	3C		
Controller address	Modbus function	Register address 041D <sub>hex</sub> = <b>1053</b> <sub>dec</sub>		Number of registers			CRC		

Response: (Numbers in Hex)									
01	03	02	00	F0	B8	00			
Controller address	Modbus function	Length of data 02 <sub>hex</sub> = 2 bytes read		Data 00F0 <sub>hex</sub> = <b>240</b> <sub>dec</sub>			CRC		

We read value 240 from register 01053. From table of modbus registers we get dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So battery voltage is **24.0 V**.

- ▶ Reading Nominal power
  - Export table of values from IntelliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
<b>01228</b>	9018	<b>Nominal Power</b>	<b>kW</b>	Integer	2	<b>0</b>	0	32767	Generator

Request: (Numbers in Hex)									
01	03	04	CC	00	01	45	05		
Controller address	Modbus function	Register address 04CC <sub>hex</sub> = <b>1228</b> <sub>dec</sub>		Number of registers			CRC		

Response: (Numbers in Hex)									
01	03	02	00	C8	B9	D2			
Controller address	Modbus function	Length of data 02 <sub>hex</sub> = 2 bytes read		Data 00C8 <sub>hex</sub> = <b>200</b> <sub>dec</sub>			CRC		

Read nominal power is 200 kW.

► Reading all binary inputs as modbus register

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
<b>01068</b>	8235	<b>Binary Inputs</b>		Binary#2	2	<b>0</b>	-	-	Controller I/O

Request: (Numbers in Hex)							
01	03	04	2C	00	01	44	F3
Controller address	Modbus function	Register address 042C <sub>hex</sub> = <b>1068</b> <sub>dec</sub>		Number of registers		CRC	

Response: (Numbers in Hex)							
01	03	02	00	12	38	49	
Controller address	Modbus function	Length of data 02 <sub>hex</sub> = 2 bytes read	Data 0012 <sub>hex</sub> = <b>00010010</b> <sub>bin</sub>		CRC		

Binary inputs is 00010010. It means Binary input 2 and binary input 5 are active.

**Note:** You can use modbus function 4 insted of 3, rest of data remain same (CRC differs).

► Reading binary inputs as coil status.

Table: Binaries						
Allowed MODBUS functions: 01, 02						
Addresses 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 <sub>hex</sub> = 0001 <sub>dec</sub>		Number of registers		CRC	

Response: (Numbers in Hex)						
01	01	01	01	90	48	
Controller address	Modbus function	Length of data 01 <sub>hex</sub> = 1 byte read		Data 01 <sub>hex</sub> = active		CRC

The readed data is 01, it means this binary input is active.

**Note:** You can use modbus function 2 insted of 1, rest of data remains same (CRC differs).

► Starting the engine

Before starting engine you may need to write password. Depends on your settings in controller.

Table Reserved registers (page 154)

Register addresses	Number of registers	Access	Data type	Meaning
4207 - 4208	2	read/write	Unsigned32	Writing: command argument Reading: command return value
4209	1	write	Unsigned16	Command code

Table List of commands and arguments (page 155)

Action	Command code	Argument	Return value
Engine start	0x01	0x01FE0000	0x000001FF
Engine stop	0x01	0x02FD0000	0x000002FE

Request 1/2: (Numbers in Hex)

01	10	10	6F	00	03	06
Controller address	Modbus function 10 <sub>hex</sub> = 16 <sub>dec</sub>	Register address 106F <sub>hex</sub> = 4207 <sub>dec</sub>	Number of registers		Data length in bytes	

Request 2/2: (Numbers in Hex)

01	FE	00	00	00	01	68	0B
Argument				Command code		CRC	

**Note:** Command and argument may be written as one "packet" (function 16) or you can split it and write argument (function 16) and after that write command code (function 6).

► Password

This password is the same as in IntelliConfig or directly in controller.

Table **Reserved registers (page 154)**

Register addresses	Number of registers	Access	Data type	Meaning
4211	1	write	Unsigned16	Password

**Note:** Default password is "0".

In this example the password is "1234".

Request: (Numbers in Hex)							
01	06	10	73	04	D2	7C	D1
Controller address	Modbus function	Register address 1073 <sub>hex</sub> = 4211 <sub>dec</sub>		Password 04D2 <sub>hex</sub> = 1234 <sub>dec</sub>		CRC	

Response for success: (Numbers in Hex)							
01	06	10	73	00	00	7C	D1
Controller address	Modbus function	Register address 1073 <sub>hex</sub> = 4211 <sub>dec</sub>		Allways zero.		CRC	

Response for bad password: (Numbers in Hex)							
01	86	04			43	A3	
Controller address	Modbus exception for function 6.	04 – device error <b>see Error codes (exception codes) on page 154</b>			CRC		

► Nominal Power – writing

Table: Setpoints									
Allowed MODBUS functions: 03, 04, 06, 16									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
<b>03008</b>	8276	<b>Nominal Power</b>	<b>kW</b>	Unsigned	2	<b>0</b>	1	5000	Basic Settings

Request: (Numbers in Hex)									
01	06	0B	C0	00	64	8A	39		
Controller address	Modbus function	Register address 0BC0 <sub>hex</sub> = 3008 <sub>dec</sub>		Data 0064 <sub>hex</sub> = 100 <sub>dec</sub>		CRC			

Response: (Numbers in Hex)									
01	06	0B	C0	00	00	8B	D2		
Controller address	Modbus function	Register address 0BC0 <sub>hex</sub> = 3008 <sub>dec</sub>		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<sub>hex</sub>



## Modbus TCP examples

### ▶ Reading of Battery voltage

- Export table of values from IntelliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
<b>01053</b>	8213	<b>BatteryVoltage</b>	<b>V</b>	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 <sub>hex</sub> = 1053 <sub>dec</sub>		Number of registers			

Request: (Numbers in Hex)											
00	00	00	00	00	06	01	03	04	1D	00	01
transaction identifier (usually 0)	protocol identifier (usually 0)	Length of data bytes following		Controller address	Modbus function	Register address 041D <sub>hex</sub> = 1053 <sub>dec</sub>		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 <sub>hex</sub> = 2 bytes read		Data 00F0 <sub>hex</sub> = 240 <sub>dec</sub>			

We read value 240 from register 01053. From table of modbus registers we get dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So battery voltage is **24.0 V**.

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# 7 Technical data

## Power supply

<b>Power supply range</b>	8-36 VDC
<b>Power consumption</b>	394 mA / 8 VDC 255 mA / 12 VDC 140 mA / 24 VDC 97 mA / 36 VDC
<b>Fusing</b>	Power terminal max. 3 A E-Stop max. 12 A
<b>Fusing E-Stop</b>	12 A
<b>Max. Power Dissipation</b>	3.5 W

## Operating conditions

<b>Operating temperature</b>	-20 °C to +70 °C
<b>Storage temperature</b>	-30 °C to +80 °C
<b>Protection degree (front panel)</b>	IP 65
<b>Operating humidity</b>	95 % w/o condensation
<b>Vibration</b>	5-25 Hz, ± 1.6 mm 25-100 Hz, a = 4 g
<b>Shocks</b>	a = 500 m/s <sup>2</sup>
Surrounding air temperature rating 70°C	
Suitable for pollution degree 3	

## D+ terminal

<b>Max. output current</b>	250 mA / 36 V
<b>Charging fail threshold</b>	Adjustable

## Voltage measurement

<b>Measurement inputs</b>	3ph-n Gen voltage , 3ph-n Mains
<b>Measurement range</b>	277 V / 480 V AC (EU) 346 V / 600 V AC (US/Canada)
<b>Linear measurement and protection range</b>	381 V / 660 V
<b>Accuracy</b>	1 %
<b>Frequency range</b>	40-70 Hz (accuracy 0.1 Hz)
<b>Input impedance</b>	0.72 MΩ ph-ph , 0.36 MΩ ph-n

## Communications

<b>USB port</b>	non-isolated
<b>CAN 1</b>	CAN bus, 250 kbps, max 200 m, 120 Ω termination option, non-isolated

## Current measurement

<b>Measurement inputs</b>	3ph Gen current
<b>Measurement range</b>	5 A
<b>Max. allowed current</b>	10 A
<b>Accuracy</b>	1.5 % for full temperature range (1 % from 0 °C to 50 °C)
<b>Input impedance</b>	< 0.1 Ω

## Binary inputs

<b>Number</b>	7, non-isolated
<b>Close/Open indication</b>	0-2 VDC close contact 6-36 VDC open contact

## Binary outputs

<b>Low current</b>	5 low current output, non-isolated 0.5 A switching to positive supply voltage, BATT+
<b>High current</b>	2 high current output, non-isolated 5 A (60 °C), 4 A (70 °C) switching to positive supply voltage, BATT+

## Analog inputs

<b>Number</b>	3, non-isolated
<b>Type</b>	Resistive
<b>Resolution</b>	0.1 Ω
<b>Range</b>	0-2500 Ω
<b>Input impedance</b>	170 Ω
<b>Accuracy</b>	±2 % from value in range 0-2500 Ω ±1.5 kΩ in range 2.5-15 kΩ

## Magnetic pickup

<b>Voltage input range</b>	4 Vpk-pk to 50 Vpk-pk in range 4 Hz to 1 kHz 6 Vpk-pk to 50 Vpk-pk in range 1 kHz to 5 kHz 10 Vpk-pk to 50 Vpk-pk in range 5 kHz to 10 kHz
<b>Frequency input range</b>	4 Hz to 10 kHz
<b>Frequency measurement tolerance</b>	0.2 % from range 10 kHz

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## 8.1 Controller objects

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## 8.1.1 Setpoints

### What setpoints are:

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

All setpoints can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure. See the chapter **Password (page 80)** in Operator guide for instructions on how to enter and modify a password.

**IMPORTANT: Do not write setpoints repeatedly (e.g. power control from a PLC by repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory, which can be overwritten up to 10<sup>5</sup> times without risk of damage or data loss, but it may become damaged, when the allowed number of writing cycles is exceeded.**

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For full list of setpoints go to the chapter **List of setpoints (page 168)**.

## List of setpoints

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## Group: Basic settings

### Subgroup: Name

#### Gen-Set Name

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 15 characters [-]		
<b>Default value</b>	InteliLite	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8637	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
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 IntelliConfig or from controller's configuration menu.			
<i>Note: If the Gen-Set Name is "TurboRunHours", the running hours will be counted faster - 1 minute in real will represent 1 hour.</i>			

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### Subgroup: Power settings

#### Nominal Power Split Phase

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	9977	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type (page 175)</b>		
<b>Description</b>			
Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC (page 216)</b> protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type (page 175)</b> is adjusted to Autodetect and Autodetect detects connection type as Monophase or SplitPhase.</i>			
<i>Note: To lock this setpoint against editing you also have to lock setpoint <b>Nominal Power Split Phase 1 (page 272)</b>, <b>Nominal Power Split Phase 2 (page 276)</b> and <b>Nominal Power Split Phase 3 (page 280)</b>.</i>			

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## Nominal Power

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	8276	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal power of the gen-set. Generator <b>Overload BOC (page 216)</b> protection is based on this setpoint.			
<i><b>Note:</b> This setpoint is used when setpoint <b>Connection type (page 175)</b> is adjusted to 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.</i>			
<i><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Power 1 (page 272)</b>, <b>Nominal Power 2 (page 276)</b> and <b>Nominal Power 3 (page 280)</b>.</i>			

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### Subgroup: Current settings

## Nominal Current

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 10 000 [A]		
<b>Default value</b>	350 A	<b>Alternative config</b>	YES
<b>Step</b>	1 A		
<b>Comm object</b>	8275	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type (page 175)</b> .		
<b>Description</b>			
It is current limit for mains current protections and means maximal continuous mains current. Nominal Current can be different from mains rated current value.			
<i><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Current 1 (page 270)</b>, <b>Nominal Current 2 (page 274)</b> and <b>Nominal Current 3 (page 278)</b>.</i>			

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## CT Ratio

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [A/5A]		
<b>Default value</b>	2 000 A/5A	<b>Alternative config</b>	NO
<b>Step</b>	1 A/5A		
<b>Comm object</b>	8274	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Gen-set current transformers ratio.			
<p><b>Note:</b> Generator currents and power measurement is suppressed if current level is below 1% of CT range.</p>			

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## CT Location

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Load / GenSet/ None [-]		
<b>Default value</b>	Gen-set	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	11625	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Adjustment of location of current measurement.			
<ul style="list-style-type: none"> <li>▶ Load: Current CT's are physically placed on Load (typically between GCB and MCB)</li> <li>▶ GenSet: Current CT's are physically placed on GenSet (typically before GCB)</li> <li>▶ None: There are no current CT's.</li> </ul>			
When option None is selected, following objects are hided/changed:			
<ul style="list-style-type: none"> <li>▶ Current screen is hidden</li> <li>▶ Generator Power screen is hidden</li> <li>▶ Statistics screens - values Genset kWh, Genset kVArh, Mains kWh and Mains kWArh are hidden</li> <li>▶ Mains screen - kW meter is replaced by generator voltage meter <ul style="list-style-type: none"> <li>● Generator L1-N voltage is displayed for Monopahse, Splitphase L1L2, Splitphase L1L3 and High Leg delta connection types</li> <li>● Generator L1-L2 voltage is displayed for 3ph3w and 3ph4w connection types</li> </ul> </li> <li>▶ Group Load is hidden</li> <li>▶ Group Statistics - values Genset kWh, Genset kVArh, Mains kWh and Mains kWArh are hidden</li> </ul>			
<p><b>Note:</b> For more details about this function see chapter <i>CT Location</i> (page 27).</p>			

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## Subgroup: Voltage settings

### Connection type

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
<b>Default value</b>	3Ph4Wire	<b>Alternative config</b>	YES
<b>Step</b>	[-]		
<b>Comm object</b>	11628	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		

#### Description

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
SplitPhase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3

3x CT (Current Transformer)		
Autodetect	High Leg Delta	L1 >=100V; L1 <=160V L2 >=160V L3 >=100V; L3 <=160V
	or	
	3PH3Wire or 3Ph4Wire	L1 >= 100V L2 >= 100V L3 >= 100V
	or	
	3PH Low Y	L1 >=20V; L1 <=160V L2 >=20V; L2 <=160V L3 >=20V; L3 <=160V
	or	
	3PH High Y	L1L2 < 300V L2L3 < 300V L3L1 < 300V L1 > 160V L2 > 160V L3 > 160V L1L2 >= 300V L2L3 >= 300V L3L1 >= 300V
	or	
	SpIPhL1L2	L1 >=100V L2 >=100V L3 <= 20V
	or	
	SpIPhL1L3	L1 >=100V L2 <= 20V L3 >=100V
	or	
	Mono Phase	L1 >=100V L2 <= 20V L3 <= 20V
	or	
	<b>Voltage Autodetect</b> shutdown	

**Note:** To lock this setpoint against editing you also have to lock setpoint **Connection Type 1** (page 268), **Connection type 2** (page 272) and **Connection type 3** (page 276).

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## Nominal Voltage Ph-N

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 20 000 [V]		
<b>Default value</b>	231 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	8277	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type (page 175)</b> .		
<b>Description</b>			
Nominal voltage (phase to neutral).			
<p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Voltage Ph-N 1 (page 271)</b>, <b>Nominal Voltage Ph-N 2 (page 275)</b> and <b>Nominal Voltage Ph-N 3 (page 279)</b>.</p>			

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## Nominal Voltage Ph-Ph

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 40 000 [V]		
<b>Default value</b>	400 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	11657	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type (page 175)</b> .		
<b>Description</b>			
Nominal system voltage (phase to phase).			
<p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Voltage Ph-Ph 1 (page 271)</b>, <b>Nominal Voltage Ph-Ph 2 (page 275)</b> and <b>Nominal Voltage Ph-Ph 3 (page 279)</b>.</p>			

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## PT Ratio

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,1 .. 500,0 [V/V]		
<b>Default value</b>	1,0 V/V	<b>Alternative config</b>	NO
<b>Step</b>	0,1 V/V		
<b>Comm object</b>	9579	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Generator voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1.			

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## Vm PT Ratio

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,1 .. 500,0 [V/V]		
<b>Default value</b>	1,0 V/V	<b>Alternative config</b>	NO
<b>Step</b>	0,1 V/V		
<b>Comm object</b>	9580	<b>Related applications</b>	AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Mains voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1.			

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### Subgroup: Frequency settings

## Nominal Frequency

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	45 .. 65 [Hz]		
<b>Default value</b>	50 Hz	<b>Alternative config</b>	YES
<b>Step</b>	1 Hz		
<b>Comm object</b>	8278	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal system frequency (usually 50 or 60 Hz).			
<p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Frequency 1 (page 270)</b>, <b>Nominal Frequency 2 (page 274)</b> and <b>Nominal Frequency 3 (page 278)</b>.</p>			

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## Gear Teeth

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	FGen->RPM / 1 .. 500 [-]		
<b>Default value</b>	120	<b>Alternative config</b>	NO
<b>Step</b>	1		
<b>Comm object</b>	8252	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>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.</p> <p><i><b>Note:</b> 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.</i></p>			

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## Nominal RPM

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	100 .. 4 000 [RPM]		
<b>Default value</b>	1 500 RPM	<b>Alternative config</b>	YES
<b>Step</b>	1 RPM		
<b>Comm object</b>	8253	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>Nominal engine speed (RPM - revolutions per minute).</p> <p><i><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal RPM 1</b> (page 271), <b>Nominal RPM 2</b> (page 275) and <b>Nominal RPM 3</b> (page 279).</i></p>			

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## Subgroup: Controller settings

### Controller mode

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	OFF / MAN / AUTO / TEST [-]		
<b>Default value</b>	OFF	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8315	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
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 IntelliConfig.			




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### Power On Mode

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0				
<b>Range [units]</b>	Previous / OFF [-]						
<b>Default value</b>	Previous	<b>Alternative config</b>	NO				
<b>Step</b>	[-]						
<b>Comm object</b>	13000	<b>Related applications</b>	AMF, MRS				
<b>Config level</b>	Advanced						
<b>Setpoint visibility</b>	Always						
<b>Description</b>							
This setpoint adjusts controller mode after power on of controller.							
<table border="1"> <tr> <td>Previous</td> <td>When controller is power on, than is switched into last mode before power off.</td> </tr> <tr> <td>OFF</td> <td>When controller is power on, than is switched into OFF mode.</td> </tr> </table>				Previous	When controller is power on, than is switched into last mode before power off.	OFF	When controller is power on, than is switched into OFF mode.
Previous	When controller is power on, than is switched into last mode before power off.						
OFF	When controller is power on, than is switched into OFF mode.						
<p><b>Note:</b> 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</p>							

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## Operation Mode

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0				
<b>Range [units]</b>	AMF / MRS [-]						
<b>Default value</b>	AMF	<b>Alternative config</b>	NO				
<b>Step</b>	[-]						
<b>Comm object</b>	12157	<b>Related applications</b>	AMF				
<b>Config level</b>	Advanced						
<b>Setpoint visibility</b>	Always						
<b>Description</b>							
Based on this setpoint is defined basic controller function.							
<table border="1"> <tr> <td>AMF</td> <td>Normal AMF operation</td> </tr> <tr> <td>MRS</td> <td>When MRS mode is selected the controller will not perform AMF functions anymore. MCB button  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 <b>REMOTE START/STOP (PAGE 442)</b> binary input.</td> </tr> </table>				AMF	Normal AMF operation	MRS	When MRS mode is selected the controller will not perform AMF functions anymore. MCB button  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 <b>REMOTE START/STOP (PAGE 442)</b> binary input.
AMF	Normal AMF operation						
MRS	When MRS mode is selected the controller will not perform AMF functions anymore. MCB button  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 <b>REMOTE START/STOP (PAGE 442)</b> binary input.						

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## Controller Address

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 32 [-]		
<b>Default value</b>	1	<b>Alternative config</b>	NO
<b>Step</b>	1		
<b>Comm object</b>	24537	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Controller identification number. It is possible to set controller address different from the default value (1) so that more IL controllers can be interconnected (via RS485) and accessed e.g. from MODBUS terminal.			
<p><b>Note:</b> When opening connection to the controller it's address has to correspond with the setting in PC tool.</p>			
<p><b>Note:</b> This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</p>			

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## Reset To Manual

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / Enabled [-]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	9983	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>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.</p> <p><b>Example:</b> Controller is in AUTO mode and there is red inactive unconfirmed alarm and fault reset button is pressed, controller will start automatically.</p>			

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## Backlight Timeout

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / 1 .. 255 [min]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	1 min		
<b>Comm object</b>	10121	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>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.</p>			


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## Horn Timeout

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / 1 .. 599 [s]		
<b>Default value</b>	10 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8264	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Setting of horn behavior.			
Disabled	Disabling the Horn sounding function		
1 .. 599 [s]	Timeout for <b>HORN (PAGE 472)</b> binary output. The <b>HORN (PAGE 472)</b> output is opened when this timeout elapsed.		
<p><b>Note:</b> Horn timeout starts again from the beginning if a new alarm appears before previous Horn timeout has elapsed.</p>			

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## Zero Power Mode

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / 1 - 360 [min]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	1 min		
<b>Comm object</b>	8548	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
The controller is switched to Zero Power Mode when there is no user interaction with the controller for the preset time period. Zero Power Mode is disabled in AMF automatic mode. 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.			
<p><b>Note:</b> Power consumption of controller in Zero Power Mode is 0 mA. Controller is internally disconnected from power supply.</p>			

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## RunHoursSource

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0						
<b>Range [units]</b>	AUTO/ECU/INTERNAL [-]								
<b>Default value</b>	AUTO	<b>Alternative config</b>	NO						
<b>Step</b>	[-]								
<b>Comm object</b>	13345	<b>Related applications</b>	AMF, MRS						
<b>Config level</b>	Advanced								
<b>Setpoint visibility</b>	Always								
<b>Description</b>									
This setpoint selects source of running hours									
<table border="1"> <tr> <td>AUTO</td> <td>If there is some ECU which send valid running hours, then this value is used. Otherwise value from internal counter is used.</td> </tr> <tr> <td>ECU</td> <td>Running hours are taken from ECU if ECU send valid data. It is not possible to set and reset this value in statistics.</td> </tr> <tr> <td>INTERNAL</td> <td>Running hours are taken from internal counter. It is possible to set and reset this value in statistics.</td> </tr> </table>				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.
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.								
<p><b>Note:</b> <i>It is not necessary to restart controller when this setpoint is changed. Change of this setpoint should be applied immediately.</i></p>									

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## Screen Filter

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Enable/Disabled [-]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	15889	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>This setpoint enables/disables filter values on CU screen and PC tools. List of values which are filtered when filter is ON.</p> <ul style="list-style-type: none"> <li>▶ Generator Voltage L1-L2</li> <li>▶ Generator Voltage L2-L3</li> <li>▶ Generator Voltage L3-L1</li> <li>▶ Generator Voltage L1-N</li> <li>▶ Generator Voltage L2-N</li> <li>▶ Generator Voltage L3-N</li> <li>▶ Generator Frequency</li> <li>▶ Load kVA</li> <li>▶ Load kVA L1</li> <li>▶ Load kVA L2</li> <li>▶ Load kVA L3</li> <li>▶ Load kVAr</li> <li>▶ Load kVAr L1</li> <li>▶ Load kVAr L2</li> <li>▶ Load kVAr L3</li> <li>▶ Load kW</li> <li>▶ Load kW L1</li> <li>▶ Load kW L2</li> <li>▶ Load kW L3</li> </ul>			

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## Subgroup: HMI Settings

### Main Screen Line 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	RPM/PF/Run Hours/ATT/AIN1 [-]		
<b>Default value</b>	PF	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	13346	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
This setpoint adjusts line 1 on Mains screen.			

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### Main Screen Line 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	RPM/PF/Run Hours/ATT/AIN1 [-]		
<b>Default value</b>	RPM	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	14628	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
This setpoint adjusts line 2 on Mains screen.			

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## Group: Engine settings

### Subgroup: Starting

#### Cranking Attempts

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 10 [-]		
<b>Default value</b>	3	<b>Alternative config</b>	NO
<b>Step</b>	1		
<b>Comm object</b>	8255	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Maximal number of cranking attempts.			

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## Maximum Cranking Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 255 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8256	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Maximum time limit of cranking time.			
<p><b>IMPORTANT:</b> There is a protection against broken pinion on starter. In case that there are no RPM after 5 seconds of starting, cranking is interrupted and cranking fail pause follows.</p>			

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## Cranking Fail Pause

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	5 .. 60 [s]		
<b>Default value</b>	8 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8257	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Pause between <b>Cranking Attempts (page 186)</b> . <b>PRESTART (PAGE 481)</b> output is active in this pause until Cranking Fail Pause elapses.			

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## Prestart Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 600 [s]		
<b>Default value</b>	2 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8394	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		

### Description

Time of closing of the **PRESTART (PAGE 481)** output prior to the engine start. Set to zero if you want to leave the output **PRESTART (PAGE 481)** open.

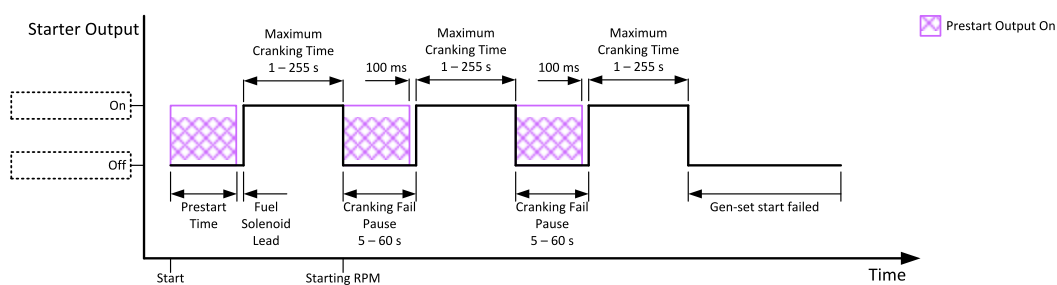


Image 8.1 Prestart Time

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## Starting RPM

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	5 .. 50 [%]		
<b>Default value</b>	25%	<b>Alternative config</b>	NO
<b>Step</b>	1 % of Nominal RPM (page 179)		
<b>Comm object</b>	8254	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		

### Description

This setpoint defines the “firing” speed level as percent value of the **Nominal RPM (page 179)**. If this level is exceeded the engine is considered as started.

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## Starting Oil Pressure

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / 0,1 .. 10,0 [bar]		
<b>Default value</b>	4,5 bar	<b>Alternative config</b>	NO
<b>Step</b>	0,1 bar		
<b>Comm object</b>	9681	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>Oil pressure limit for starting. The controller will stop cranking (<b>STARTER (PAGE 484)</b> goes OFF) if the oil pressure rises above this limit.</p> <p>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.</p>			
<p><b>IMPORTANT: Value from analog input has higher priority than value from ECU.</b></p>			

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## Glow Plugs Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. Prestart Time (page 188) [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14412	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>This setpoint defines the time before starting when logical binary output <b>GLOW PLUGS (PAGE 470)</b> will be close.</p>			

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## Idle RPM

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	100 .. 4000 [RPM]		
<b>Default value</b>	900 RPM	<b>Alternative config</b>	NO
<b>Step</b>	1 RPM		
<b>Comm object</b>	9946	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>This setpoint adjusts idle speed of engine.</p>			

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## Subgroup: Choke

### Choke Function

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled /Fixed Time / Temp Based [-]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	15717	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when LBO CHOKE (PAGE 460) is configured.		
<b>Description</b>			
This setpoint defines choke function behavior.			
Disabled	Choke function is disabled and logical binary output <b>CHOKE (PAGE 460)</b> is activated under no circumstances.		
Fixed Time	Choke time is fixedly defined by <b>Choke Time (page 190)</b> setpoint.		
Temp Based	Choke time is calculated using actual engine (coolant) temperature. Setpoints <b>Choke Start Temp (page 191)</b> and <b>Choke Increment (page 192)</b> are taken into consideration.		

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### Choke Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0–3600 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	13011	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when LBO CHOKE (PAGE 460) is configured and setpoint <b>Choke Function (page 190)</b> = Fixed Time.		
<b>Description</b>			
Defines time logical binary output <b>CHOKE (PAGE 460)</b> is activated for when fixed time is used. When setpoint <b>Choke Function (page 190)</b> is set to <i>Temp Based</i> value, <i>Choke Time</i> value have no effect.			
<p><b>Note:</b> If setpoint <b>Choke Lead (page 194)</b> is set to nonzero value, total time the <b>CHOKE</b> output is activated still matches value set by <b>Choke Time</b> setpoint. This mean <b>Choke Time</b> should be longer than <b>Choke Lead</b> to ensure expected <b>Choke</b> behavior.</p>			

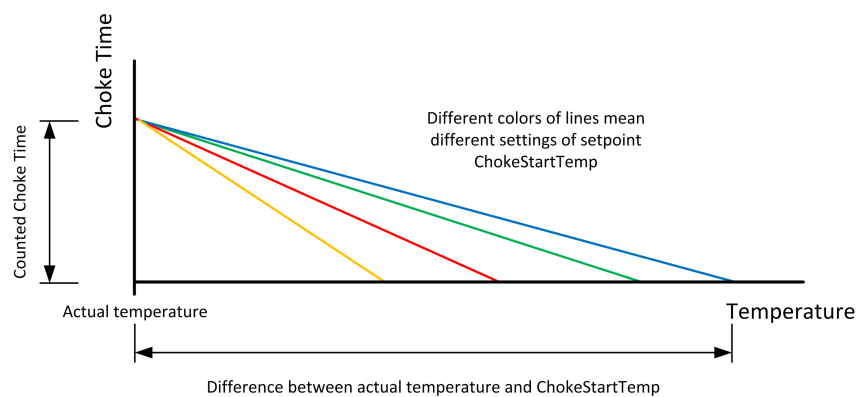
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## Choke Start Temp

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	-20,0 .. 80,0 [°C]		
<b>Default value</b>	0,0 °C	<b>Alternative config</b>	NO
<b>Step</b>	0,1 °C		
<b>Comm object</b>	15716	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when LBO CHOKE (PAGE 460) is configured and setpoint Choke Function (page 190) = 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 192)**. When setpoint **Choke Function (page 190)** is set to *Fixed Time* value, setpoint *Choke Start Temp* has no effect.



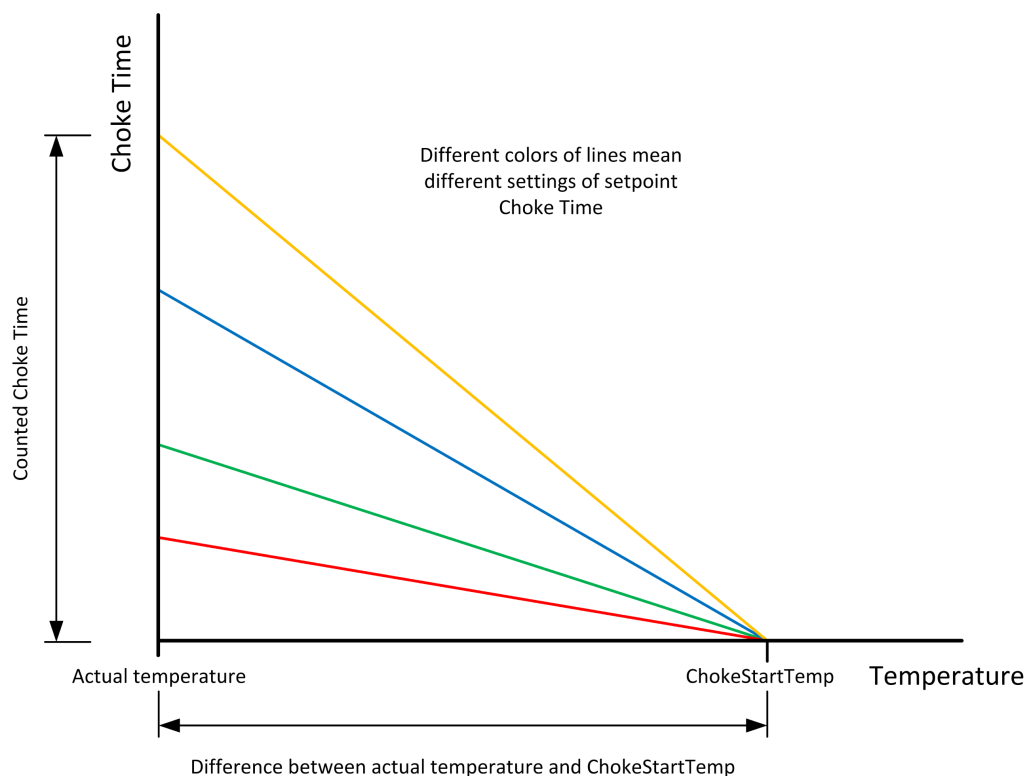
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## Choke Increment

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,00 .. 20,00 [s/°C]		
<b>Default value</b>	0,00 s/°C	<b>Alternative config</b>	NO
<b>Step</b>	0,01 s/°C		
<b>Comm object</b>	15715	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when LBO CHOKE (PAGE 460) is configured and setpoint Choke Function (page 190) = Temp Based.		

### Description

This setpoint adjust the maximal time of activation of binary output **CHOKE** (PAGE 460). Calculated time depends on engine (coolant) temperature. Setpoint adjust curve which is used for calculating actual Choke Time. When setpoint **Choke Function** (page 190) is set to *Fixed Time* value, setpoint *Choke Increment* has no effect.



**Note:** If setpoint **Choke Lead** (page 194) 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 191)) This mean that adjusted parameters should ensure that calculated **Choke Time** will be longer than **Choke Lead** to ensure expected **Choke** behavior.

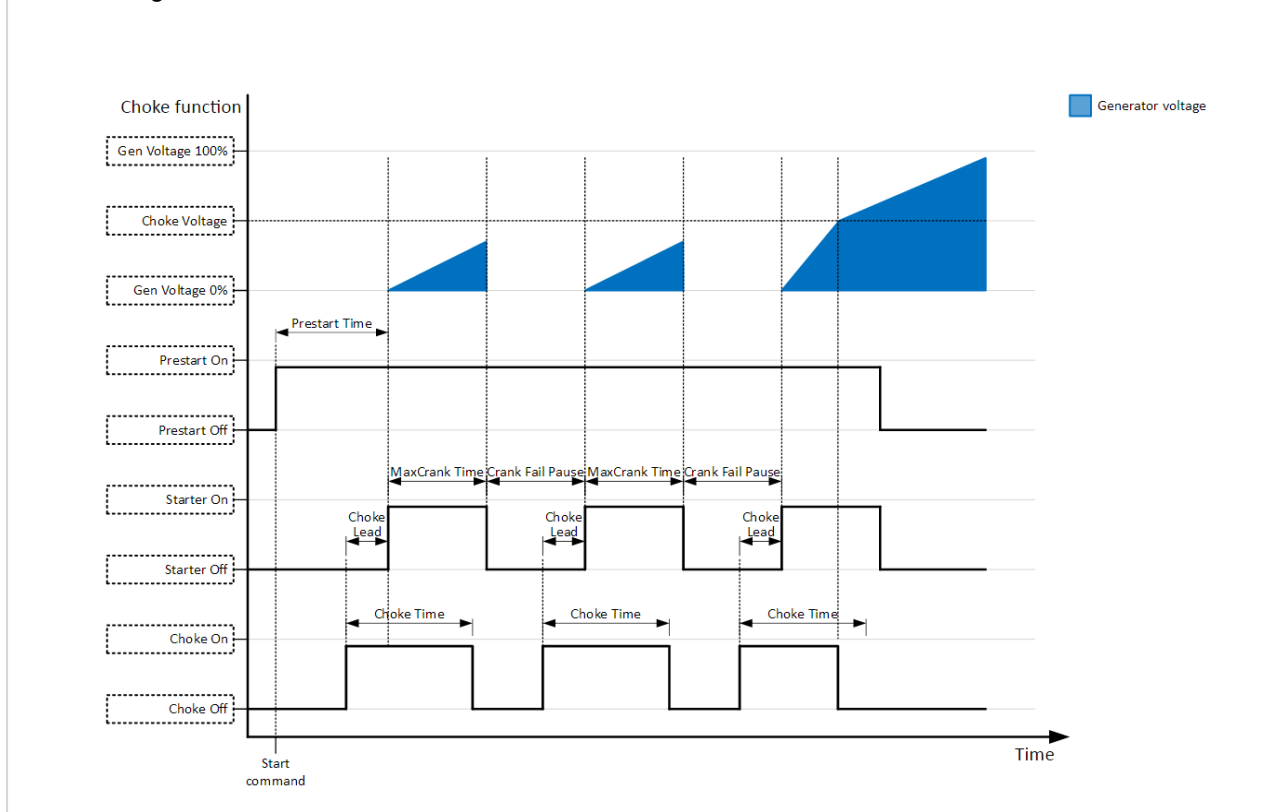
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## Choke Voltage

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / 1–100 [%]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	1 %		
<b>Comm object</b>	15718	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when LBO CHOKE (PAGE 460) is configured.		

### Description


This setpoint adjust threshold level for deactivation of **CHOKE (PAGE 460)** 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

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. Prestart Time [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	15774	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when LBO CHOKE (PAGE 460) is configured.		
<b>Description</b>			
This setpoint adjust the lead of logical binary output CHOKE. CHOKE (PAGE 460) is activated before logical binary output STARTER (PAGE 484).			
<i><b>Note:</b> 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.</i>			

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## Subgroup: Starting Timers

### Fuel Solenoid Lead

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 25,0 [s]		
<b>Default value</b>	0,5 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	10525	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		

#### Description

Delay between **FUEL SOLENOID (PAGE 464)** and **STARTER (PAGE 484)** logical binary outputs. **FUEL SOLENOID (PAGE 464)** is closed before **STARTER (PAGE 484)**. Lead time is adjusted via this setpoint.

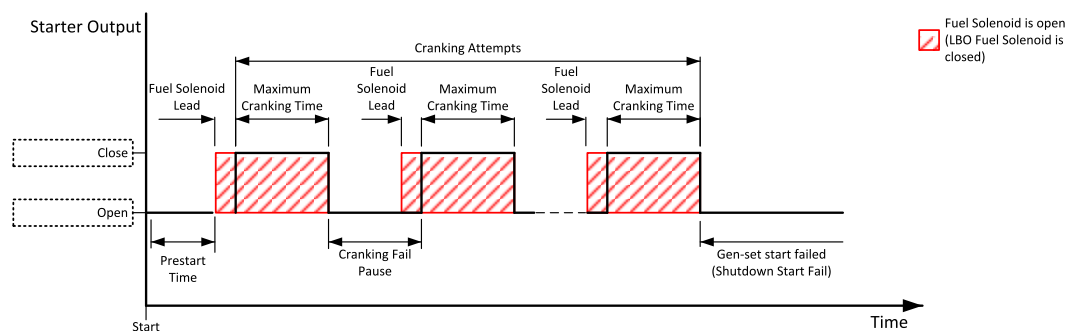


Image 8.2 Fuel Solenoid Lead

**Note:** LBO PRESTART (PAGE 481) goes to logical zero when Fuel Solenoid Lead goes to logical one.

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### Idle Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 600 [s]		
<b>Default value</b>	12 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9097	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		

#### Description

Idle Time delay starts when RPM exceeds **Starting RPM (page 188)**. Start fail is detected when during Idle state RPM decreases below 2 RPM.

The output **IDLE/NOMINAL (PAGE 473)** remains inactive during the idle period. Binary output Idle/Nominal opens during Cooling period again. This output can be used for switching the governor between idle and nominal speed.

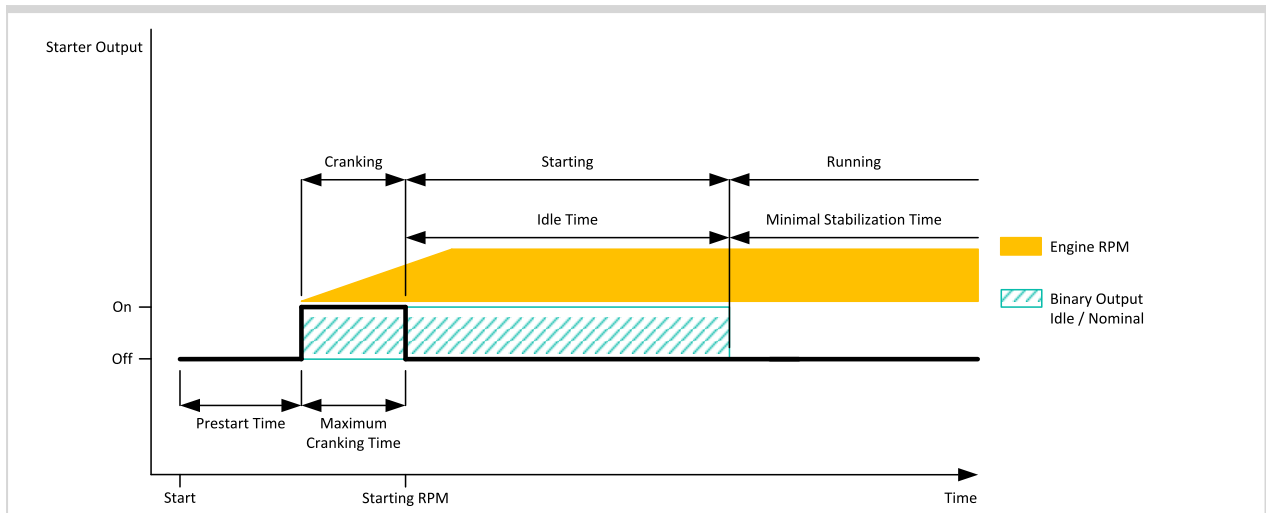


Image 8.3 Idle Time 1

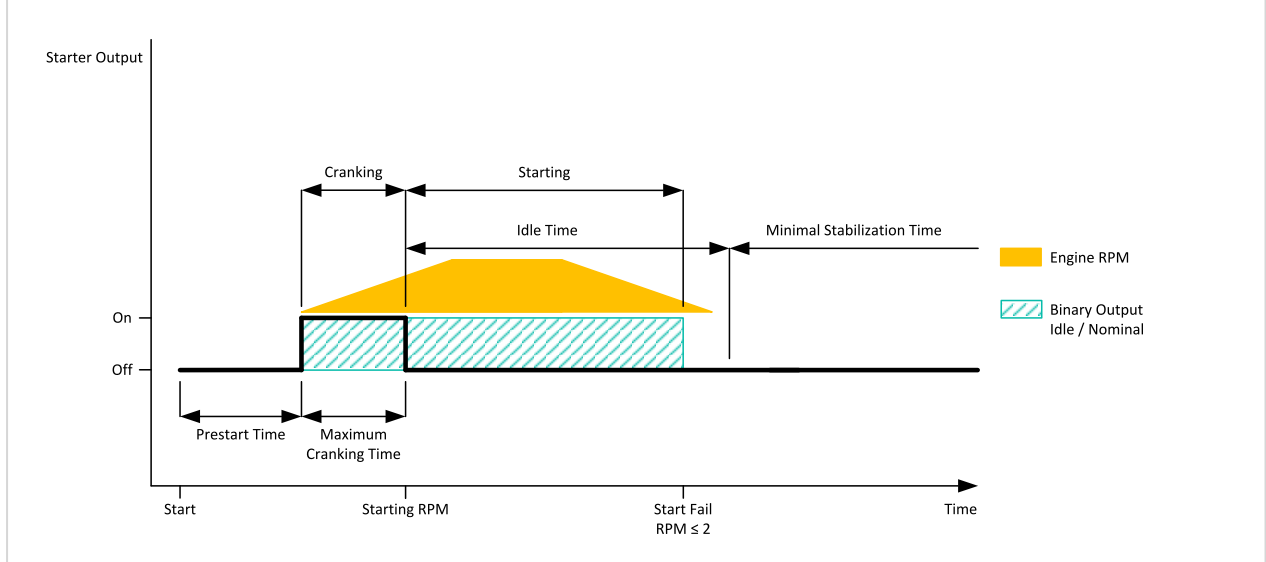


Image 8.4 Idle Time 2

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## Minimal Stabilization Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. Maximal Stabilization Time (page 198) [s]		
<b>Default value</b>	2 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8259	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		

### Description

When the gen-set has been started and the idle timer has elapsed, the controller will wait for a period adjusted by this setpoint before closing GCB, even if the generator voltage and frequency are already in limits.

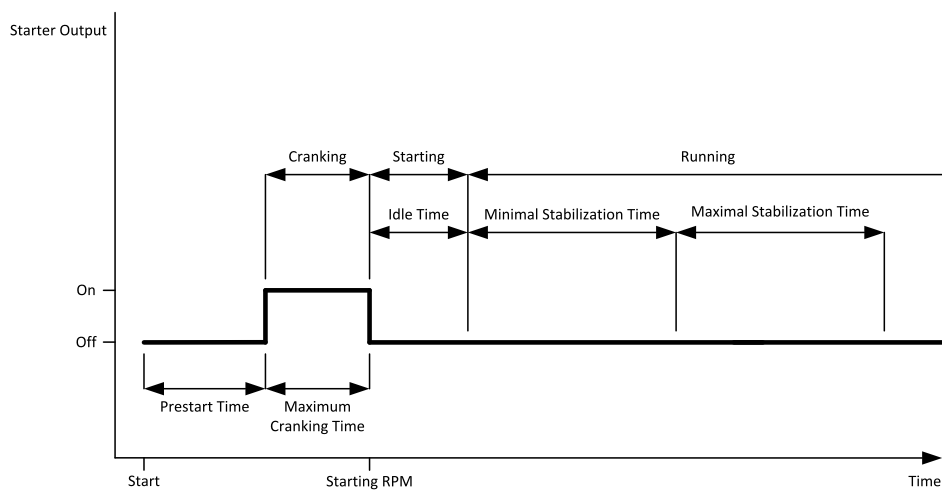


Image 8.5 Minimal Stabilization Time

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## Maximal Stabilization Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Minimal Stabilization Time (page 197) .. 300 [s]		
<b>Default value</b>	10 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8313	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		

### Description

When the gen-set has been started and the idle timer has elapsed, the generator voltage and frequency must get within limits within this period of time, otherwise an appropriate shutdown alarm (generator voltage and/or frequency) is issued.

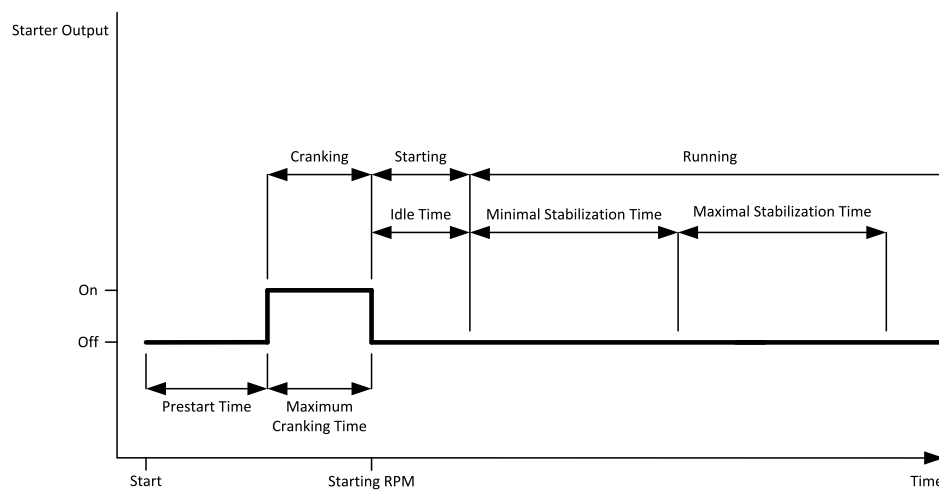


Image 8.6 Maximal Stabilization Time

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## Protection Hold Off

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 300,0 [s]		
<b>Default value</b>	5,0 s	<b>Alternative config</b>	YES
<b>Step</b>	0,1 s		
<b>Comm object</b>	10023	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		

### Description

During the start of the gen-set, some engine protections have to be blocked (e.g. Oil pressure). The protections are unblocked after the Protect Hold Off. The time starts after reaching Starting RPM.

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## Subgroup: Stopping

### Cooling Speed

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Idle / Nominal [-]		
<b>Default value</b>	Nominal	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10046	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Selects the function of the binary output <b>IDLE/NOMINAL (PAGE 473)</b> 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.		
<i><b>Note:</b> When ECU is connected the predefined value 900 RPM for Idle speed is requested.</i>			
<i><b>Note:</b> Binary output <b>IDLE/NOMINAL (PAGE 473)</b> must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor.</i>			

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## Subgroup: Stopping Timers

### Cooling Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 3 600 [s]		
<b>Default value</b>	30 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8258	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Runtime of the unloaded gen-set to cool the engine before stop.			

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### Stop Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 600 [s]		
<b>Default value</b>	60 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9815	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		

**Description**

Under normal conditions the engine must certainly stop within this period after the **FUEL SOLENOID (PAGE 464)** has been de-energized and the **STOP SOLENOID (PAGE 485)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off.

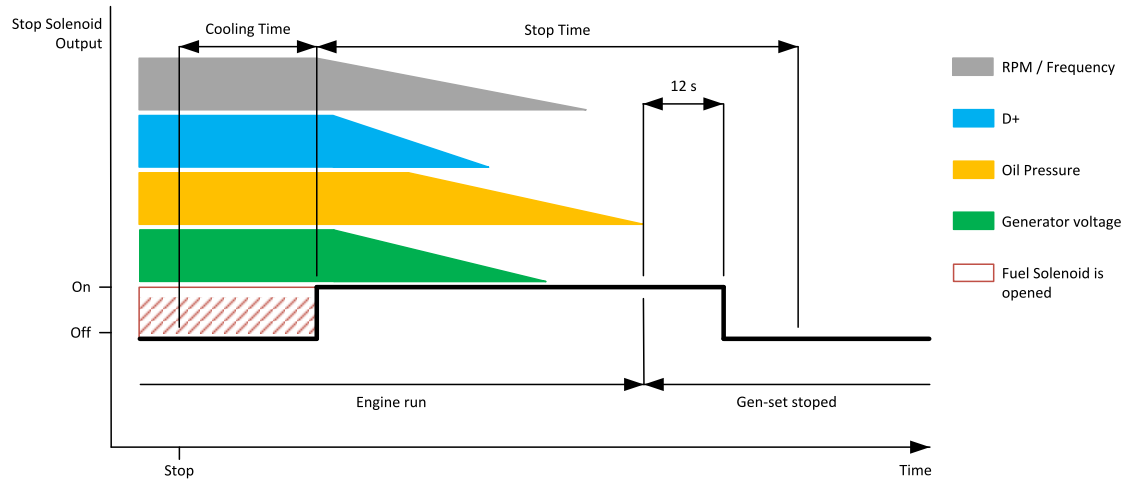


Image 8.7 Stop Time 1

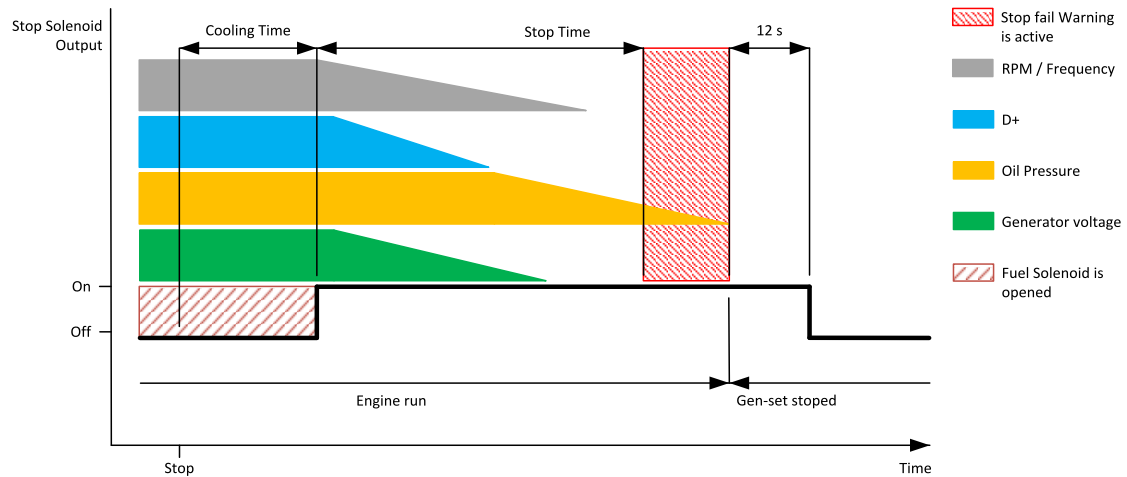


Image 8.8 Stop Time 2

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## After Cooling Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 3 600 [s]		
<b>Default value</b>	180 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8662	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Runtime of engine after cooling pump. Binary output Cooling pump is closed when the engine starts and opens AfterCool time delayed after gen-set stops.			

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### Subgroup: D+ Function

#### D+ Function

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0						
<b>Range [units]</b>	Enabled / ChargeFail / Disabled [-]								
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO						
<b>Step</b>	[-]								
<b>Comm object</b>	9683	<b>Related applications</b>	AMF, MRS						
<b>Config level</b>	Standard								
<b>Setpoint visibility</b>	Always								
<b>Description</b>									
Behavior of D+ terminal.									
<table border="1"> <tr> <td>Enabled</td> <td>The D+ terminal is used for both functions – “running engine” detection and charge fail detection.</td> </tr> <tr> <td>ChargeFail</td> <td>The D+ terminal is used for charge fail detection only</td> </tr> <tr> <td>Disabled</td> <td>The D+ terminal is not used.</td> </tr> </table>				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.
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.								

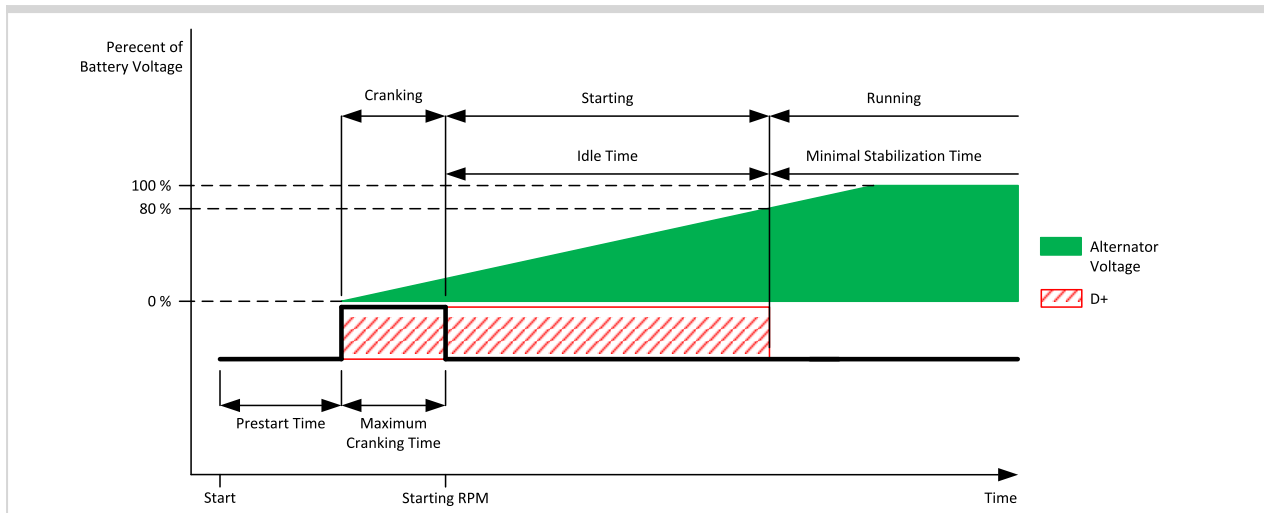


Image 8.9 D+ Function 1

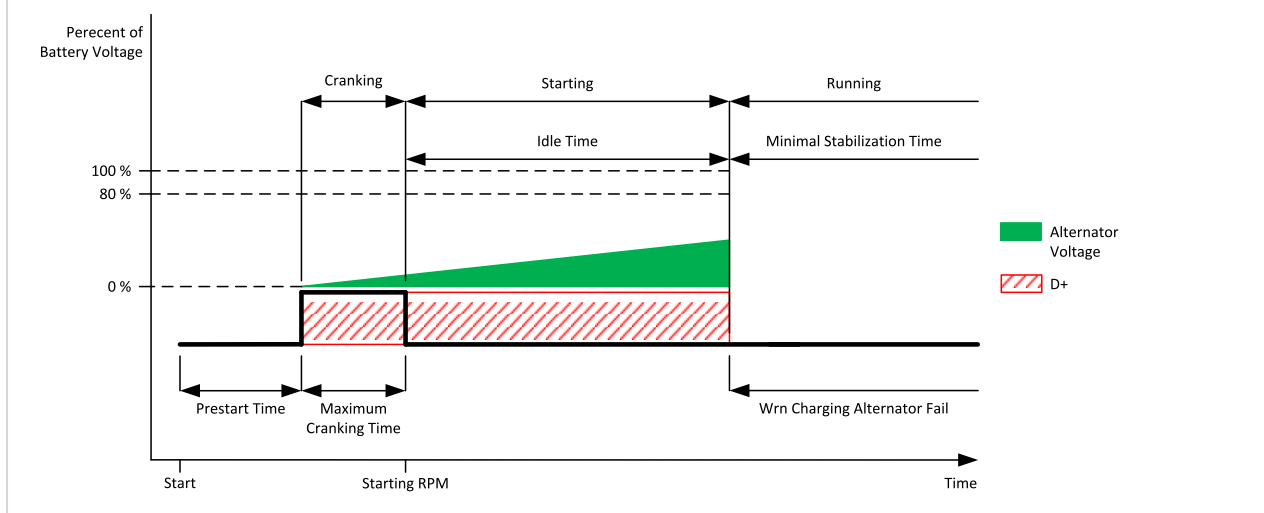


Image 8.10 D+ Function 2

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### D+ Threshold

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..100 [%]		
<b>Default value</b>	80 %	<b>Alternative config</b>	NO
<b>Step</b>	1 %		
<b>Comm object</b>	14959	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only if setpoint <b>D+ Function</b> (page 201) is not set to <i>Disabled</i> value.		
<b>Description</b>			
This setpoint adjusts threshold level for D+ function.			

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## D+ Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1..255 [s]		
<b>Default value</b>	1 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14960	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only if setpoint <b>D+ Function (page 201)</b> is not set to <i>Disabled</i> value.		
<b>Description</b>			
This setpoint adjusts delay for D+ function. This delay is used for: <ul style="list-style-type: none"> <li>▶ Alarm Charging Alternator Fail.</li> <li>▶ For engine running condition - disengagement of starter</li> </ul>			

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## D+ Alarm Type

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	No Protec/Wrn/Sd [-]		
<b>Default value</b>	Wrn	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	15751	<b>Related applications</b>	MRS. AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only if setpoint <b>D+ Function (page 201)</b> is not set to <i>Disabled</i> value.		
<b>Description</b>			
This setpoint adjusts type of alarm Charging Alternator Fail.			

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## Subgroup: Engine Protections

### Overspeed Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	<b>Underspeed Sd (page 204)</b> .. 200 [%]		
<b>Default value</b>	115%	<b>Alternative config</b>	NO
<b>Step</b>	1 % of <b>Nominal RPM (page 179)</b>		
<b>Comm object</b>	8263	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for over speed protection. Relative to the nominal speed.			

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## Underspeed Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. Overspeed Sd (page 203) [%]		
<b>Default value</b>	25%	<b>Alternative config</b>	NO
<b>Step</b>	1 % of Nominal RPM (page 179)		
<b>Comm object</b>	8260	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for underspeed protection. Relative to the nominal speed.			

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## Overspeed Overshot

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 50 [%]		
<b>Default value</b>	20%	<b>Alternative config</b>	NO
<b>Step</b>	1 % of Nominal RPM (page 179)		
<b>Comm object</b>	14107	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
This setpoint rise the upper limit of overspeed protection for the time which is defined in setpoint <b>Overspeed Overshot Period (page 204)</b> . In this time the upper limit of protection is <b>Overspeed Sd (page 203) + Overspeed Overshoot</b> .			

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## Overspeed Overshot Period

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 255 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14108	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Overspeed Overshot (page 204)</b>		
<b>Description</b>			
Time for which is <b>Overspeed Overshot (page 204)</b> active. The timer starts in the same time when starter starts.			
<i>Note: The setpoint is visible only, if <b>Overspeed Overshot (page 204)</b> is greater than 0.</i>			

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## Oil Pressure Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	12895	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>OIL PRESSURE (PAGE 514)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>OIL PRESSURE (PAGE 514)</b> .			

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## Oil Pressure Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	12779	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>OIL PRESSURE (PAGE 514)</b> is configured		
<b>Description</b>			
Shutdown threshold level for <b>OIL PRESSURE (PAGE 514)</b> .			

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## Oil Pressure Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	3 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14341	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>OIL PRESSURE (PAGE 514)</b> is configured or logical binary input <b>OIL PRESSURE (PAGE 439)</b> is configured		
<b>Description</b>			
Delay for <b>OIL PRESSURE (PAGE 514)</b> .			

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### ECU Oil Pressure Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by ECU sensor curve		
<b>Default value</b>	the value is defined by ECU sensor curve	<b>Alternative config</b>	YES
<b>Step</b>	the step is defined by ECU sensor curve		
<b>Comm object</b>	14426	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Warning threshold level for Oil pressure which is send from ECU.			

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### ECU Oil Pressure Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by ECU sensor curve		
<b>Default value</b>	the value is defined by ECU sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by ECU sensor curve		
<b>Comm object</b>	14425	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Shutdown threshold level for Oil pressure which is send from ECU.			

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### ECU Oil Pressure Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	3 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14427	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Delay for Oil pressure which is send from ECU.			

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### Coolant Temperature Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	12896	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>COOLANT TEMP (PAGE 511)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>COOLANT TEMP (PAGE 511)</b> .			

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### Coolant Temperature Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	12780	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>COOLANT TEMP (PAGE 511)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>COOLANT TEMP (PAGE 511)</b> .			

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### Coolant Temperature Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14342	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>COOLANT TEMP (PAGE 511)</b> is configured or logical binary input <b>COOLANT TEMP (PAGE 430)</b> is configured		
<b>Description</b>			
Delay for <b>COOLANT TEMP (PAGE 511)</b> .			

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### ECU Coolant Temperature Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by ECU sensor curve		
<b>Default value</b>	the value is defined by ECU sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by ECU sensor curve		
<b>Comm object</b>	14429	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Warning threshold level for Coolant temperature which is send from ECU.			

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### ECU Coolant Temperature Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by ECU sensor curve		
<b>Default value</b>	the value is defined by ECU sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by ECU sensor curve		
<b>Comm object</b>	14428	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Shutdown or BOC threshold level for Coolant temperature which is send from ECU.			

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### ECU Coolant Temperature Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14430	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Delay for Coolant temperature which is send from ECU.			

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### Coolant Temperature Low Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	YES
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9684	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>COOLANT TEMP (PAGE 511)</b> is configured		
<b>Description</b>			
Threshold level for lower limit of <b>COOLANT TEMP (PAGE 511)</b> .			

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### Coolant Temperature Low Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	YES
<b>Step</b>	1 s		
<b>Comm object</b>	10270	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>COOLANT TEMP (PAGE 511)</b> is configured		
<b>Description</b>			
Delay for <b>Coolant Temperature Low Wrn (page 209)</b> .			

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### Fuel Level Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	12897	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>FUEL LEVEL (PAGE 512)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>FUEL LEVEL (PAGE 512)</b> .			

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## Fuel Level Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	12898	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>FUEL LEVEL (PAGE 512)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>FUEL LEVEL (PAGE 512)</b> .			

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## Fuel Level Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	10 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14343	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>FUEL LEVEL (PAGE 512)</b> is configured or logical binary input <b>FUEL LEVEL (PAGE 433)</b> is configured		
<b>Description</b>			
Delay for <b>FUEL LEVEL (PAGE 512)</b> .			

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## ECU Fuel Level Wrn

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by ECU sensor curve		
<b>Default value</b>	the value is defined by ECU sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by ECU sensor curve		
<b>Comm object</b>	14432	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Warning threshold level for Fuel level which is send from ECU.			

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## ECU Fuel Level Sd

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by ECU sensor curve		
<b>Default value</b>	the value is defined by ECU sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by ECU sensor curve		
<b>Comm object</b>	14431	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
Shutdown or BOC threshold level for Fuel level which is send from ECU.			

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## ECU Fuel Level Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	10 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	14433	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if ECU is configuredd		
<b>Description</b>			
Delay for Fuel level which is send from ECU.			

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## Subgroup: Maintenance

### Maintenance Timer 1

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	-10 000 ... 9 999 [h] / Disabled		
<b>Default value</b>	1 000 h	<b>Alternative config</b>	NO
<b>Step</b>	1 h		
<b>Comm object</b>	11616	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Maintenance timer 1 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics.			

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## Maintenance Timer 2

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	-10 000 ... 9 999 [h] / Disabled		
<b>Default value</b>	1 000 h	<b>Alternative config</b>	NO
<b>Step</b>	1 h		
<b>Comm object</b>	11617	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Maintenance timer 2 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics.			

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## Maintenance Timer 3

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	-10 000 ... 9 999 [h] / Disabled		
<b>Default value</b>	1 000 h	<b>Alternative config</b>	NO
<b>Step</b>	1 h		
<b>Comm object</b>	11618	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Maintenance timer 3 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics.			

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## Subgroup: Battery Protections

### Battery Undervoltage

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	8,0 V .. <b>Battery Overvoltage (page 213)</b> [V]		
<b>Default value</b>	18,0 V	<b>Alternative config</b>	NO
<b>Step</b>	0,1 V		
<b>Comm object</b>	8387	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Warning threshold for low battery voltage.			

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## Battery Overvoltage

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Battery Undervoltage (page 212) .. 40,0 [V]		
<b>Default value</b>	36,0 V	<b>Alternative config</b>	NO
<b>Step</b>	0,1 V		
<b>Comm object</b>	9587	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Warning threshold for high battery voltage.			

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## Battery <> Voltage Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 600 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8383	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Delay for Battery Undervoltage (page 212) and Battery Overvoltage (page 213) protection.			

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## Battery Charger Fail Delay

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 15 [min]		
<b>Default value</b>	5 min	<b>Alternative config</b>	NO
<b>Step</b>	1 min		
<b>Comm object</b>	11374	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Conditioned with LBI BATTERY CHARGER (PAGE 405)		
<b>Description</b>			
Delay for LBI BATTERY CHARGER (PAGE 405).			

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## Subgroup: Pulse Counters

### Conversion Coefficient Pulse 1

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 ... 1 000 [-]		
<b>Default value</b>	1	<b>Alternative config</b>	NO
<b>Step</b>	1		
<b>Comm object</b>	10994	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only if LBI PULSE COUNTER 1 (PAGE 439) is configured		
<b>Description</b>			
<p>This setpoint adjusts the rate of increasing of the Pulse Counter 1 function. The module counts pulses at the input PULSE COUNTER 1 (PAGE 439) and if the input pulses counter reaches value given by this setpoint, the counter value Pulse Counter 1 (page 384) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p>			

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### Conversion Coefficient Pulse 2

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 ... 1 000 [-]		
<b>Default value</b>	1	<b>Alternative config</b>	NO
<b>Step</b>	1		
<b>Comm object</b>	10995	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only if LBI PULSE COUNTER 2 (PAGE 440) is configured		
<b>Description</b>			
<p>This setpoint adjusts the rate of increasing of the Pulse Counter 2 function. The module counts pulses at the input PULSE COUNTER 2 (PAGE 440) and if the input pulses counter reaches value given by this setpoint, the counter value Pulse Counter 2 (page 384) is increased by 0,1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p>			

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## Subgroup: Ventilation

### Ventilation Pulse Time

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0–3600 [s]		
<b>Default value</b>	30 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	15767	<b>Related applications</b>	MRS, AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Only when logical binary output <b>VENTILATION ON PULSE (PAGE 488)</b> or <b>VENTILATION OFF PULSE (PAGE 487)</b> is configured.		
<b>Description</b>			
This setpoint defines duration of pulse generated on logical binary outputs <b>VENTILATION ON PULSE (PAGE 488)</b> or <b>VENTILATION OFF PULSE (PAGE 487)</b> at the moment when logical binary output <b>VENTILATION (PAGE 487)</b> is activated or deactivated respectively.			

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## Subgroup: ECU Settings

### ECU Speed Adjustment

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 100 [%]		
<b>Default value</b>	50 %	<b>Alternative config</b>	NO
<b>Step</b>	1 %		
<b>Comm object</b>	9948	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
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.			
<b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>ECU Speed Adjustment 1 (page 281)</b> , <b>ECU Speed Adjustment 2 (page 281)</b> and <b>ECU Speed Adjustment 3 (page 282)</b> .			

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## Group: Generator settings

### Subgroup: Overload Protection

#### Overload BOC

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	<b>Overload Wrn (page 216) .. 200 [%]</b>		
<b>Default value</b>	120 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of <b>Nominal Power (page 173)</b>		
<b>Comm object</b>	8280	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold level for generator overload (in % of Nominal power) protection. Protection is BOC (Breaker Open and gen-set Cooldown).			
<i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>			

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#### Overload Wrn

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. <b>Overload BOC (page 216) [%]</b>		
<b>Default value</b>	120 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of <b>Nominal Power (page 173)</b>		
<b>Comm object</b>	9685	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold level for generator overload (in % of Nominal power) protection. This is only warning.			

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#### Overload Delay

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	5,0 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	8281	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Delay for <b>Overload BOC (page 216)</b> <b>Overload BOC (page 216)</b> and <b>Overload Wrn (page 216)</b> protection.			

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## Subgroup: Current Protection

### Short Circuit BOC

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	100 .. 500 [%]		
<b>Default value</b>	250 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of <b>Nominal Current</b> (page 173)		
<b>Comm object</b>	8282	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
BOC occurs when generator current reaches this preset threshold.			
<i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>			

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### Short Circuit BOC Delay

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,00 .. 10,00 [s]		
<b>Default value</b>	0,04 s	<b>Alternative config</b>	YES
<b>Step</b>	0,01 s		
<b>Comm object</b>	9991	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Delay for <b>Short Circuit BOC</b> (page 217) protection.			

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## Subgroup: Voltage Protection

### Generator Overvoltage Sd

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	<b>Generator Overvoltage Wrn</b> (page 218) .. 200 [%]		
<b>Default value</b>	110 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of <b>Nominal Voltage Ph-N</b> (page 177) or <b>Nominal Voltage Ph-Ph</b> (page 177)		
<b>Comm object</b>	8291	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used.			
<i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>			

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## Generator Overvoltage Wrn

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Generator Undervoltage Wrn (page 219) .. Generator Overvoltage Sd (page 217) [%]		
<b>Default value</b>	110 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of Nominal Voltage Ph-N (page 177) or Nominal Voltage Ph-Ph (page 177)		
<b>Comm object</b>	9686	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used.			
<i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>			

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## Generator Undervoltage BOC

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. Generator Undervoltage Wrn (page 219) [%]		
<b>Default value</b>	70 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of Nominal Voltage Ph-N (page 177) or Nominal Voltage Ph-Ph (page 177)		
<b>Comm object</b>	8293	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used.			
<i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>			
<i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>			

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## Generator Undervoltage Wrn

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Generator Undervoltage BOC (page 218) .. Generator Overvoltage Wrn (page 218) [%]		
<b>Default value</b>	70 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of Nominal Voltage Ph-N (page 177) or Nominal Voltage Ph-Ph (page 177)		
<b>Comm object</b>	9687	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used.			
<i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>			

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## Generator <> Voltage Delay

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	3,0 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	9103	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Delay for Generator Overvoltage Sd (page 217), Generator Overvoltage Wrn (page 218), Generator Undervoltage BOC (page 218) and Generator Undervoltage Wrn (page 219) protection.			

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## Subgroup: Frequency Protection

### Generator Overfrequency BOC

<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Generator Overfrequency Wrn (page 220) .. 200,0 [%]		
<b>Default value</b>	110,0 %	<b>Alternative config</b>	NO
<b>Step</b>	0,1 % of Nominal Frequency (page 178)		
<b>Comm object</b>	8296	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Threshold for generator phase L1 overfrequency.			
<i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>			

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## Generator Overfrequency Wrn

Setpoint group	Generator settings	Related FW	1.9.0
Range [units]	Generator Underfrequency Wrn (page 220) .. Generator Overfrequency BOC (page 219) [%]		
Default value	110,0 %	Alternative config	NO
Step	0,1 % of Nominal Frequency (page 178)		
Comm object	9688	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
<b>Description</b>			
Threshold for generator phase L1 overfrequency.			

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## Generator Underfrequency BOC

Setpoint group	Generator settings	Related FW	1.9.0
Range [units]	0,0 .. Generator Underfrequency Wrn (page 220) [%]		
Default value	85,0 %	Alternative config	NO
Step	0,1 % of Nominal Frequency (page 178)		
Comm object	8298	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
<b>Description</b>			
Threshold for generator phase L1 underfrequency.			
<i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>			

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## Generator Underfrequency Wrn

Setpoint group	Generator settings	Related FW	1.9.0
Range [units]	Generator Underfrequency BOC (page 220) .. Generator Overfrequency Wrn (page 220) [%]		
Default value	85,0 %	Alternative config	NO
Step	0,1 % of Nominal Frequency (page 178)		
Comm object	9689	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
<b>Description</b>			
Threshold for generator phase L1 underfrequency.			

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## Generator <> Frequency Delay

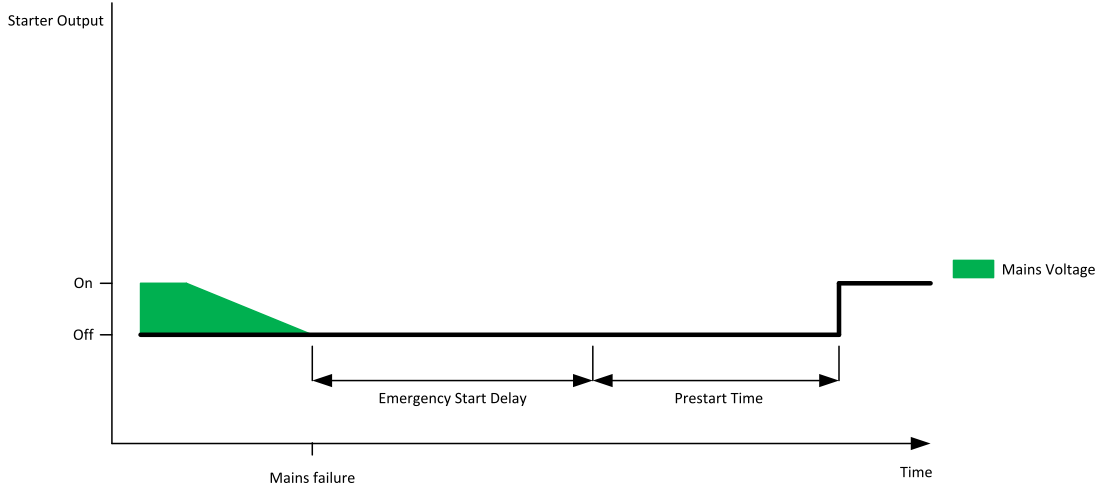
<b>Setpoint group</b>	Generator settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	3,0 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	8297	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Delay for <b>Generator Overfrequency BOC</b> (page 219), <b>Generator Overfrequency Wrn</b> (page 220), <b>Generator Underfrequency Wrn</b> (page 220) and <b>Generator Underfrequency BOC</b> (page 220) protection.			

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## Group: AMF settings

### Subgroup: AMF Timers

#### Emergency Start Delay

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 6 000 [s]		
<b>Default value</b>	5 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8301	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Delay after the mains failure to the start command of the gen-set.			
 <p>The diagram illustrates the 'Emergency Start Delay' process. The vertical axis represents 'Starter Output' with levels 'On' and 'Off'. The horizontal axis represents 'Time'. A green shaded area at the top indicates 'Mains Voltage', which starts high and then drops to 'Off' at a point labeled 'Mains failure'. Following 'Mains failure', the 'Starter Output' remains 'On' for a short duration before transitioning to 'Off'. This 'Off' state is divided into two periods: 'Emergency Start Delay' and 'Prestart Time'. After the 'Prestart Time' interval, the 'Starter Output' returns to 'On'.</p>			
Image 8.11 Emergency Start Delay			

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#### Mains Return Delay

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 3 600 [s]		
<b>Default value</b>	20 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	8302	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
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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## Transfer Delay

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	1,0 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	8303	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		

### Description

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 229)** is set to GENRUN.

The time charts below 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 465)** output straight away (100 ms) after the **MCB FEEDBACK (PAGE 438)** input deactivates.

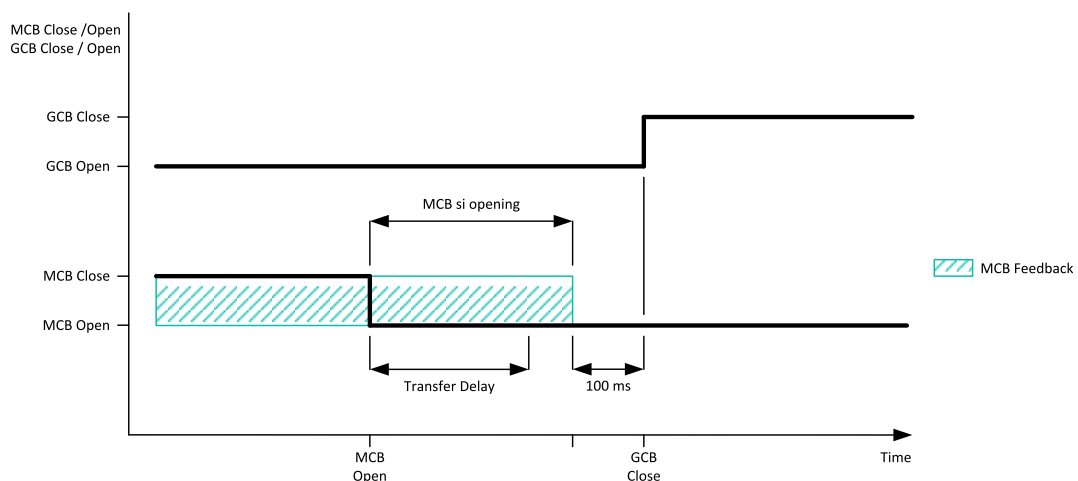


Image 8.12 Transfer Delay 1

If some delay between **MCB FEEDBACK (PAGE 438)** deactivation and closing of **GCB CLOSE/OPEN (PAGE 465)** output is required, then the Transfer Delay must be set to sum of “MCB opening” + “Delay” time.

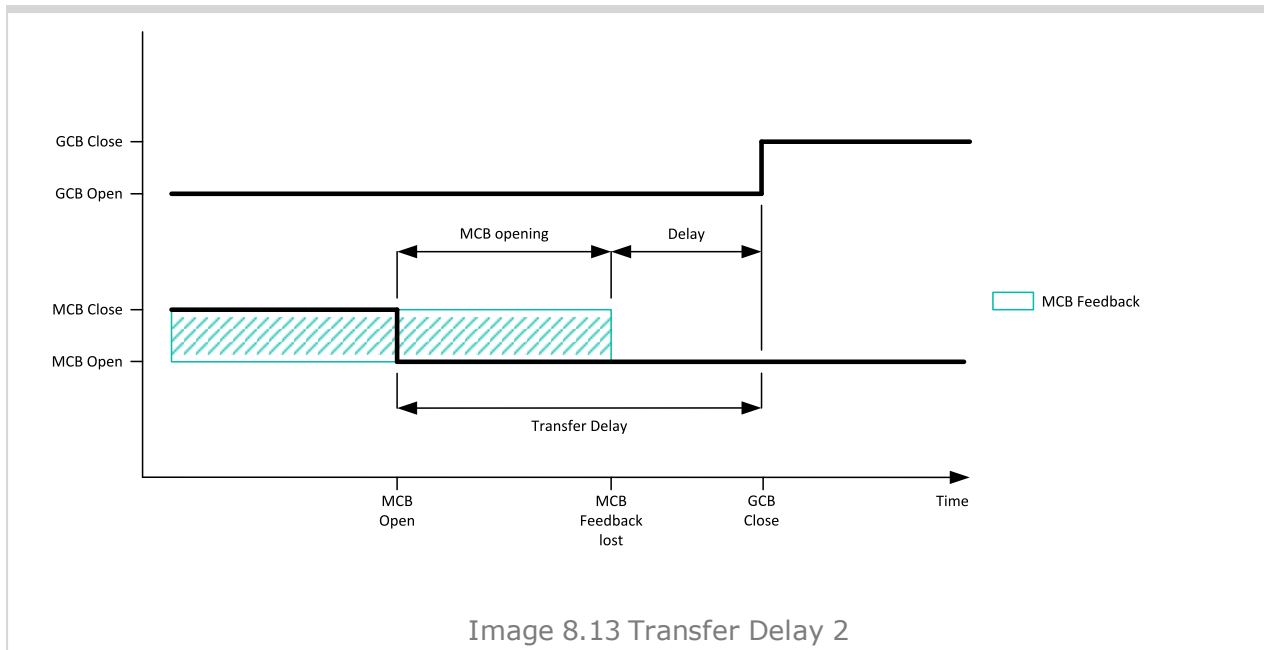


Image 8.13 Transfer Delay 2

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### MCB Close Delay

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	1,0 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	8389	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
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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### Subgroup: AMF Voltage Conditions

#### Mains Overvoltage

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	<b>Mains Undervoltage (page 225) .. 150 [%]</b>		
<b>Default value</b>	110 %	<b>Alternative config</b>	NO
<b>Step</b>	1 % of <b>Nominal Voltage Ph-Ph (page 177)</b>		
<b>Comm object</b>	8305	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Threshold for mains overvoltage. All three phases are checked. Maximum out of three is used.			

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## Mains Undervoltage

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	50 .. Mains Overvoltage (page 224) [%]		
<b>Default value</b>	60 %	<b>Alternative config</b>	YES
<b>Step</b>	1 % of Nominal Voltage Ph-Ph (page 177)		
<b>Comm object</b>	8307	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint Operation Mode (page 181)		
<b>Description</b>			
Threshold for mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

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## Mains <> Voltage Delay

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	2,0 s	<b>Alternative config</b>	YES
<b>Step</b>	0,1 s		
<b>Comm object</b>	8306	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint Operation Mode (page 181)		
<b>Description</b>			
Delay for Mains Undervoltage (page 225) and Mains Overvoltage (page 224) protection.			

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## Subgroup: AMF Frequency Conditions

### Mains Overfrequency

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Mains Underfrequency (page 226) .. 150 [%]		
<b>Default value</b>	102,0 %	<b>Alternative config</b>	NO
<b>Step</b>	1,0 % of Nominal Frequency (page 178)		
<b>Comm object</b>	8310	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint Operation Mode (page 181)		
<b>Description</b>			
Threshold for mains overfrequency.			

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## Mains Underfrequency

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	50 .. Mains Overfrequency (page 225) [%]		
<b>Default value</b>	98,0 %	<b>Alternative config</b>	NO
<b>Step</b>	1,0 % of Nominal Frequency (page 178)		
<b>Comm object</b>	8312	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Threshold for mains underfrequency.			

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## Mains < > Frequency Delay

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0,0 .. 600,0 [s]		
<b>Default value</b>	0,5 s	<b>Alternative config</b>	NO
<b>Step</b>	0,1 s		
<b>Comm object</b>	8311	<b>Related applications</b>	AMF
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Delay for <b>Mains Underfrequency (page 226)</b> and <b>Mains Overfrequency (page 225)</b> protection.			

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## Subgroup: AMF Settings

### Return From Island

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Manual / Auto [-]		
<b>Default value</b>	Auto	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	9590	<b>Related applications</b>	AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Setpoint adjust the behavior of closing MCB when the mains returns.			
Manual	<p>Controller remains in AUT mode and the manual return to Mains is done via MCB button. <b>Manual Restore (page 538)</b> message is displayed in alarmlist to notify operator - it will disappear automatically after MCB close button is pushed.</p> <p><b>Note:</b> Select <i>MANUAL</i> in case you need to manually control the moment when the load is transferred back to the mains.</p>		
Auto	No automatic mode change is performed.		

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### MCB Logic

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Close On / Close Off [-]		
<b>Default value</b>	Close Off	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8444	<b>Related applications</b>	AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
The set point influences the behavior of the output <b>MCB CLOSE/OPEN (PAGE 474)</b> .			
Close On When the output <b>MCB CLOSE/OPEN (PAGE 474)</b> is closed – MCB should be closed.			
Close Off When the output <b>MCB CLOSE/OPEN (PAGE 474)</b> is closed – MCB should be opened.			

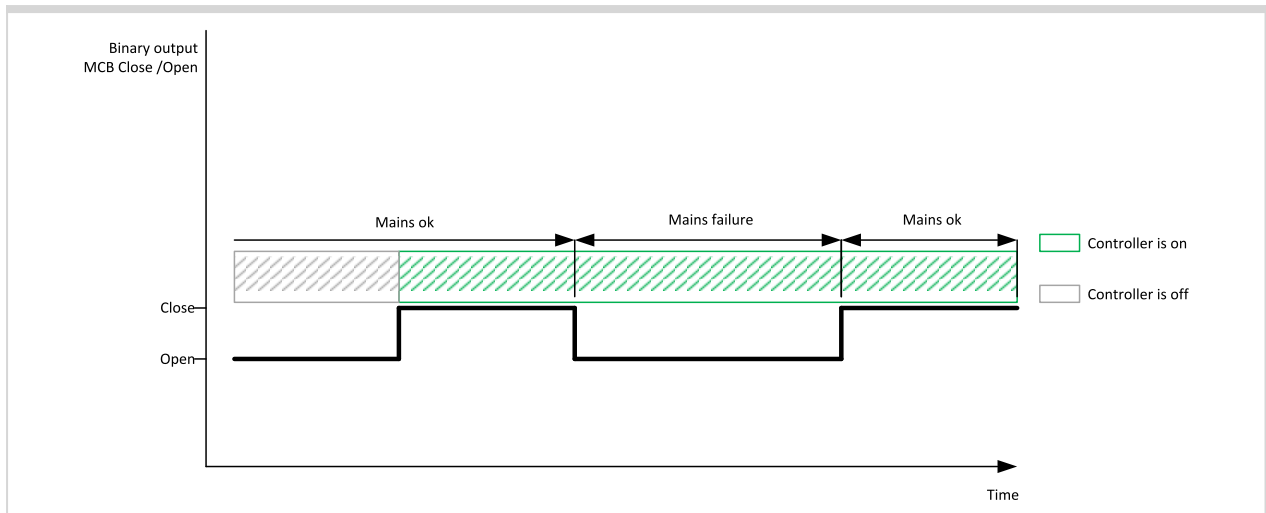


Image 8.14 MCB Logic 1

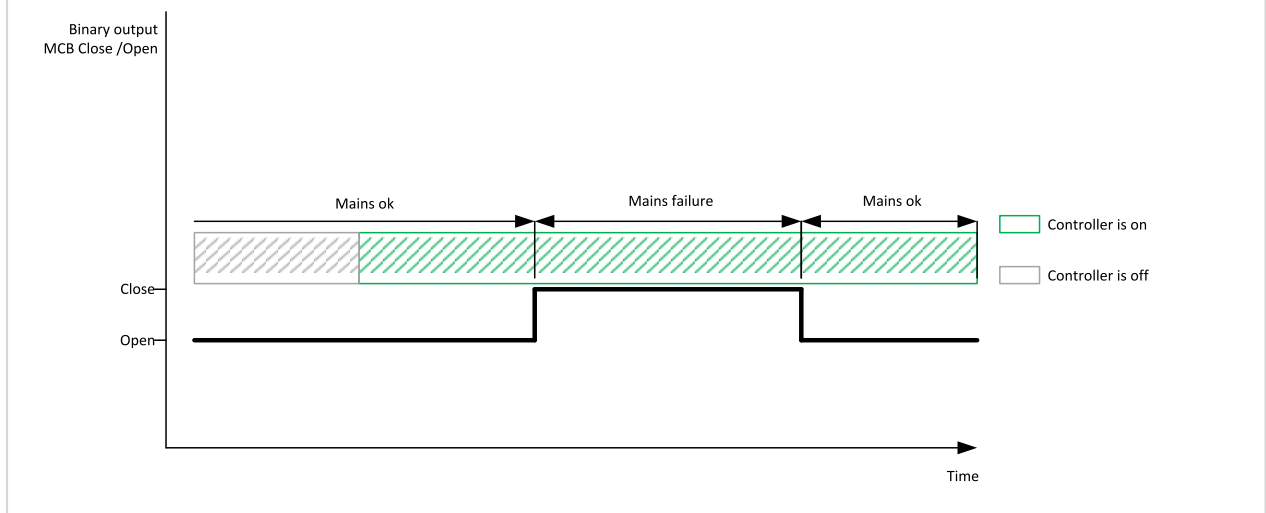


Image 8.15 MCB Logic 2

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## MCB Opens On

<b>Setpoint group</b>	AMF settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Mains Fail / Gen Run [-]		
<b>Default value</b>	Gen Run	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	9850	<b>Related applications</b>	AMF
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Operation Mode (page 181)</b>		
<b>Description</b>			
Setpoint adjust the behavior of opening MCB in AUTO mode when there is mains fail.			
<p>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 <b>MCB Close Delay (page 224)</b> is applied before MCB closing.</p> <p>Gen Run MCB will be opened when engine will be running and it will be possible to transfer load from Mains to gen-set (after stabilisation phase).</p>			
<p><b>Note:</b> This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.</p>			

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## Group: General Analog Inputs

### General Analog Input 1

#### Analog Protection 1 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9259	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT01 (PAGE 491)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT01 (PAGE 491)</b> .			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT01 (PAGE 491)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## Analog Protection 1 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9260	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT01 (PAGE 491)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT01 (PAGE 491)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT01 (PAGE 491)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 1 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9261	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT01 (PAGE 491)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT01 (PAGE 491)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT01 (PAGE 491)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 2

### Analog Protection 2 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9262	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT02 (PAGE 492)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT02 (PAGE 492)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT02 (PAGE 492)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 2 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9263	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT02 (PAGE 492)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT02 (PAGE 492)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT02 (PAGE 492)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 2 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9264	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT02</b> (PAGE 492) is configured		
<b>Description</b>			
Delay for <b>AIN PROT02</b> (PAGE 492).			
<i>Note: These setpoints are used only if LAI <b>AIN PROT02</b> (PAGE 492) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 3

### Analog Protection 3 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9265	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT03</b> (PAGE 493) is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT03</b> (PAGE 493).			
<i>Note: These setpoints are used only if LAI <b>AIN PROT03</b> (PAGE 493) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 3 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9266	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT03 (PAGE 493)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT03 (PAGE 493)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT03 (PAGE 493)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 3 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9267	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT03 (PAGE 493)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT03 (PAGE 493)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT03 (PAGE 493)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 4

### Analog Protection 4 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9268	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT04 (PAGE 494)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT04 (PAGE 494)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT04 (PAGE 494)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 4 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9269	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT04 (PAGE 494)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT04 (PAGE 494)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT04 (PAGE 494)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 4 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9270	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT04</b> (PAGE 494) is configured		
<b>Description</b>			
Delay for <b>AIN PROT04</b> (PAGE 494).			
<p><i>Note: These setpoints are used only if LAI <b>AIN PROT04</b> (PAGE 494) is adjusted to required protection type. Otherwise these setpoints are useless.</i></p>			

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## General Analog Input 5

### Analog Protection 5 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9271	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT05</b> (PAGE 495) is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT05</b> (PAGE 495).			
<p><i>Note: These setpoints are used only if LAI <b>AIN PROT05</b> (PAGE 495) is adjusted to required protection type. Otherwise these setpoints are useless.</i></p>			

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## Analog Protection 5 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9272	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT05 (PAGE 495)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT05 (PAGE 495)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT05 (PAGE 495)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 5 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9273	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT05 (PAGE 495)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT05 (PAGE 495)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT05 (PAGE 495)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 6

### Analog Protection 6 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9274	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT06 (PAGE 496)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT06 (PAGE 496)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT06 (PAGE 496)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 6 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9275	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT06 (PAGE 496)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT06 (PAGE 496)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT06 (PAGE 496)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 6 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9276	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT06 (PAGE 496)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT06 (PAGE 496)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT06 (PAGE 496)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 7

### Analog Protection 7 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9277	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT07 (PAGE 497)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT07 (PAGE 497)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT07 (PAGE 497)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 7 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9278	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT07 (PAGE 497)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT07 (PAGE 497)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT07 (PAGE 497)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 7 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9279	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT07 (PAGE 497)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT07 (PAGE 497)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT07 (PAGE 497)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 8

### Analog Protection 8 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9280	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT08 (PAGE 498)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT08 (PAGE 498)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT08 (PAGE 498)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 8 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9281	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT08 (PAGE 498)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT08 (PAGE 498)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT08 (PAGE 498)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 8 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9282	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT08</b> (PAGE 498) is configured		
<b>Description</b>			
Delay for <b>AIN PROT08</b> (PAGE 498).			
<i>Note: These setpoints are used only if LAI <b>AIN PROT08</b> (PAGE 498) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 9

### Analog Protection 9 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9283	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT09</b> (PAGE 499) is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT09</b> (PAGE 499).			
<i>Note: These setpoints are used only if LAI <b>AIN PROT09</b> (PAGE 499) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 9 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9284	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT09</b> (PAGE 499) is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT09</b> (PAGE 499).			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT09</b> (PAGE 499) is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## Analog Protection 9 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9285	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT09</b> (PAGE 499) is configured		
<b>Description</b>			
Delay for <b>AIN PROT09</b> (PAGE 499).			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT09</b> (PAGE 499) is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## General Analog Input 10

### Analog Protection 10 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9286	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT10 (PAGE 500)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT10 (PAGE 500)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT10 (PAGE 500)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 10 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9287	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT10 (PAGE 500)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT10 (PAGE 500)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT10 (PAGE 500)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 10 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9288	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT10 (PAGE 500)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT10 (PAGE 500)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT10 (PAGE 500)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 11

### Analog Protection 11 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9289	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT11 (PAGE 501)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT11 (PAGE 501)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT11 (PAGE 501)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 11 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9290	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT11 (PAGE 501)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT11 (PAGE 501)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT11 (PAGE 501)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 11 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9291	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT11 (PAGE 501)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT11 (PAGE 501)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT11 (PAGE 501)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 12

### Analog Protection 12 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9292	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT12 (PAGE 502)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT12 (PAGE 502)</b> .			
<i>Note: These setpoints are used only if LAI AIN PROT12 (PAGE 502) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 12 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9293	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT12 (PAGE 502)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT12 (PAGE 502)</b> .			
<i>Note: These setpoints are used only if LAI AIN PROT12 (PAGE 502) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 12 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9294	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT12 (PAGE 502)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT12 (PAGE 502)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT12 (PAGE 502)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 13

### Analog Protection 13 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9295	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT13 (PAGE 503)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT13 (PAGE 503)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT13 (PAGE 503)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 13 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9296	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT13 (PAGE 503)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT13 (PAGE 503)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT13 (PAGE 503)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 13 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9297	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT13 (PAGE 503)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT13 (PAGE 503)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT13 (PAGE 503)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 14

### Analog Protection 14 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9298	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT14 (PAGE 504)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT14 (PAGE 504)</b> .			
<i>Note: These setpoints are used only if LAI AIN PROT14 (PAGE 504) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 14 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9299	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT14 (PAGE 504)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT14 (PAGE 504)</b> .			
<i>Note: These setpoints are used only if LAI AIN PROT14 (PAGE 504) is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 14 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9300	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT14 (PAGE 504)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT14 (PAGE 504)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT14 (PAGE 504)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 15

### Analog Protection 15 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9301	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT15 (PAGE 505)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT15 (PAGE 505)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT15 (PAGE 505)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 15 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9302	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT15 (PAGE 505)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT15 (PAGE 505)</b> .			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT15 (PAGE 505)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## Analog Protection 15 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9303	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT15 (PAGE 505)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT15 (PAGE 505)</b> .			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT15 (PAGE 505)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## General Analog Input 16

### Analog Protection 16 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9304	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT16 (PAGE 506)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT16 (PAGE 506)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT16 (PAGE 506)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 16 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9305	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT16 (PAGE 506)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT16 (PAGE 506)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT16 (PAGE 506)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 16 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9306	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT16 (PAGE 506)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT16 (PAGE 506)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT16 (PAGE 506)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 17

### Analog Protection 17 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9307	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT17 (PAGE 507)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT17 (PAGE 507)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT17 (PAGE 507)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 17 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9308	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT17 (PAGE 507)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT17 (PAGE 507)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT17 (PAGE 507)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 17 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9309	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT17 (PAGE 507)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT17 (PAGE 507)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT17 (PAGE 507)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 18

### Analog Protection 18 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9310	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT18 (PAGE 508)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT18 (PAGE 508)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT18 (PAGE 508)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 18 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9311	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT18 (PAGE 508)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT18 (PAGE 508)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT18 (PAGE 508)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 18 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9312	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT18 (PAGE 508)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT18 (PAGE 508)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT18 (PAGE 508)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## General Analog Input 19

### Analog Protection 19 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9313	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT19 (PAGE 509)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT19 (PAGE 509)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT19 (PAGE 509)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 19 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9314	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT19 (PAGE 509)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT19 (PAGE 509)</b> .			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT19 (PAGE 509)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## Analog Protection 19 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9315	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT19 (PAGE 509)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT19 (PAGE 509)</b> .			
<p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT19 (PAGE 509)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p>			

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## General Analog Input 20

### Analog Protection 20 Wrn

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9316	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT20 (PAGE 510)</b> is configured		
<b>Description</b>			
Warning or history threshold level for <b>AIN PROT20 (PAGE 510)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT20 (PAGE 510)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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### Analog Protection 20 Sd

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	the range is defined by analog sensor curve		
<b>Default value</b>	the value is defined by analog sensor curve	<b>Alternative config</b>	NO
<b>Step</b>	the step is defined by analog sensor curve		
<b>Comm object</b>	9317	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT20 (PAGE 510)</b> is configured		
<b>Description</b>			
Shutdown or BOC threshold level for <b>AIN PROT20 (PAGE 510)</b> .			
<i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT20 (PAGE 510)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Analog Protection 20 Delay

<b>Setpoint group</b>	General Analog Inputs	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 900 [s]		
<b>Default value</b>	0 s	<b>Alternative config</b>	NO
<b>Step</b>	1 s		
<b>Comm object</b>	9318	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Visible only if the logical analog input <b>AIN PROT20 (PAGE 510)</b> is configured		
<b>Description</b>			
Delay for <b>AIN PROT20 (PAGE 510)</b> .			
<i>Note: These setpoints are used only if LAI <b>AIN PROT20 (PAGE 510)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i>			

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## Group: Scheduler

Subgroup: Time & Date

### Time

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	HH:MM:SS [-]		
<b>Default value</b>	0:0:0	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24554	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Real time clock adjustment.			

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### Date

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	DD/MM/YYYYY [-]		
<b>Default value</b>	1.1.2015	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24553	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Actual date adjustment.			

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## Time Stamp Period

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 240 [min]		
<b>Default value</b>	60 min	<b>Alternative config</b>	NO
<b>Step</b>	1 min		
<b>Comm object</b>	8979	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Time interval for periodic history records.			
<i>Note: History record is made only when engine is running.</i>			

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## #Summer Time Mode

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / Winter / Summer / Winter - S / Summer - S [-]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8727	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Behavior of switching between winter and summer time.			
Disable	Automatic switching between summer and wintertime is disabled.		
Winter (Summer)	Automatic switching between summer and wintertime is enabled and it is set to winter (summer) season.		
Winter - S (Summer - S)	Modification for southern hemisphere.		

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## Subgroup: Timer 1

### Timer 1 Function

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-]		
<b>Default value</b>	Disable	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	15358	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
<p>It is possible to choose from following timer functions. Binary output <b>EXERCISE TIMER 1 (PAGE 463)</b> is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.</p> <p>Controller activates timer whenever it is powered up even in period, where timer should be already running.</p> <p>Disable      The Timer is disabled.</p> <p>No Func      There is no any other function, only binary output of timer is activated.</p> <p>TEST        When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.</p> <p>TEST OnLd    When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.</p> <p>MFail Blk    When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.</p> <p>Mode OFF    When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.</p>			

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## Timer 1 Setup

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10969	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Related setpoints for timer 1 are:			
▶ <a href="#">Timer 1 Function (page 261)</a>		▶ <a href="#">Timer 1 Day (page 266)</a>	
▶ <a href="#">Timer 1 Repetition (page 262)</a>		▶ <a href="#">Timer 1 Repeated Day In Week (page 267)</a>	
▶ <a href="#">Timer 1 First Occur. Date (page 263)</a>		▶ <a href="#">Timer 1 Repeat Day In Month (page 267)</a>	
▶ <a href="#">Timer 1 First Occur. Time (page 263)</a>		▶ <a href="#">Timer 1 Repeat Week In Month (page 268)</a>	
▶ <a href="#">Timer 1 Duration (page 263)</a>		▶ <a href="#">Timer 1 Refresh Period (page 265)</a>	
▶ <a href="#">Timer 1 Repeated (page 264)</a>		▶ <a href="#">Timer 1 Weekends (page 266)</a>	
▶ <a href="#">Timer 1 Repeat Day (page 267)</a>			

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## Timer 1 Repetition

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0						
<b>Range [units]</b>	Off / Once / Repeated [-]								
<b>Default value</b>	Off	<b>Alternative config</b>	NO						
<b>Step</b>	[-]								
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS						
<b>Config level</b>	Standard								
<b>Setpoint visibility</b>	Conditioned by the setpoint <a href="#">Timer 1 Function (page 261)</a>								
<b>Description</b>									
Defines repetition of <a href="#">Timer 1 Function (page 261)</a> .									
<table border="1"> <tr> <td>Off</td> <td><a href="#">Timer 1 Function (page 261)</a> will not be activated.</td> </tr> <tr> <td>Once</td> <td><a href="#">Timer 1 Function (page 261)</a> will be activated only one time.</td> </tr> <tr> <td>Repeated</td> <td><a href="#">Timer 1 Function (page 261)</a> will be repeatedly activated.</td> </tr> </table>				Off	<a href="#">Timer 1 Function (page 261)</a> will not be activated.	Once	<a href="#">Timer 1 Function (page 261)</a> will be activated only one time.	Repeated	<a href="#">Timer 1 Function (page 261)</a> will be repeatedly activated.
Off	<a href="#">Timer 1 Function (page 261)</a> will not be activated.								
Once	<a href="#">Timer 1 Function (page 261)</a> will be activated only one time.								
Repeated	<a href="#">Timer 1 Function (page 261)</a> will be repeatedly activated.								

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### Timer 1 First Occur. Date

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[DD/MM/YYYY]		
<b>Default value</b>	01/01/2000	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Date of first occurrence of <b>Timer 1 Function (page 261)</b> .			

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### Timer 1 First Occur. Time

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[HH:MM]		
<b>Default value</b>	00:00	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Time of first occurrence of <b>Timer 1 Function (page 261)</b> .			

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### Timer 1 Duration

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[HH:MM]		
<b>Default value</b>	00:00	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Timer 1 Function (page 261) duration time.			

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## Timer 1 Repeated

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Daily / Weekly / Monthly / Short Period [-]		
<b>Default value</b>	Daily	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Repeated interval of <b>Timer 1 Function (page 261)</b> .			
Daily	<b>Timer 1 Function (page 261)</b> is repeated every day.		
Weekly	<b>Timer 1 Function (page 261)</b> is repeated every week in chosen days.		
Monthly	<b>Timer 1 Function (page 261)</b> is repeated in chosen day every month or in chosen days of chosen week of month		
Short Period	<b>Timer 1 Function (page 261)</b> is repeated in adjusted period.		

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## Timer 1 Refresh Period

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Refresh period of <b>Timer 1 Function (page 261)</b> . Meaning of this setpoint depends on type of repetition adjusted in <b>Timer 1 Repeated (page 264)</b> .			
Daily	<p>Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated.</p> <p><b>Example:</b> If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of <b>Timer 1 Function (page 261)</b>, the <b>Timer 1 Function (page 261)</b> will be activated.</p>		
Weekly	<p>Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated.</p> <p><b>Example:</b> If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of <b>Timer 1 Function (page 261)</b>, the <b>Timer 1 Function (page 261)</b> will be activated in selected days adjusted by <b>Timer 1 Day (page 266)</b>.</p>		
Monthly	<p>Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated.</p> <p><b>Example:</b> If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of <b>Timer 1 Function (page 261)</b>, the <b>Timer 1 Function (page 261)</b> will be activated in selected day of month adjusted by <b>Timer 1 Repeat Day In Month (page 267)</b> or in selected days of week of month adjusted by <b>Timer 1 Day (page 266)</b> and <b>Timer 1 Repeat Week In Month (page 268)</b>.</p>		
Short Period	<p>Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated.</p> <p><b>Example:</b> If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of <b>Timer 1 Function (page 261)</b>, the <b>Timer 1 Function (page 261)</b> will be activated.</p>		

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## Timer 1 Weekends

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Including / Skip / Postpone [-]		
<b>Default value</b>	Including	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Behavior of <b>Timer 1 Function (page 261)</b> on weekends.			
Including	<b>Timer 1 Function (page 261)</b> counter is running on the weekends and <b>Timer 1 Function (page 261)</b> can be active.		
Skip	<b>Timer 1 Function (page 261)</b> counter is running on the weekends but <b>Timer 1 Function (page 261)</b> isn't active.		
Postpone	<b>Timer 1 Function (page 261)</b> counter isn't running on the weekends and <b>Timer 1 Function (page 261)</b> isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date.		

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## Timer 1 Day

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
<b>Default value</b>	All OFF	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
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 Repeat Day

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Repeated Day / Repeated Day In Week [-]		
<b>Default value</b>	Repeated Day	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Use this setpoint to adjust behavior of monthly repetition of the <b>Timer 1 Function (page 261)</b> .			
Repeated Day                      Chose one day in month when <b>Timer 1 Function (page 261)</b> will be activated.			
Repeated Day In Week      Chose days in one week when <b>Timer 1 Function (page 261)</b> will be activated.			

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### Timer 1 Repeated Day In Week

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
<b>Default value</b>	All OFF	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Use this setpoint to select the day of week when timer will be activated.			
<i>Note: More day can be selected. Timer will be activated on the day which happened like the first.</i>			

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### Timer 1 Repeat Day In Month

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1..31 [day]		
<b>Default value</b>	0	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
Use this setpoint to chose the day in month when the <b>Timer 1 Function (page 261)</b> will be activated.			

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## Timer 1 Repeat Week In Month

<b>Setpoint group</b>	Scheduler	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 [week]		
<b>Default value</b>	1 week	<b>Alternative config</b>	NO
<b>Step</b>	1 week		
<b>Comm object</b>	0	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Timer 1 Function (page 261)</b>		
<b>Description</b>			
This setpoint adjust the week of month in which the <b>Timer 1 Function (page 261)</b> will be activated.			

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## Group: Plug-In Modules

### Slot A

<b>Setpoint group</b>	Plug-In Modules	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ENABLED / DISABLED [-]		
<b>Default value</b>	ENABLED	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24280	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
This setpoint enable or disable module in slot A.			

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## Group: Alternate Config

### Subgroup: Basic settings

### Connection Type 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
<b>Default value</b>	3Ph4Wire	<b>Alternative config</b>	YES
<b>Step</b>	[-]		
<b>Comm object</b>	12058	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Connection type:			

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
SplitPhase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SpIPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SpIPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
Autodetect	<p>High Leg Delta <span style="float: right;">L1 &gt;=100V; L1 &lt;=140V</span></p> <p>or <span style="float: right;">L2 &gt;=140V</span></p> <p><span style="float: right;">L3 &gt;=100V; L3 &lt;=140V</span></p> <p>3PH3Wire or 3Ph4Wire <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &gt;=100V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>SpIPhL1L2 <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &gt;=100V</span></p> <p><span style="float: right;">L3 &lt;= 20V</span></p> <p>SpIPhL1L3 <span style="float: right;">L1 &gt;=100V</span></p>

or	L2 <= 20V
	L3 >=100V
Mono Phase	L1 >=100V
or	L2 <= 20V
	L3 <= 20V
<b>Voltage Autodetect</b> shutdown	

**Note:** This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 404)** is active.

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### Nominal Current 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 10 000 [A]		
<b>Default value</b>	350 A	<b>Alternative config</b>	YES
<b>Step</b>	1 A		
<b>Comm object</b>	12049	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.			
<b>Note:</b> This value is used when any other alternate configuration is not active.			

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### Nominal Frequency 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	45 .. 65 [Hz]		
<b>Default value</b>	50 Hz	<b>Alternative config</b>	YES
<b>Step</b>	1 Hz		
<b>Comm object</b>	9913	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal system frequency (usually 50 or 60 Hz).			
<b>Note:</b> This value is used when any other alternate configuration is not active.			

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## Nominal RPM 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	100 .. 4000 [RPM]		
<b>Default value</b>	1 500 RPM	<b>Alternative config</b>	YES
<b>Step</b>	1 RPM		
<b>Comm object</b>	9915	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal engine speed (RPM - revolutions per minute).			
<i>Note: This value is used when any other alternate configuration is not active.</i>			

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## Nominal Voltage Ph-N 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 20000 [V]		
<b>Default value</b>	231 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	12052	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection Type 1 (page 268)</b> .		
<b>Description</b>			
Nominal system voltage (phase to neutral).			
<i>Note: This value is used when any other alternate configuration is not active.</i>			

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## Nominal Voltage Ph-Ph 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 40000 [V]		
<b>Default value</b>	400 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	12055	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection Type 1 (page 268)</b> .		
<b>Description</b>			
Nominal system voltage (phase to phase).			
<i>Note: This value is used when any other alternate configuration is not active.</i>			

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## Nominal Power 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	12046	<b>Related applications</b>	AMF, MRS,
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal power of the gen-set. Generator <b>Overload BOC (page 216)</b> protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type (page 175)</b> 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.</i>			
<i>Note: This value is used when any other alternate configuration is not active.</i>			

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## Nominal Power Split Phase 1

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	15771	<b>Related applications</b>	AMF, MRS,
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type (page 175)</b>		
<b>Description</b>			
Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC (page 216)</b> protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type (page 175)</b> is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.</i>			
<i>Note: This value is used when any other alternate configuration is not active.</i>			

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## Connection type 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
<b>Default value</b>	3Ph4Wire	<b>Alternative config</b>	YES
<b>Step</b>	[-]		
<b>Comm object</b>	12059	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		

<b>Setpoint visibility</b>	Always	
<b>Description</b>		
Connection type:		
Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)	
SplitPhase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)	
SpIPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)	
SpIPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)	
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)	
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)	
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)	
Autodetect	High Leg Delta	L1 >=100V; L1 <=140V L2 >=140V L3 >=100V; L3 <=140V
	or	
	3PH3Wire or 3Ph4Wire	L1 >=100V L2 >=100V L3 >=100V
	or	
	SpIPhL1L2	L1 >=100V

	or	L2 >=100V L3 <= 20V
	SplPhL1L3	L1 >=100V L2 <= 20V
	or	L3 >=100V
	Mono Phase	L1 >=100V L2 <= 20V
	or	L3 <= 20V
<b>Voltage Autodetect</b> shutdown		

**Note:** This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 404)** is active.

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### Nominal Current 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 10000 [A]		
<b>Default value</b>	350 A	<b>Alternative config</b>	YES
<b>Step</b>	1 A		
<b>Comm object</b>	12050	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.			
<b>Note:</b> This value is used when binary input <b>ALTERNATE CONFIG 2 (PAGE 404)</b> is active.			

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### Nominal Frequency 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	45 .. 65 [Hz]		
<b>Default value</b>	50 Hz	<b>Alternative config</b>	YES
<b>Step</b>	1 Hz		
<b>Comm object</b>	9914	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal system frequency (usually 50 or 60 Hz).			
<b>Note:</b> This value is used when binary input <b>ALTERNATE CONFIG 2 (PAGE 404)</b> is active.			

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## Nominal RPM 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	100 .. 4000 [RPM]		
<b>Default value</b>	1 500 RPM	<b>Alternative config</b>	YES
<b>Step</b>	1 RPM		
<b>Comm object</b>	9916	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal engine speed (RPM - revolutions per minute).			
<i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 404) is active.</i>			

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## Nominal Voltage Ph-N 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 20000 [V]		
<b>Default value</b>	231 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	12053	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type 2 (page 272)</b> .		
<b>Description</b>			
Nominal system voltage (phase to neutral).			
<i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 404) is active.</i>			

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## Nominal Voltage Ph-Ph 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 40000 [V]		
<b>Default value</b>	400 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	12056	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type 2 (page 272)</b> .		
<b>Description</b>			
Nominal system voltage (phase to phase).			
<i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 404) is active.</i>			

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## Nominal Power 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	12047	<b>Related applications</b>	AMF, MRS,
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal power of the gen-set. Generator <b>Overload BOC</b> (page 216) protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type</b> (page 175) 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.</i>			
<i>Note: This value is used when binary input <b>ALTERNATE CONFIG 2</b> (PAGE 404) is active.</i>			

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## Nominal Power Split Phase 2

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	15772	<b>Related applications</b>	AMF, MRS,
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type</b> (page 175)		
<b>Description</b>			
Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC</b> (page 216) protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type</b> (page 175) is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.</i>			
<i>Note: This value is used when binary input <b>ALTERNATE CONFIG 2</b> (PAGE 404) is active.</i>			

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## Connection type 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
<b>Default value</b>	3Ph4Wire	<b>Alternative config</b>	YES
<b>Step</b>	[-]		
<b>Comm object</b>	12060	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		

<b>Setpoint visibility</b>	Always	
<b>Description</b>		
Connection type:		
Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)	
SplitPhase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)	
SpIPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)	
SpIPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)	
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)	
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)	
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)	
Autodetect	High Leg Delta	L1 >=100V; L1 <=140V L2 >=140V L3 >=100V; L3 <=140V
	or	
	3PH3Wire or 3Ph4Wire	L1 >=100V L2 >=100V L3 >=100V
	or	
	SpIPhL1L2	L1 >=100V

	or	L2 >=100V L3 <= 20V
	SplPhL1L3	L1 >=100V L2 <= 20V
	or	L3 >=100V
	Mono Phase	L1 >=100V L2 <= 20V
	or	L3 <= 20V
<b>Voltage Autodetect</b> shutdown		

**Note:** This value is used when binary input **ALTERNATE CONFIG 3** (PAGE 404) is active.

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### Nominal Current 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 10 000 [A]		
<b>Default value</b>	350 A	<b>Alternative config</b>	YES
<b>Step</b>	1 A		
<b>Comm object</b>	12051	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.			
<b>Note:</b> This value is used when binary input <b>ALTERNATE CONFIG 3</b> (PAGE 404) is active.			

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### Nominal Frequency 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	45 .. 65 [Hz]		
<b>Default value</b>	50 Hz	<b>Alternative config</b>	YES
<b>Step</b>	1 Hz		
<b>Comm object</b>	15197	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal system frequency (usually 50 or 60 Hz).			
<b>Note:</b> This value is used when binary input <b>ALTERNATE CONFIG 3</b> (PAGE 404) is active.			

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### Nominal RPM 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	100 .. 4 000 [RPM]		
<b>Default value</b>	1 500 RPM	<b>Alternative config</b>	YES
<b>Step</b>	1 RPM		
<b>Comm object</b>	15196	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal engine speed (RPM - revolutions per minute).			
<i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 404) is active.</i>			

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### Nominal Voltage Ph-N 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 20 000 [V]		
<b>Default value</b>	231 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	12054	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type 3 (page 276)</b> .		
<b>Description</b>			
Nominal system voltage (phase to neutral).			
<i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 404) is active.</i>			

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### Nominal Voltage Ph-Ph 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	80 .. 40 000 [V]		
<b>Default value</b>	400 V	<b>Alternative config</b>	YES
<b>Step</b>	1 V		
<b>Comm object</b>	12057	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type 3 (page 276)</b> .		
<b>Description</b>			
Nominal system voltage (phase to phase).			
<i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 404) is active.</i>			

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### Nominal Power 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	12048	<b>Related applications</b>	AMF, MRS,
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Always		
<b>Description</b>			
Nominal power of the gen-set. Generator <b>Overload BOC</b> (page 216) protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type</b> (page 175) 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.</i>			
<i>Note: This value is used when binary input <b>ALTERNATE CONFIG 3</b> (PAGE 404) is active.</i>			

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### Nominal Power Split Phase 3

<b>Setpoint group</b>	Basic settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	1 .. 5 000 [kW]		
<b>Default value</b>	200 kW	<b>Alternative config</b>	Yes
<b>Step</b>	1 kW		
<b>Comm object</b>	15773	<b>Related applications</b>	AMF, MRS,
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Conditioned by the setpoint <b>Connection type</b> (page 175)		
<b>Description</b>			
Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC</b> (page 216) protection is based on this setpoint.			
<i>Note: This setpoint is used when setpoint <b>Connection type</b> (page 175) is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.</i>			
<i>Note: This value is used when binary input <b>ALTERNATE CONFIG 3</b> (PAGE 404) is active.</i>			

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## Subgroup: Engine settings

### ECU Speed Adjustment 1

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 100 [%]		
<b>Default value</b>	50 %	<b>Alternative config</b>	NO
<b>Step</b>	1 %		
<b>Comm object</b>	14337	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
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.			
<i>Note: This value is used when any other alternate configuration is not active.</i>			

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### ECU Speed Adjustment 2

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 100 [%]		
<b>Default value</b>	50 %	<b>Alternative config</b>	NO
<b>Step</b>	1 %		
<b>Comm object</b>	14338	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
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.			
<i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 404) is active.</i>			

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### ECU Speed Adjustment 3

<b>Setpoint group</b>	Engine settings	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0 .. 100 [%]		
<b>Default value</b>	50 %	<b>Alternative config</b>	NO
<b>Step</b>	1 %		
<b>Comm object</b>	15199	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Advanced		
<b>Setpoint visibility</b>	Visible only if ECU is configured		
<b>Description</b>			
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.			
<i>Note: This value is used when binary input <b>ALTERNATE CONFIG 3 (PAGE 404)</b> is active.</i>			

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### Group: CM-RS232-485

#### COM1 Mode

<b>Setpoint group</b>	CM-RS232-485	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Direct / MODBUS / DualSlave / Dual Master [-]		
<b>Default value</b>	Direct	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24522	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Communication protocol switch for the COM1 channel.			
Direct	InteliConfig communication protocol via serial cable.		
MODBUS	MODBUS protocol.		

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## COM1 Communication Speed

<b>Setpoint group</b>	CM-RS232-485	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	9600 / 19200 / 38400 / 57600 / 115200[bps]		
<b>Default value</b>	57600 bps	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24341	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>COM1 Mode (page 282)</b>		
<b>Description</b>			
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.			
<i>Note: Winscope supports only 19200, 38400, 57600 speeds.</i>			

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## COM1 MODBUS Communication Speed

<b>Setpoint group</b>	CM-RS232-485	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
<b>Default value</b>	9600 bps	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24477	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>COM1 Mode (page 282)</b>		
<b>Description</b>			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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## COM2 Mode

<b>Setpoint group</b>	CM-RS232-485	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Direct / MODBUS / DualSlave / Dual Master [-]		
<b>Default value</b>	Direct	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24451	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Communication protocol switch for the COM2 channel.			
Direct	InteliConfig communication protocol via serial cable.		
MODBUS	MODBUS protocol.		

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## COM2 Communication Speed

<b>Setpoint group</b>	CM-RS232-485	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	9600 / 19200 / 38400 / 57600 / 115200[bps]		
<b>Default value</b>	57600 bps	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24340	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>COM2 Mode (page 284)</b>		
<b>Description</b>			
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.			
<b>Note:</b> Winscope supports only 19200, 38400, 57600 speeds.			

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## COM2 MODBUS Communication Speed

<b>Setpoint group</b>	CM-RS232-485	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
<b>Default value</b>	9600 bps	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24420	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>COM2 Mode (page 284)</b>		
<b>Description</b>			
If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here.			

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## Group: CM-GPRS

### Message Language

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[-]		
<b>Default value</b>	English	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24299	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Use this setpoint to set the language of SMS and e-mail.			
<p><b>Note:</b> Numbers correspond with languages in language list. See the chapter for <b>Language selection (page 87)</b> more information.</p>			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Time Zone

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	GMT-12:00 .. GMT+13:00 [hours]		
<b>Default value</b>	GMT+1:00 hour	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24366	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>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.</p> <p><b>Note:</b> 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.</p> <p><b>Note:</b> This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</p>			

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## Event Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10926	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>This setpoint enables or disables Event Messages.</p> <p>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</p>			

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## Wrn Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8482	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Wrn Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## BOC Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10566	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables BOC Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Sd Messages

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8484	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Sd Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Telephone Number 1

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..31 characters [-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24296	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix.			
<div style="background-color: #f0f0f0; padding: 5px;"> <b>IMPORTANT: Telephone number has to be entered without spaces.</b> </div>			

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## Group: CM-4G-GPS

### Message Language

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[-]		
<b>Default value</b>	English	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24299	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Use this setpoint to set the language of SMS and e-mail.			
<div style="background-color: #f0f0f0; padding: 5px;"> <b>Note:</b> Numbers correspond with languages in language list. See the chapter for <i>Language selection (page 87)</i> more information.         </div>			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Time Zone

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	GMT-12:00 .. GMT+13:00 [hours]		
<b>Default value</b>	GMT+1:00 hour	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24366	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>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.</p> <p><b>Note:</b> 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.</p> <p><b>Note:</b> This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</p>			

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## Event Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10926	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>This setpoint enables or disables Event Messages.</p> <p>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</p>			

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## Wrn Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8482	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Wrn Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## BOC Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10566	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables BOC Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Sd Messages

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8484	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Sd Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Telephone Number 1

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..31 characters [-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24296	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix.			
<div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: Telephone number has to be entered without spaces.</b></div>			

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## Group: CM-Ethernet

### Email Address 1

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..63 characters [-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24298	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent.			
<div style="background-color: #f0f0f0; padding: 5px;"><b>Note: This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</b></div>			

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## Message Language

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	[-]		
<b>Default value</b>	English	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24299	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Use this setpoint to set the language of SMS and e-mail.			
<p><b>Note:</b> Numbers correspond with languages in language list. See the chapter for <i>Language selection</i> (page 87) more information.</p>			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Time Zone

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	GMT-12:00 .. GMT+13:00 [hours]		
<b>Default value</b>	GMT+1:00 hour	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24366	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
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.			
<p><b>Note:</b> 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.</p>			
<p><b>Note:</b> This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.</p>			

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## Event Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10926	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Event Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Wrn Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8482	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Wrn Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## BOC Message

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	10566	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables BOC Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## Sd Messages

<b>Setpoint group</b>	CM-GPRS; CM-4G-GPS; CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	ON / OFF [-]		
<b>Default value</b>	ON	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	8484	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
This setpoint enables or disables Sd Messages.			
This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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## SMTP UserName

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..31 characters [-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24370	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
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

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..15 characters [-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24369	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

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## SMTP Server Address

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..31 characters [-]		
<b>Default value</b>	airgate.comap.cz:9925	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24368	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>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.</p>			

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## SMTP Sender Address

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	0..31 characters [-]		
<b>Default value</b>	[-]	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24367	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>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.</p>			
<p><b>Note:</b> <i>It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i></p>			
<p><b>IMPORTANT: This item is obligatory when emails are configured.</b></p>			

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## IP Address Mode

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	FIXED / AUTOMATIC [-]		
<b>Default value</b>	AUTOMATIC	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24259	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
The setpoint is used to select the method how the ethernet connection is adjusted.			
<b>DISABLED:</b>	The Ethernet connection is fixed by means of the setpoints <u>IP Addr</u> , <u>NetMask</u> , <u>GateIP</u> , <u>DNS IP Address</u> .		
	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).		
<b>ENABLED:</b>	The Ethernet connection setting is obtained <b>automatically from the DHCP server</b> . 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 <i>000.000.000.000</i> is copied to the setpoint IP address and the module continues to try to obtain the settings.		

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## IP Address

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Valid IP address [-]		
<b>Default value</b>	192.168.1.254	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24376	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode (page 296)</b>		
<b>Description</b>			
The setpoint is used to set the address when you are in static mode.			
If <b>IP Address Mode (page 296)</b> is FIXED this setpoint is used to adjust the IP address of the ethernet interface of the controller. Ask your IT specialist for help with this setting.			
If <b>IP Address Mode (page 296)</b> is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.			

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## Subnet Mask

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Valid IP address [-]		
<b>Default value</b>	255.255.255.0	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24375	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode (page 296)</b>		
<b>Description</b>			
<p>The setpoint is used to select the method how the Subnet Mask is adjusted.</p> <p>If <b>IP Address Mode (page 296)</b> is FIXED this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.</p> <p>If <b>IP Address Mode (page 296)</b> is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.</p>			

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## Gateway IP

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Valid IP address [-]		
<b>Default value</b>	192.168.1.1	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24373	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode (page 296)</b>		
<b>Description</b>			
<p>The setpoint is used to select the method how the Gateway IP is adjusted.</p> <p>If <b>IP Address Mode (page 296)</b> is DISABLE this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected.</p> <p>If <b>IP Address Mode (page 296)</b> is ENABLED this setpoint is used to display the gateway IP address which has been assigned by the DHCP server.</p> <p>A gateway is a device which connects the respective segment with the other segments and/or Internet.</p>			

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## DNS IP Address 1

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Valid IP address [-]		
<b>Default value</b>	8.8.8.8	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24362	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>The setpoint is used to select the method how the DNS Address 1 is adjusted.</p> <p>If <b>IP Address Mode (page 296)</b> 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.</p> <p>If <b>IP Address Mode (page 296)</b> is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.</p>			

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## DNS IP Address 2

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Valid IP address [-]		
<b>Default value</b>	8.8.8.8	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24331	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
<p>The setpoint is used to select the method how the DNS Address 2 is adjusted.</p> <p>If <b>IP Address Mode (page 296)</b> 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.</p> <p>If <b>IP Address Mode (page 296)</b> is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.</p>			

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## MODBUS Server

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	DISABLED / ENABLED [-]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24337	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed		
<b>Description</b>			
Enable or disable MODBUS communication via ethernet interface.			

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## Web Interface

<b>Setpoint group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Disabled / Enabled [-]		
<b>Default value</b>	Disabled	<b>Alternative config</b>	NO
<b>Step</b>	[-]		
<b>Comm object</b>	24110	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode</b> (page 296)		
<b>Description</b>			
The setpoint is used to enable/disable WebServer function.			

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## Group: PLC

### PLC Setpoint 1

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10440	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

#### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

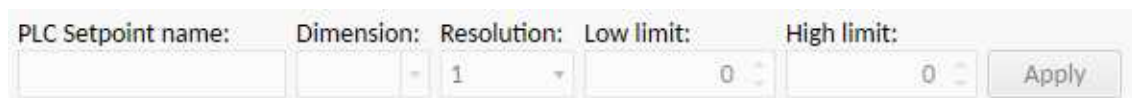


Image 8.16 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 2

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10441	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

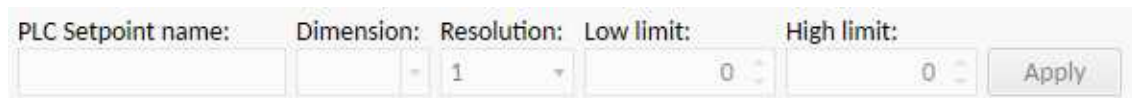


Image 8.17 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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### PLC Setpoint 3

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10442	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

#### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

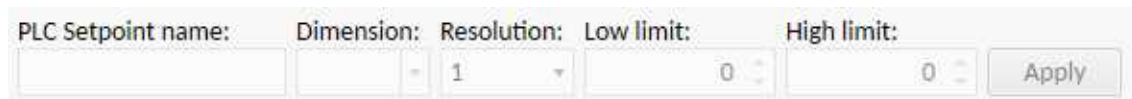


Image 8.18 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 4

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10443	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

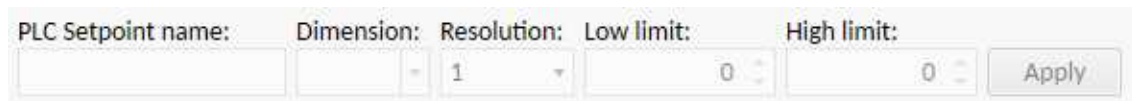


Image 8.19 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 5

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10444	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

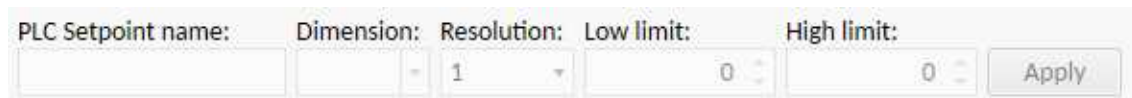


Image 8.20 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 6

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10445	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

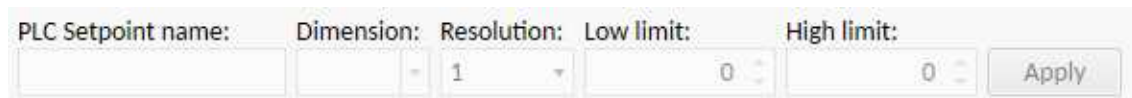


Image 8.21 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 7

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10446	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

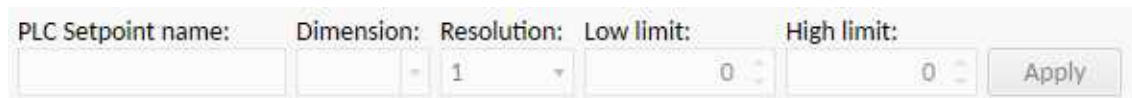


Image 8.22 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 8

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10447	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

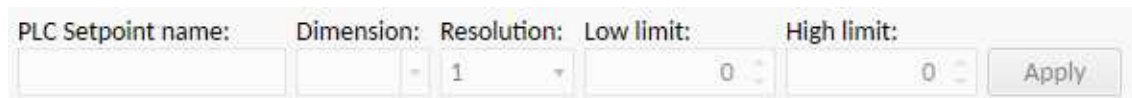


Image 8.23 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 9

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10448	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

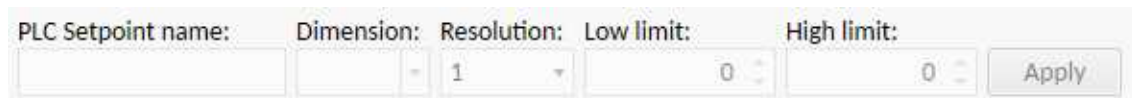


Image 8.24 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 10

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10449	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

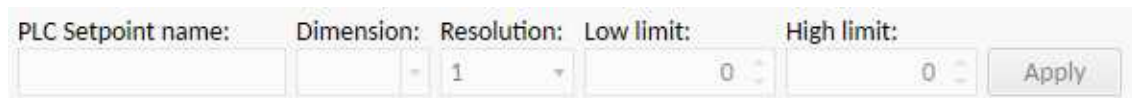


Image 8.25 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 11

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10450	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

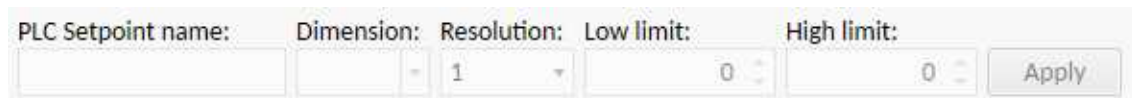


Image 8.26 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 12

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10451	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

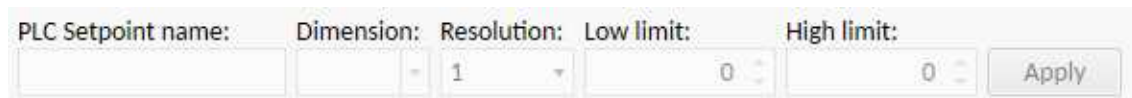


Image 8.27 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 13

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10452	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

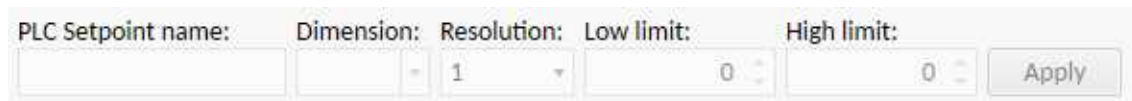


Image 8.28 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 14

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10453	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

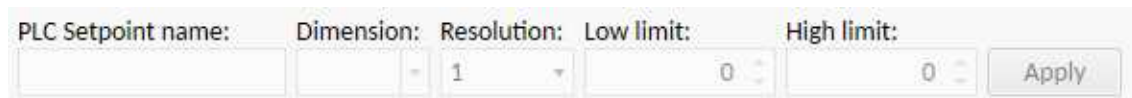


Image 8.29 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 15

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10454	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

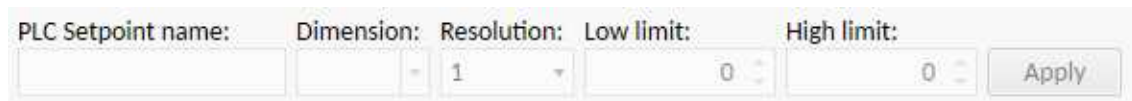


Image 8.30 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 16

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10455	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

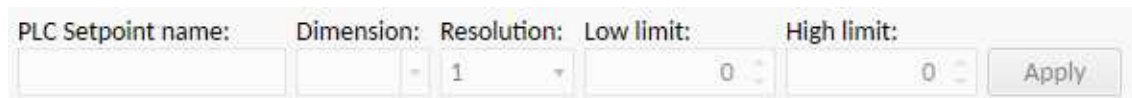


Image 8.31 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 17

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10456	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

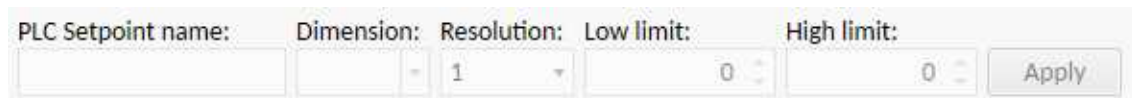


Image 8.32 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 18

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10457	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

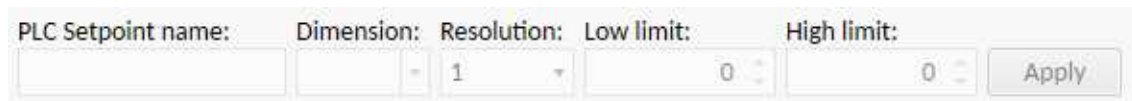


Image 8.33 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 19

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10458	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

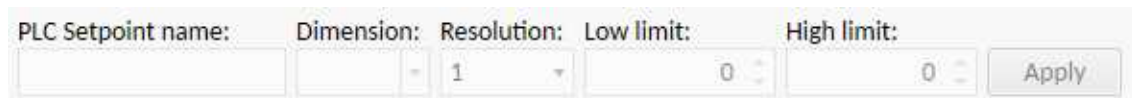


Image 8.34 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 20

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10459	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

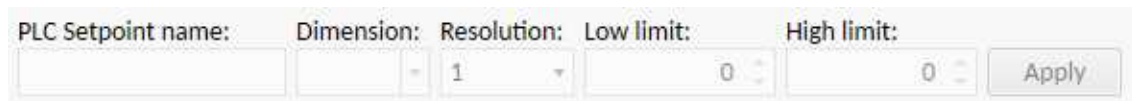


Image 8.35 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 21

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10460	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

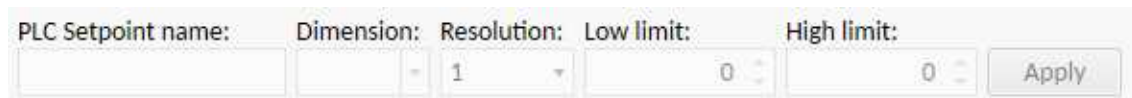


Image 8.36 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 22

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10461	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

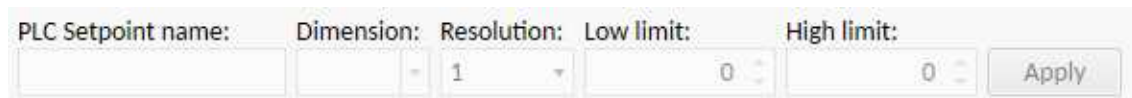


Image 8.37 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 23

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10462	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

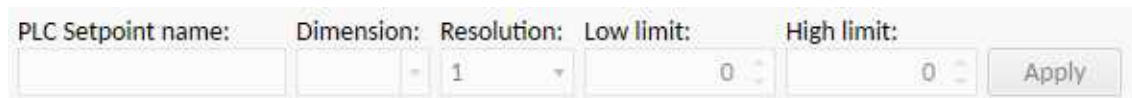


Image 8.38 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 24

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10463	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

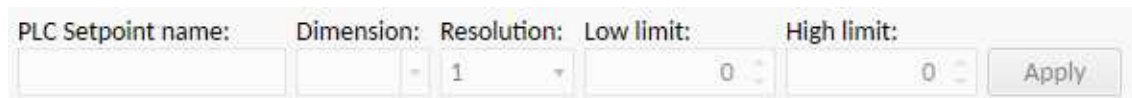


Image 8.39 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 25

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10464	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

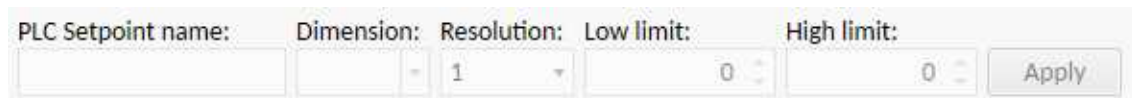


Image 8.40 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 26

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10465	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

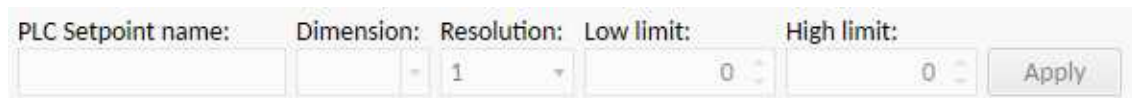


Image 8.41 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 27

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10466	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

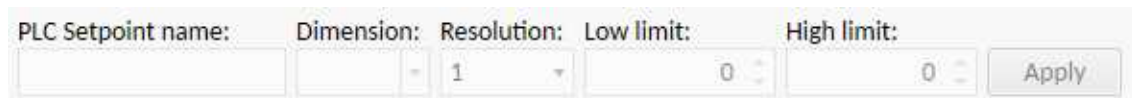


Image 8.42 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 28

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10467	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

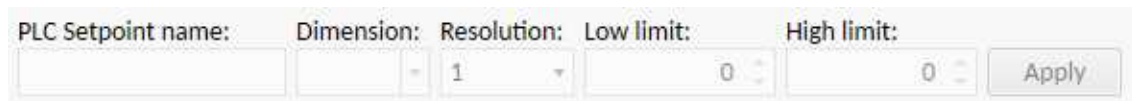


Image 8.43 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 29

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10468	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

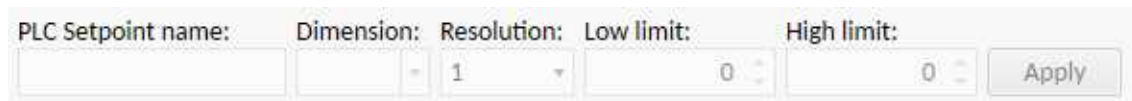


Image 8.44 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 30

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10469	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

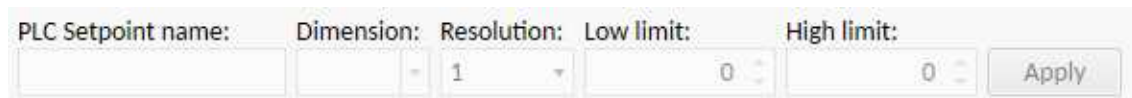


Image 8.45 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 31

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10470	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

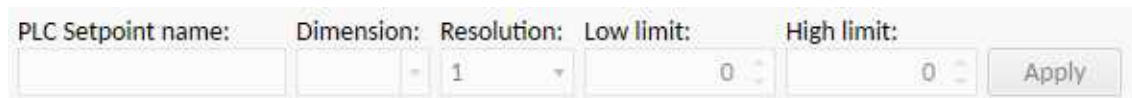


Image 8.46 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 32

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10471	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

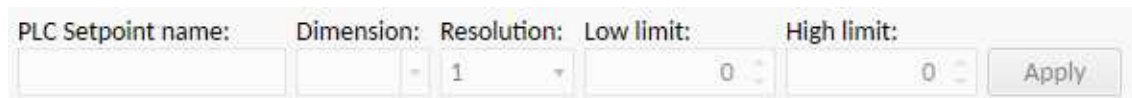


Image 8.47 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 33

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10472	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

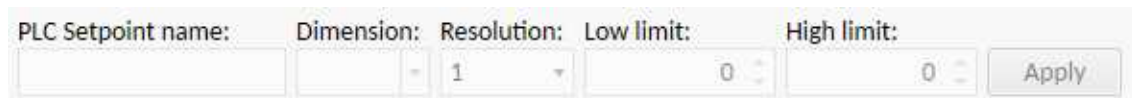


Image 8.48 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 34

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10473	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

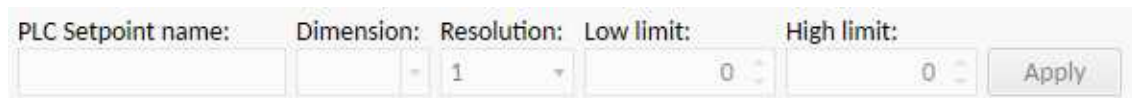


Image 8.49 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 35

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10474	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

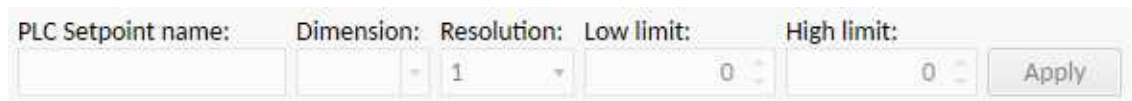


Image 8.50 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 36

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10475	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

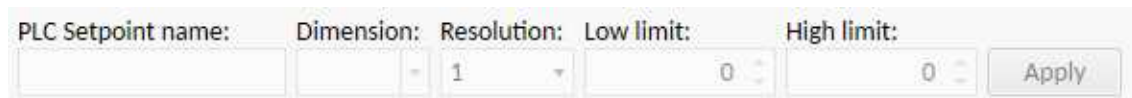


Image 8.51 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 37

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10476	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

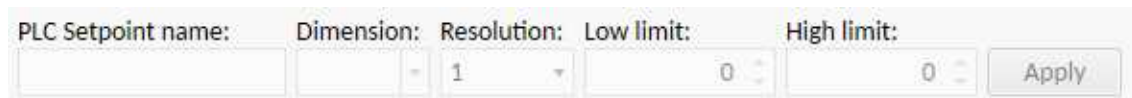


Image 8.52 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 38

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10477	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

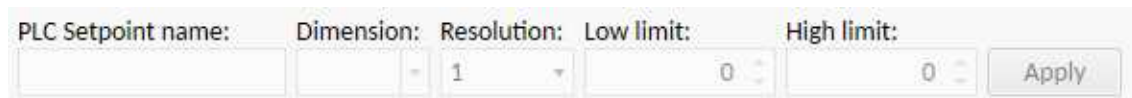


Image 8.53 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 39

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10478	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

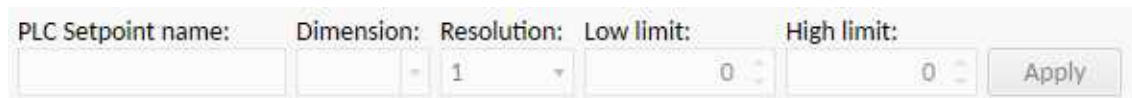


Image 8.54 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 40

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10479	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

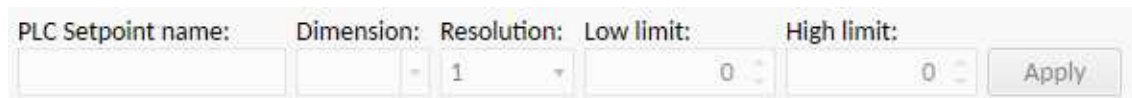


Image 8.55 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 41

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10480	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

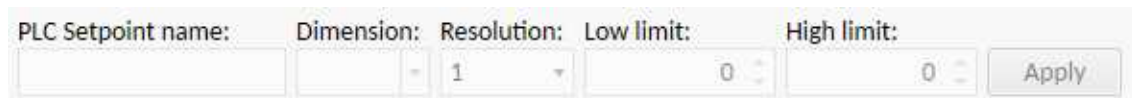


Image 8.56 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 42

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10481	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

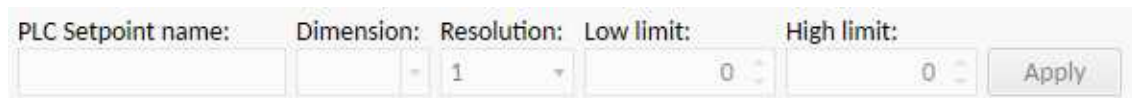


Image 8.57 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 43

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10482	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

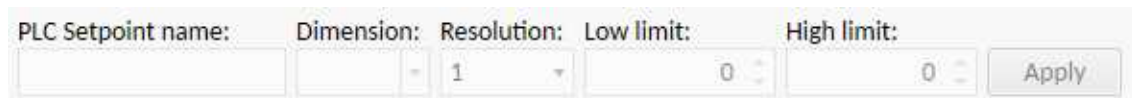


Image 8.58 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 44

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10483	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

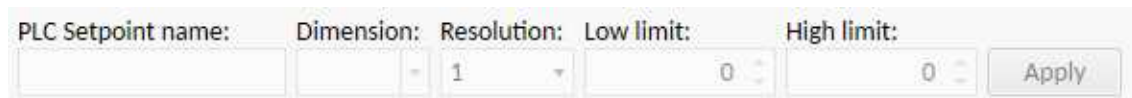


Image 8.59 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 45

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10484	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

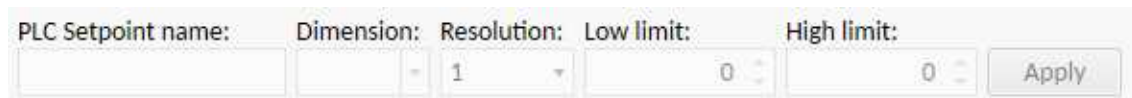


Image 8.60 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 46

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10485	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

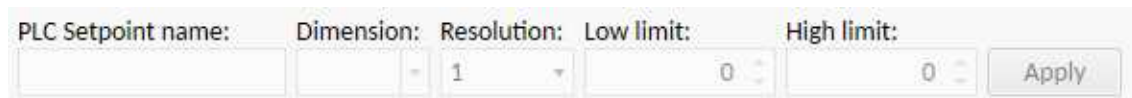


Image 8.61 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 47

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10486	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

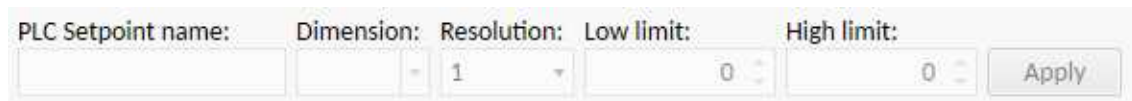


Image 8.62 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 48

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10487	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

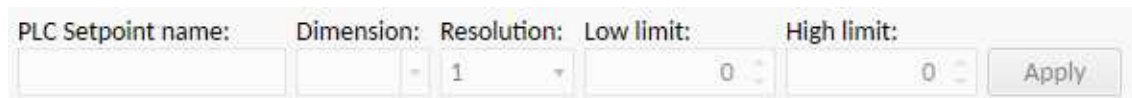


Image 8.63 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 49

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10488	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

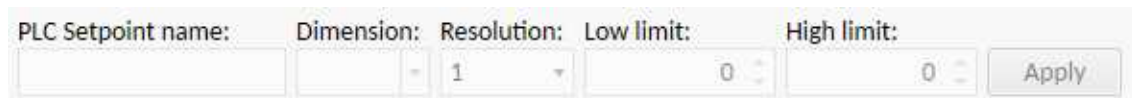


Image 8.64 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 50

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10489	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

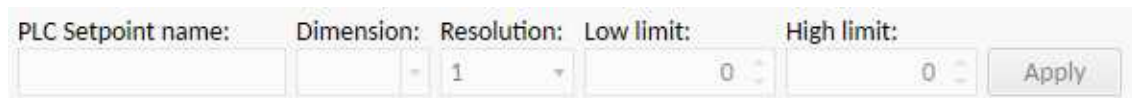


Image 8.65 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 51

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10490	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

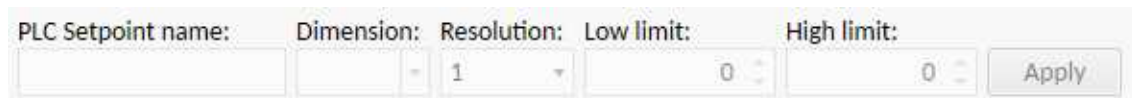


Image 8.66 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 52

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10491	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

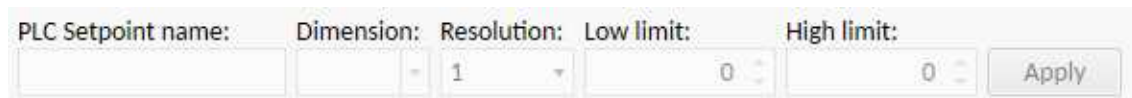


Image 8.67 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 53

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10492	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

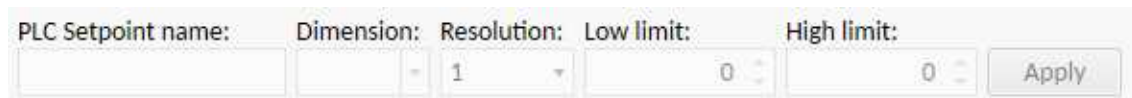


Image 8.68 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 54

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10493	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

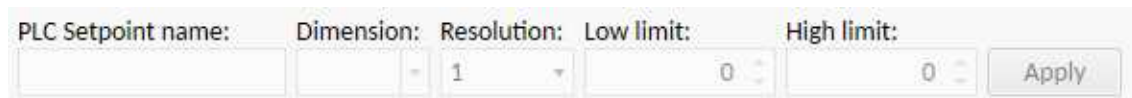


Image 8.69 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 55

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10494	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

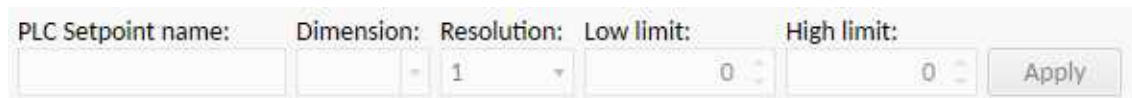


Image 8.70 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 56

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10495	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

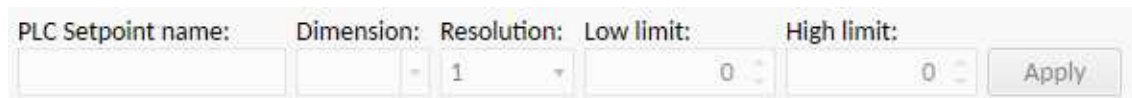


Image 8.71 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 57

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10496	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

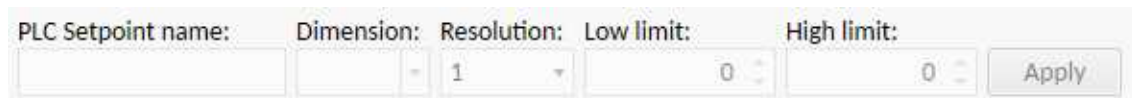


Image 8.72 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 58

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10497	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

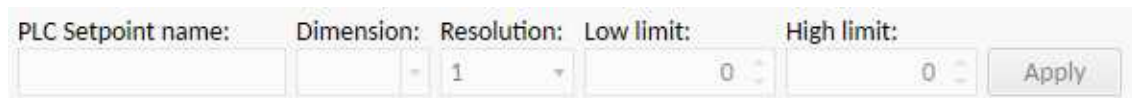


Image 8.73 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 59

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10498	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

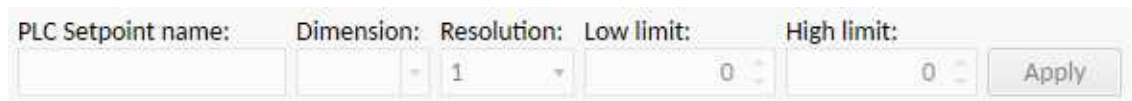


Image 8.74 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 60

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10499	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

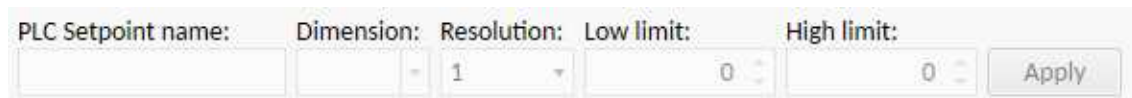


Image 8.75 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 61

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10500	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

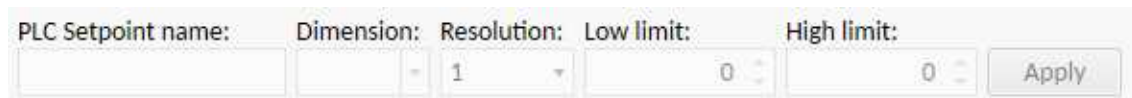


Image 8.76 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 62

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10501	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

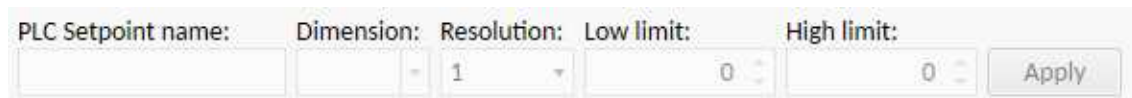


Image 8.77 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 63

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10502	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

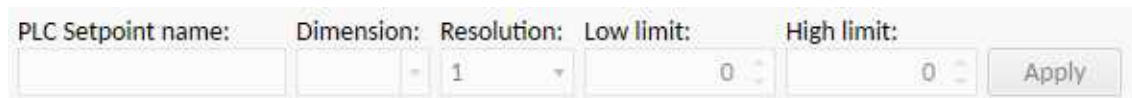


Image 8.78 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## PLC Setpoint 64

<b>Setpoint group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Range [units]</b>	Depends on resolution of value [-]		
<b>Default value</b>	Depends on resolution of value [-]	<b>Alternative config</b>	NO
<b>Step</b>	Depends on resolution of value [-]		
<b>Comm object</b>	10503	<b>Related applications</b>	AMF, MRS
<b>Config level</b>	Standard		
<b>Setpoint visibility</b>	Only if relevant setpoint is used in PLC		

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

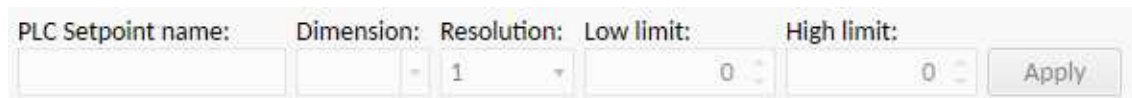


Image 8.79 Screen of configuration from IntelliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

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## 8.1.2 Values

### What values are:

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

### Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- ▶ The value is not being evaluated in the scope of the current application and configuration.
- ▶ Sensor fail has been detected on an analog input.
- ▶ The configured ECU or extension module does not provide the particular value.
- ▶ The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as “####” in IntelliConfig 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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For full list of setpoints go to the chapter **List of values (page 365)**.

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## Group: Engine

### DEF Level

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	14522	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The level of diesel exhaust fluid tank.			

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### DPFAshLoad

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	12483	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The rate of ash in DPF (Diesel particulate filter).			

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### DPFSootLoad

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	12484	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The rate of soot in DPF (Diesel particulate filter).			

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### ECU-BIN 1

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10153	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<p><b>Note:</b> 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.</p>			

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## ECU-BIN 2

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10154	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i>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.</i>			

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## ECU-BIN 3

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10155	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i>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.</i>			

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## ECU-BIN 4

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10156	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i>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.</i>			

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## ECU-BIN 5

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10157	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i>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.</i>			

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## ECU-BIN 6

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10158	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i><b>Note:</b> 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.</i>			

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## ECU-BIN 7

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10159	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i><b>Note:</b> 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.</i>			

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## ECU-BIN 8

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10160	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i><b>Note:</b> 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.</i>			

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## ECU-BIN 9

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10161	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<i><b>Note:</b> 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.</i>			

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## ECU-BIN-EXT-1

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	Depends on ECU value		
<b>Comm object</b>	10173	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.			
<p><b>Note:</b> 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.</p>			

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## ECU Frequency Select

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	-		
<b>Comm object</b>	12926	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Shows selected frequency of ECU. The value is calculated from setpoint <b>Nominal Frequency (page 178)</b>			
<ul style="list-style-type: none"> <li>▶ If is <b>Nominal Frequency (page 178)</b> in range from 45 Hz to 54 Hz, is considered as 50 Hz application. The value is set to 0.</li> <li>▶ If is <b>Nominal Frequency (page 178)</b> in range from 55 Hz to 65 Hz, is considered as 60 Hz application. The value is set to 1.</li> </ul>			

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## ECU State

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	-		
<b>Comm object</b>	10034	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Shows binary status (0 or 1) of ECU:			
<ul style="list-style-type: none"> <li>▶ ECU Yellow Lamp</li> <li>▶ ECU Red Lamp</li> <li>▶ Wait To Start</li> </ul>			

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## RPM

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	RPM		
<b>Comm object</b>	10123	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This value contains the current engine speed. The value is obtained from one of the following sources: <ul style="list-style-type: none"> <li>▶ ECU, if an ECU is configured</li> <li>▶ Pickup input</li> <li>▶ Generator frequency</li> </ul>			

[◀ back to List of values](#)

## Speed Request

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0												
<b>Units</b>	%														
<b>Comm object</b>	10137	<b>Related applications</b>	AMF, MRS												
<b>Description</b>															
Engine speed control via CAN bus.															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Speed request</th> <th>Requested speed</th> <th>Accelerator pedal position</th> </tr> </thead> <tbody> <tr> <td>0%</td> <td>1350 RPM</td> <td>0%</td> </tr> <tr> <td>50%</td> <td>1500 RPM</td> <td>50%</td> </tr> <tr> <td>100%</td> <td>1650 RPM</td> <td>100%</td> </tr> </tbody> </table>				Speed request	Requested speed	Accelerator pedal position	0%	1350 RPM	0%	50%	1500 RPM	50%	100%	1650 RPM	100%
Speed request	Requested speed	Accelerator pedal position													
0%	1350 RPM	0%													
50%	1500 RPM	50%													
100%	1650 RPM	100%													

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## Speed Required RPM

<b>Value group</b>	Engine	<b>Related FW</b>	1.9.0
<b>Units</b>	RPM		
<b>Comm object</b>	10006	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Requested engine speed.			

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## Group: Generator

### Generator Frequency

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	Hz		
<b>Comm object</b>	8210	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Frequency of generator.			

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### Generator Voltage L1-L2

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9628	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator phase to phase voltage between L1 and L2 phases.			

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### Generator Voltage L1-N

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8192	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator voltage on phase 1.			

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### Generator Voltage L2-L3

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9629	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator phase to phase voltage between L2 and L3 phases.			

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### Generator Voltage L2-N

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8193	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator voltage on phase 2.			

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### Generator Voltage L3-L1

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9630	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator phase to phase voltage between L3 and L1 phases.			

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### Generator Voltage L3-N

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8194	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator voltage on phase 3.			

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### Nominal Current

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	A		
<b>Comm object</b>	9978	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator nominal current.			

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### Nominal Power

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9018	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator nominal power.			

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### Nominal Voltage

<b>Value group</b>	Generator	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9917	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator nominal voltage.			

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## Group: Load

### Load A L1

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	A		
<b>Comm object</b>	8198	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load current phase L1.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load A L2

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	A		
<b>Comm object</b>	8199	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load current phase L2.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load A L3

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	A		
<b>Comm object</b>	8200	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load current phase L3.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load Characteristic

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8395	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Character of the load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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### Load Characteristic L1

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8626	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Character of the generator load in the L1 phase. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

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### Load Characteristic L2

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8627	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Character of the generator load in the L2 phase. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

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### Load Characteristic L3

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8628	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Character of the generator load in the L3 phase. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

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### Load kVA

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kVA		
<b>Comm object</b>	8565	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load apparent power.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via IntelliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVA L1

Value group	Load	Related FW	1.9.0
Units	kVA		
Comm object	8530	Related applications	AMF, MRS
<b>Description</b>			
Load apparent power L1.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVA L2

Value group	Load	Related FW	1.9.0
Units	kVA		
Comm object	8531	Related applications	AMF, MRS
<b>Description</b>			
Load apparent power L2.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVA L3

Value group	Load	Related FW	1.9.0
Units	kVA		
Comm object	8532	Related applications	AMF, MRS
<b>Description</b>			
Load apparent power L3.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVAr

Value group	Load	Related FW	1.9.0
Units	kVAr		
Comm object	8203	Related applications	AMF, MRS
<b>Description</b>			
Load reactive power.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVAr L1

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kVAr		
<b>Comm object</b>	8527	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load reactive power in phase L1.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVAr L2

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kVAr		
<b>Comm object</b>	8528	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load reactive power in phase L2.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kVAr L3

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kVAr		
<b>Comm object</b>	8529	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load reactive power in phase L3.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kW

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kW		
<b>Comm object</b>	8202	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load active power.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kW L1

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kW		
<b>Comm object</b>	8524	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load active power in phase L1.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kW L2

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kW		
<b>Comm object</b>	8525	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load active power in phase L2.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load kW L3

<b>Value group</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	kW		
<b>Comm object</b>	8526	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Load active power in phase L3.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Load Power Factor

<b>Load</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8204	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator power factor.			

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### Load Power Factor L1

<b>Load</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8533	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator power factor in phase L1.			

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### Load Power Factor L2

<b>Load</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8534	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator power factor in phase L2.			

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### Load Power Factor L3

<b>Load</b>	Load	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8535	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Generator power factor in phase L3.			

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## Group: Mains

### Mains Frequency

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	Hz		
<b>Comm object</b>	8211	<b>Related applications</b>	AMF
<b>Description</b>			
Frequency of mains.			

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### Mains Voltage L1-L2

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9631	<b>Related applications</b>	AMF
<b>Description</b>			
Mains phase to phase voltage between L1 and L2 phases.			

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### Mains Voltage L1-N

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8195	<b>Related applications</b>	AMF
<b>Description</b>			
Mains voltage on phase 1.			

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### Mains Voltage L2-L3

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9632	<b>Related applications</b>	AMF
<b>Description</b>			
Mains phase to phase voltage between L2 and L3 phases.			

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### Mains Voltage L2-N

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8196	<b>Related applications</b>	AMF
<b>Description</b>			
Mains voltage on phase 2.			

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### Mains Voltage L3-L1

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	9633	<b>Related applications</b>	AMF
<b>Description</b>			
Mains phase to phase voltage between L3 and L1 phases.			

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### Mains Voltage L3-N

<b>Value group</b>	Mains	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8197	<b>Related applications</b>	AMF
<b>Description</b>			
Mains voltage on phase 3.			

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## Group: Controller I/O

### Analog Input 1

<b>Value group</b>	Controller I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	Configurable		
<b>Comm object</b>	9151	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is the value of the analog input 1 of the controller.			

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### Analog Input 2

<b>Value group</b>	Controller I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	Configurable		
<b>Comm object</b>	9152	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is the value of the analog input 2 of the controller.			

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### Analog Input 3

<b>Value group</b>	Controller I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	Configurable		
<b>Comm object</b>	9153	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is the value of the analog input 3 of the controller.			

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### Battery Volts

<b>Value group</b>	Controller I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	8213	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Controller supply voltage.			

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### Binary Inputs

<b>Value group</b>	Controller I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8235	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of the binary inputs of the controller.			

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## Binary Outputs

<b>Value group</b>	Controler I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8239	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of the binary outputs of the controller.			

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## D+

<b>Value group</b>	Controler I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	V		
<b>Comm object</b>	10603	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
D+ terminal voltage.			

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## Group: Statistics

### Genset kVArh

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	kVArh		
<b>Comm object</b>	8539	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Counter of gen-set reactive power.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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### Genset kWh

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	kWh		
<b>Comm object</b>	8205	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Counter of gen-set active power.			
<p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p>			

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## Mains kVArh

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	kVArh		
<b>Comm object</b>	11026	<b>Related applications</b>	AMF
<b>Description</b>			
Counter of mains reactive power.			
<p><i>Note: This value can be also switch into one decimal power format (via IntelliConfig PC tool). In this case the range of value is decrease 10 times.</i></p>			

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## Mains kWh

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	kWh		
<b>Comm object</b>	11025	<b>Related applications</b>	AMF
<b>Description</b>			
Counter of mains active power.			
<p><i>Note: This value can be also switch into one decimal power format (via IntelliConfig PC tool). In this case the range of value is decrease 10 times.</i></p>			

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## Maintenance 1

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	hours		
<b>Comm object</b>	11616	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Countdown until next maintenance 1. Initial value can be set in <b>Maintenance Timer 1 (page 211)</b> .			

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## Maintenance 2

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	hours		
<b>Comm object</b>	11617	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Countdown until next maintenance 2. Initial value can be set in <b>Maintenance Timer 2 (page 212)</b> .			

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### Maintenance 3

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	hours		
<b>Comm object</b>	11618	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Countdown until next maintenance 3. Initial value can be set in <b>Maintenance Timer 3 (page 212)</b> .			

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### Num E-Stops

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	11195	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Emergency stop alarms counter.			

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### Num Starts

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8207	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Engine start commands counter. The counter is increased by 1 even if the particular start command will take more than one attempt.			

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### Pulse Counter 1

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	-		
<b>Comm object</b>	10986	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is the value of <b>PULSE COUNTER 1 (PAGE 439)</b> function.			

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### Pulse Counter 2

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	-		
<b>Comm object</b>	10987	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This is the value of <b>PULSE COUNTER 2 (PAGE 440)</b> function.			

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## Running Hours

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	hours		
<b>Comm object</b>	8206	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Engine operation hours counter. The engine hours are incremented in the controller while the engine is running.			

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## Shutdowns

<b>Value group</b>	Statistics	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	11196	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Shutdown alarms counter. This counter counts all occurrences of a shutdown alarm, not only real shutdowns of the gen-set, i.e. the counter is increased by 2 if two shutdown alarms appear simultaneously.			

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## Group: IL Info

### Application

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8480	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The value contains actual application in controller.			

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### Breaker State

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9245	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The value contains actual "breaker state" message which is shown on the main screen of the controller.			

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## Connection Type

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	12944	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The text of this value represents the connection type which is adjusted in setpoint <b>Connection type (page 175)</b> .			

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## Engine State

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9244	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The value contains actual "engine state" message which is shown on the main screen of the controller.			

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## FW Branch

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	8707	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The value contains actual branch of firmware in controller.			

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## FW Version

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24339	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Major and minor firmware version number.			

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## ID String

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24501	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Name of controller which is used in IntelliConfig in command bar.			

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## Password Decode

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24202	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This value contains a number which can be used for retrieving a lost password. Send this number together with the controller serial number to your distributor if you have lost your password.			

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## SPI Module A

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	14447	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The name of plug-in module which is inserted in slot A.			

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## Timer Text

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10040	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The value contains the numeric code of the "Current process timer" text which is shown on the main screen of the controller.			
The assignment of texts to the codes can be obtained using IntelliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -> Generate CFG image (all). The resulting file will contain the assignment of texts to the codes.			

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## Timer Value

<b>Value group</b>	IL Info	<b>Related FW</b>	1.9.0
<b>Units</b>	[HH:MM:SS]		
<b>Comm object</b>	14147	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The value contains the "Current process timer" value which is shown on the main screen of the controller.			

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## Group: Log Bout

### Log Bout 1

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9143	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 2

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9144	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 3

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9145	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 4

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9146	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 5

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9147	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 6

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9148	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 7

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9149	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 8

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	9150	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 9

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	11896	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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### Log Bout 10

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	11897	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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## Log Bout 11

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	11898	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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## Log Bout 12

<b>Value group</b>	Log Bout	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	11899	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs.			

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## Group: CM-GPRS

### Connection Type

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24146	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The type of data connection.			

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### Cell Diag Code

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24288	<b>Related applications</b>	AMF, MRS
<b>Description</b>			

Diagnostic code for the CM-GPRS or CM-4G-GPS module.

#### GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off

3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can't read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can't detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS

40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

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### Cell ErrorRate

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	24300	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This value contains information about relative quality of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. The lower value means higher quality of signal.			

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### Cell Signal Lev

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	24302	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This value contains information about relative strength of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases.			

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### Cell Status

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24290	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The text of this value represents the status of the GSM modem.			

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## Operator

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24147	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The name of operator which to SIM card is connected.			
<i>Note: If roaming service is used then prefix "R" is added before the name of operator.</i>			

⬅ back to List of values

## Group: CM-4G-GPS

### Connection Type

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24146	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The type of data connection.			

⬅ back to List of values

### Cell Diag Code

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24288	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Diagnostic code for the CM-GPRS or CM-4G-GPS module.			
<b>GSM Diag Code – Common list of diagnostic codes for cellular modules</b>			
Code	Description		
0	OK. No error.		
1	Not possible to hang up.		
2	Modul is switched off		
3	Module is switched on		
4	Module – error in initialization		
5	Module – not possible to set the APN		
6	Module – not possible to connect to GPRS network		
7	Module – not possible to retrieve IP address		
8	Module – not accepted DNS IP address		

9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can't read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can't detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

 [back to List of values](#)



## Cell ErrorRate

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	24300	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This value contains information about relative quality of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. The lower value means higher quality of signal.			

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## Cell Signal Lev

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	%		
<b>Comm object</b>	24302	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
This value contains information about relative strength of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases.			

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## Cell Status

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24290	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The text of this value represents the status of the GSM modem.			

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## Operator

<b>Value group</b>	CM-GPRS; CM-4G-GPS (4G part)	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24147	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
The name of operator which to SIM card is connected.			
<b>Note:</b> If roaming service is used then prefix "R" is added before the name of operator.			

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## Group: CM-Ethernet

### Current DNS

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24181	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Current domain name server.			

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### ETH Interface Status

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24180	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Current status of ethernet communication.			

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### Current Gateway

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24182	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Current gateway address.			

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### Current IP Address

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24184	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Current IP address of the controller.			

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## Last Email Result

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0																																						
<b>Units</b>	[-]																																								
<b>Comm object</b>	24332	<b>Related applications</b>	AMF, MRS																																						
<b>Description</b>																																									
Result of last email, which was sent by controller.																																									
<table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Email was successfully sent.</td> </tr> <tr> <td>2</td> <td>It is not possible to establish connection with SMTP server.</td> </tr> <tr> <td>3</td> <td>SMTP server is not ready for communication.</td> </tr> <tr> <td>8</td> <td>HELO command was refused.</td> </tr> <tr> <td>9</td> <td>EHLO command was refused.</td> </tr> <tr> <td>11</td> <td>AUTH LOGIN command was refused.</td> </tr> <tr> <td>12</td> <td>Wrong user name.</td> </tr> <tr> <td>13</td> <td>Wrong password.</td> </tr> <tr> <td>14</td> <td>MAIL FROM command was refused.</td> </tr> <tr> <td>15</td> <td>RCPT TO command was refused.</td> </tr> <tr> <td>16</td> <td>DATA command was refused.</td> </tr> <tr> <td>17</td> <td>Sending of email failed.</td> </tr> <tr> <td>20</td> <td>QUIT command was refused.</td> </tr> <tr> <td>25</td> <td>It is impossible to create data for command DATA.</td> </tr> <tr> <td>26</td> <td>It is impossible to read data for command DATA.</td> </tr> <tr> <td>27</td> <td>Email address can't be read.</td> </tr> <tr> <td>30</td> <td>SMTP server address translation error (from DNS server).</td> </tr> <tr> <td>31</td> <td>Error reading email content data (24327).</td> </tr> </tbody> </table>				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).
Code	Description																																								
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30	SMTP server address translation error (from DNS server).																																								
31	Error reading email content data (24327).																																								

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## MAC Address

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24333	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Current MAC address of the controller ethernet interface.			

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## Current Subnet Mask

<b>Value group</b>	CM-Ethernet	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	24183	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Current subnet mask.			

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## Group: Date/Time

### Time

<b>Value group</b>	Date/Time	<b>Related FW</b>	1.9.0
<b>Units</b>	HH:MM:SS		
<b>Comm object</b>	24554	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Shows setup time.			

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### Date

<b>Value group</b>	Date/Time	<b>Related FW</b>	1.9.0
<b>Units</b>	DD.MM.YYYY		
<b>Comm object</b>	24553	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Shows setup date.			

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## Group: Plug-In I/O

### EM BIO A

<b>Value group</b>	Plug-In I/O	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	14291	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Binary inputs from extension module in slot A.			

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## Group: PLC

### PLC Resource 1

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10504	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 2

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10505	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 3

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10506	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 4

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10507	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 5

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10508	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 6

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10509	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 7

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10510	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC Resource 8

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10511	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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### PLC-BOUT 1

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10424	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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### PLC-BOUT 2

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10425	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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### PLC-BOUT 3

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10426	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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### PLC-BOUT 4

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10427	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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### PLC-BOUT 5

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10428	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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### PLC-BOUT 6

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10429	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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### PLC-BOUT 7

<b>Value group</b>	PLC	<b>Related FW</b>	1.9.0
<b>Units</b>	[-]		
<b>Comm object</b>	10430	<b>Related applications</b>	AMF, MRS
<b>Description</b>			
State of binary outputs of PLC.			

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## 8.1.3 Logical binary inputs

### What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

### Alphabetical groups of Logical binary inputs

LBI: A .....	404
LBI: B .....	405
LBI: C .....	429
LBI: D .....	431
LBI: E .....	431
LBI: F .....	432
LBI: G .....	433
LBI: H .....	434
LBI: I .....	435
LBI: L .....	435
LBI: M .....	437
LBI: N .....	439
LBI: O .....	439
LBI: P .....	439
LBI: R .....	440
LBI: S .....	443

For full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 403)**.



## Logical binary inputs alphabetically

Alternate Config 2 .....	404	BIN Protection 33 .....	421	Not Used .....	439
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AMF Function .....	404	BIN Protection 35 .....	422	Pulse Counter 1 .....	439
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## LBI: A

### Alternate Config 2

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	859		
<b>Description</b>			
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).			
<p><b>IMPORTANT: If LBO ECU POWER RELAY (PAGE 462) is used, change of alternate configuration can be made only in prestart phase. So prestart has to be set up for enough long time.</b></p>			

⬅ back to Logical binary inputs alphabetically

### Alternate Config 3

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	860		
<b>Description</b>			
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).			
<p><b>IMPORTANT: If LBO ECU POWER RELAY (PAGE 462) is used, change of alternate configuration can be made only in prestart phase. So prestart has to be set up for enough long time.</b></p>			

⬅ back to Logical binary inputs alphabetically

### AMF Function

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	692		
<b>Description</b>			
This binary input can switch controller function between AMF and MRS.			
<p><i>Note: Binary input "AMF function" has higher priority than the setpoint Operation Mode (page 181) in Basic settings.</i></p>			

⬅ back to Logical binary inputs alphabetically

### AMF Start Block

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	211		
<b>Description</b>			
This binary input can allow or block the AMF start. In case of running gen-set in AUTO mode gen-set goes to cooling procedure and stops.			

⬅ back to Logical binary inputs alphabetically

## LBI: B

### Battery Charger

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	623		
<b>Description</b>			
When binary input is active and its delay <b>Battery Charger Fail Delay (page 213)</b> is out of time then alarm <b>Battery Charger Fail (page 526)</b> is activated, written into history log and logical binary output <b>AL BATTERY CHARGER (PAGE 448)</b> is activated.			

🔍 back to Logical binary inputs alphabetically

### BIN Protection 1

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9999		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrm	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

🔍 back to Logical binary inputs alphabetically

## BIN Protection 02

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9998		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 03

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9997		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 04

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9996		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 05

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9995		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 06

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9994		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 07

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9993		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 08

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9992		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 09

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9991		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 10

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9990		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 11

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9989		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 12

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9988		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 13

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9987		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 14

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9986		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 15

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9985		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 16

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9984		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 17

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9983		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 18

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9982		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 19

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9981		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 20

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9980		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 21

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9979		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

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## BIN Protection 22

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9978		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 23

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9977		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 24

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9976		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 25

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9975		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 26

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9974		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 27

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9973		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 28

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9972		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 29

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9971		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 30

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9970		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 31

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9969		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 32

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9968		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 33

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9967		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 34

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9966		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 35

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9965		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 36

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9964		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 37

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9963		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 38

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9962		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 39

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9961		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 40

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9960		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 41

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9959		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 42

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9958		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 43

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9957		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 44

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9956		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 45

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9955		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 46

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9954		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 47

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9953		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 48

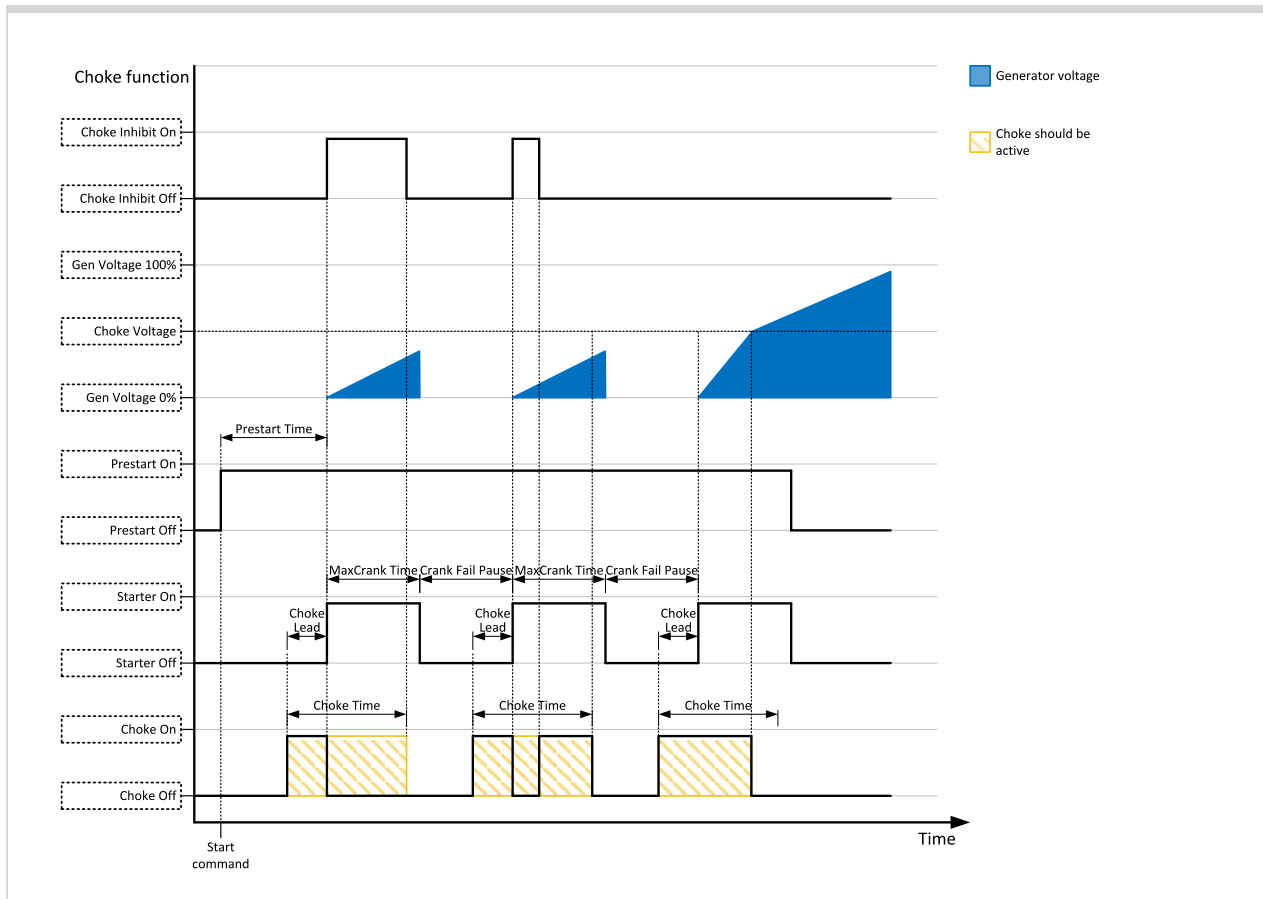
<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9952		
<b>Description</b>			
This binary input is for general input function used as alarm.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

[◀ back to Logical binary inputs alphabetically](#)

## LBI: C

### Choke Inhibit

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	946		
<b>Description</b>			
Logical binary input CHOKE INHIBIT prevent Choke functionality when logical binary output <b>CHOKE (PAGE 460)</b> 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

## Coolant Temp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	625		
<b>Description</b>			
Binary input for COOLANT TEMP (PAGE 511) protection.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnI	Binary input is not used for protection. Only history record is made if binary input is active.		
Wrn	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

⬅ back to Logical binary inputs alphabetically

## LBI: D

### Dark Mode

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	930		
<b>Description</b>			
<p>This binary input activates function of dark mode. It means that backlight of display is turn of (information on controller screens are not affected) and LEDs (Mains, Generator, Load, Breakers, etc.) are turn off (LEDs don't react on normal condition of their activation and deactivation).</p> <p><i>Note: After deactivation of dark mode, backlight of display is turned on and than behaves normally.</i></p> <p><i>Note: After deactivation of dark mode, Front Face status LEDs are turned on due to current situation of gen-set.</i></p>			

⬅ back to Logical binary inputs alphabetically

## LBI: E

### ECU Key Switch

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	951		
<b>Description</b>			
<p>This binary input is used to switch on <b>ECU POWER RELAY (PAGE 462)</b>, when engine start is not requested. It is intended to enable engine values reading, when engine doesn't run.</p> <p>When this binary input is active, binary output <b>ECU POWER RELAY (PAGE 462)</b> is active too.</p> <p>When this binary input is inactive, function of <b>ECU POWER RELAY (PAGE 462)</b> is not affected.</p>			

⬅ back to Logical binary inputs alphabetically

### ECU Speed Down

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	164		
<b>Description</b>			
<p>This binary input is used to set the setpoint <b>ECU Speed Adjustment (page 215)</b> by binary inputs. When the LBI is activated the setpoint is decreased by 2%.</p>			

⬅ back to Logical binary inputs alphabetically

### ECU Speed Up

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	165		
<b>Description</b>			
<p>This binary input is used to set the setpoint <b>ECU Speed Adjustment (page 215)</b> by binary inputs. When the LBI is activated the setpoint is increase by 2%.</p>			

⬅ back to Logical binary inputs alphabetically

## Emergency MAN

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	45		
<b>Description</b>			
<p>This input is designed to allow the gen-set or breakers to be controlled externally, not by the controller. This feature can be useful in case of some failure, which disables the gen-set or breakers to be controlled by the controller, but the gen-set itself is operational.</p> <p>The controller behaves in the following way:</p> <ul style="list-style-type: none"> <li>▶ Shows the text EmergMan in the engine status on the main screen.</li> <li>▶ Stops all functions regarding the gen-set or breaker control, deactivates all outputs related to it.</li> <li>▶ Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.</li> <li>▶ 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.</li> </ul>			

◀ back to Logical binary inputs alphabetically


## Emergency Stop

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	40		
<b>Description</b>			
<p>The shutdown procedure will start immediately when this input is activated. Input is inverted (NC = normally closed) in default configuration.</p> <p><b>Note:</b> <i>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.</i></p> <p>For more detail see chapter recommended wiring.</p>			

◀ back to Logical binary inputs alphabetically

## LBI: F

### Fault Reset Button

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	191		
<b>Description</b>			
<p>Binary input has the same function as Fault Reset button  on the IntelliLite front panel.</p>			

◀ back to Logical binary inputs alphabetically

## Force Regeneration

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	680		
<b>Description</b>			
When this binary input is activated, the controller send request for force regeneration of DPF (diesel particulate filter) to ECU.			
<b>Note:</b> ECU with Tier IV support is required for proper functionality.			

⬅ back to Logical binary inputs alphabetically

## Fuel Level

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	626		
<b>Description</b>			
Binary input for FUEL LEVEL (PAGE 512) protection.			
<b>Protection types</b>			
Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.		
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.		
Wrm	Binary input is used for warning protection only.		
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.		
Sd	Binary input is used for shutdown protection.		

⬅ back to Logical binary inputs alphabetically

## LBI: G

### GCB Button

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	193		
<b>Description</b>			
Binary input has the same function as GCB button <input type="checkbox"/> on the IntelliLite front panel. It is evaluated in MAN mode only.			

⬅ back to Logical binary inputs alphabetically

## GCB Feedback

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	63		

### Description

Use this input for indication whether the generator circuit breaker is open or closed.

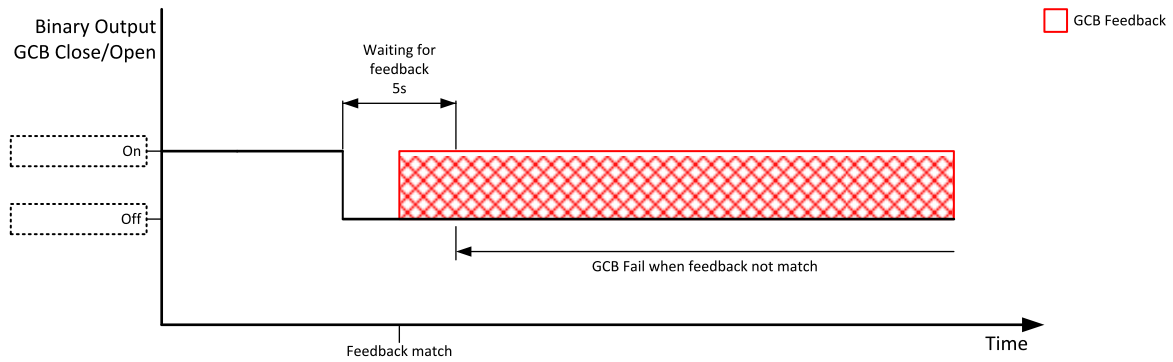


Image 8.80 GCB Feedback 1

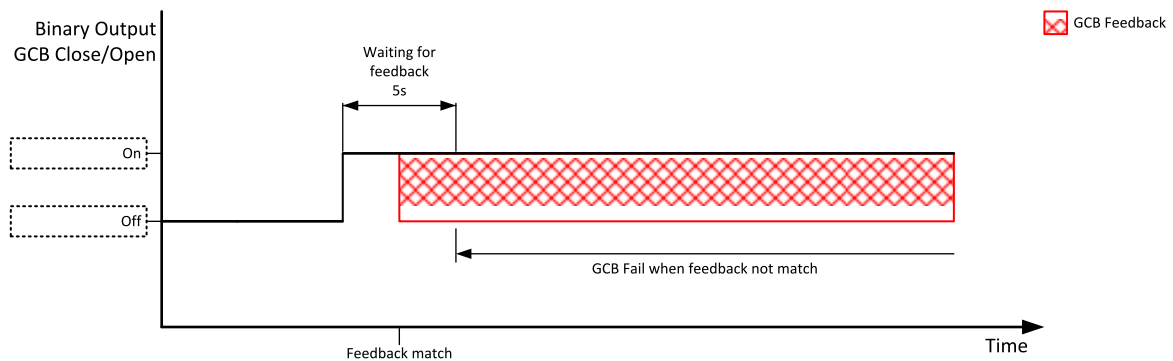


Image 8.81 GCB Feedback 2

**Note:** IntelliLite 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: H

### Horn Reset Button

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	192		

### Description

Binary input has the same function as Horn reset  button on the IntelliLite front panel.

⬅ back to Logical binary inputs alphabetically



## LBI: I

### Idle Speed

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	624		
<b>Description</b>			
This binary input changes cooling speed from nominal to idle.			

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## LBI: L

### Lang Selection 1

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS																		
<b>Comm object</b>	107																				
<b>Description</b>																					
Use this binary input with binary input <b>LANG SELECTION 2 (PAGE 436)</b> and <b>LANG SELECTION 3 (PAGE 436)</b> to choose required language of controller. The system is based on binary numbers.																					
<table border="1"> <thead> <tr> <th>Binary input</th> <th>Binary number</th> <th>Active language</th> </tr> </thead> <tbody> <tr> <td>Language Selection 1 is active</td> <td>1</td> <td>First language (English)</td> </tr> <tr> <td><b>LANG SELECTION 2 (PAGE 436)</b> is active</td> <td>2</td> <td>Second language</td> </tr> <tr> <td>Language Selection 1 and <b>LANG SELECTION 2 (PAGE 436)</b> are active</td> <td>3</td> <td>Third language</td> </tr> <tr> <td><b>LANG SELECTION 3 (PAGE 436)</b> is active</td> <td>4</td> <td>Fourth language</td> </tr> <tr> <td>Language Selection 1 and <b>LANG SELECTION 3 (PAGE 436)</b> are active</td> <td>5</td> <td>Fifth language</td> </tr> </tbody> </table>				Binary input	Binary number	Active language	Language Selection 1 is active	1	First language (English)	<b>LANG SELECTION 2 (PAGE 436)</b> is active	2	Second language	Language Selection 1 and <b>LANG SELECTION 2 (PAGE 436)</b> are active	3	Third language	<b>LANG SELECTION 3 (PAGE 436)</b> is active	4	Fourth language	Language Selection 1 and <b>LANG SELECTION 3 (PAGE 436)</b> are active	5	Fifth language
Binary input	Binary number	Active language																			
Language Selection 1 is active	1	First language (English)																			
<b>LANG SELECTION 2 (PAGE 436)</b> is active	2	Second language																			
Language Selection 1 and <b>LANG SELECTION 2 (PAGE 436)</b> are active	3	Third language																			
<b>LANG SELECTION 3 (PAGE 436)</b> is active	4	Fourth language																			
Language Selection 1 and <b>LANG SELECTION 3 (PAGE 436)</b> are active	5	Fifth language																			

[⬅ back to Logical binary inputs alphabetically](#)

## Lang Selection 2

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS																		
<b>Comm object</b>	108																				
<b>Description</b>																					
Use this binary input with binary input <b>LANG SELECTION 1 (PAGE 435)</b> and <b>LANG SELECTION 3 (PAGE 436)</b> to choose required language of controller. The system is based on binary numbers.																					
<table border="1"> <thead> <tr> <th>Binary input</th> <th>Binary number</th> <th>Active language</th> </tr> </thead> <tbody> <tr> <td><b>LANG SELECTION 1 (PAGE 435)</b> is active</td> <td>1</td> <td>First language (English)</td> </tr> <tr> <td>Lang Selection 2 is active</td> <td>2</td> <td>Second language</td> </tr> <tr> <td><b>LANG SELECTION 1 (PAGE 435)</b> and Lang Selection 2 are active</td> <td>3</td> <td>Third language</td> </tr> <tr> <td><b>LANG SELECTION 3 (PAGE 436)</b> is active</td> <td>4</td> <td>Fourth language</td> </tr> <tr> <td><b>LANG SELECTION 1 (PAGE 435)</b> and <b>LANG SELECTION 3 (PAGE 436)</b> are active</td> <td>5</td> <td>Fifth language</td> </tr> </tbody> </table>				Binary input	Binary number	Active language	<b>LANG SELECTION 1 (PAGE 435)</b> is active	1	First language (English)	Lang Selection 2 is active	2	Second language	<b>LANG SELECTION 1 (PAGE 435)</b> and Lang Selection 2 are active	3	Third language	<b>LANG SELECTION 3 (PAGE 436)</b> is active	4	Fourth language	<b>LANG SELECTION 1 (PAGE 435)</b> and <b>LANG SELECTION 3 (PAGE 436)</b> are active	5	Fifth language
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<b>LANG SELECTION 1 (PAGE 435)</b> and <b>LANG SELECTION 3 (PAGE 436)</b> are active	5	Fifth language																			

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## Lang Selection 3

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS																		
<b>Comm object</b>	109																				
<b>Description</b>																					
Use this binary input with binary input <b>LANG SELECTION 1 (PAGE 435)</b> and <b>LANG SELECTION 2 (PAGE 436)</b> to choose required language of controller. The system is based on binary numbers.																					
<table border="1"> <thead> <tr> <th>Binary input</th> <th>Binary number</th> <th>Active language</th> </tr> </thead> <tbody> <tr> <td>Language Selection 1 is active</td> <td>1</td> <td>First language (English)</td> </tr> <tr> <td><b>LANG SELECTION 2 (PAGE 436)</b> is active</td> <td>2</td> <td>Second language</td> </tr> <tr> <td>Language Selection 1 and <b>LANG SELECTION 2 (PAGE 436)</b> are active</td> <td>3</td> <td>Third language</td> </tr> <tr> <td>Lang Selection 3 (page 1) is active</td> <td>4</td> <td>Fourth language</td> </tr> <tr> <td><b>LANG SELECTION 1 (PAGE 435)</b> and Lang Selection 3 (page 1) are active</td> <td>5</td> <td>Fifth language</td> </tr> </tbody> </table>				Binary input	Binary number	Active language	Language Selection 1 is active	1	First language (English)	<b>LANG SELECTION 2 (PAGE 436)</b> is active	2	Second language	Language Selection 1 and <b>LANG SELECTION 2 (PAGE 436)</b> are active	3	Third language	Lang Selection 3 (page 1) is active	4	Fourth language	<b>LANG SELECTION 1 (PAGE 435)</b> and Lang Selection 3 (page 1) are active	5	Fifth language
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Language Selection 1 and <b>LANG SELECTION 2 (PAGE 436)</b> are active	3	Third language																			
Lang Selection 3 (page 1) is active	4	Fourth language																			
<b>LANG SELECTION 1 (PAGE 435)</b> and Lang Selection 3 (page 1) are active	5	Fifth language																			

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## LBI: M

### Mains Fail Block

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	622		
<b>Description</b>			
<p>If the input is closed, the automatic start of the gen-set at Mains failure is blocked. In case of running gen-set in AUTO mode, timer <b>Mains Return Delay (page 222)</b> is started and when it elapses GCB is opened, gen-set goes to cooling procedure and stops. When GCB is opened after <b>Transfer Delay (page 223)</b> the MCB is closed.</p> <p><i>Note: This input simulates healthy Mains.</i></p>			

⬅ back to Logical binary inputs alphabetically

### MCB Button

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	194		
<b>Description</b>			
<p>This binary input has the same function as MCB button  on the IntelliLite front panel. It is evaluated in MAN mode only.</p>			

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**MCB Feedback**

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	65		

**Description**

Use this input for indication whether the mains circuit breaker is open or closed.

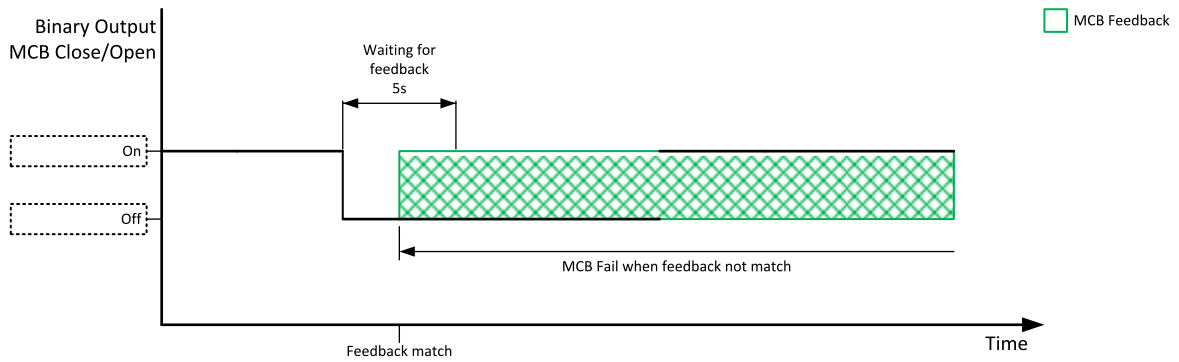


Image 8.82 MCB Feedback 1

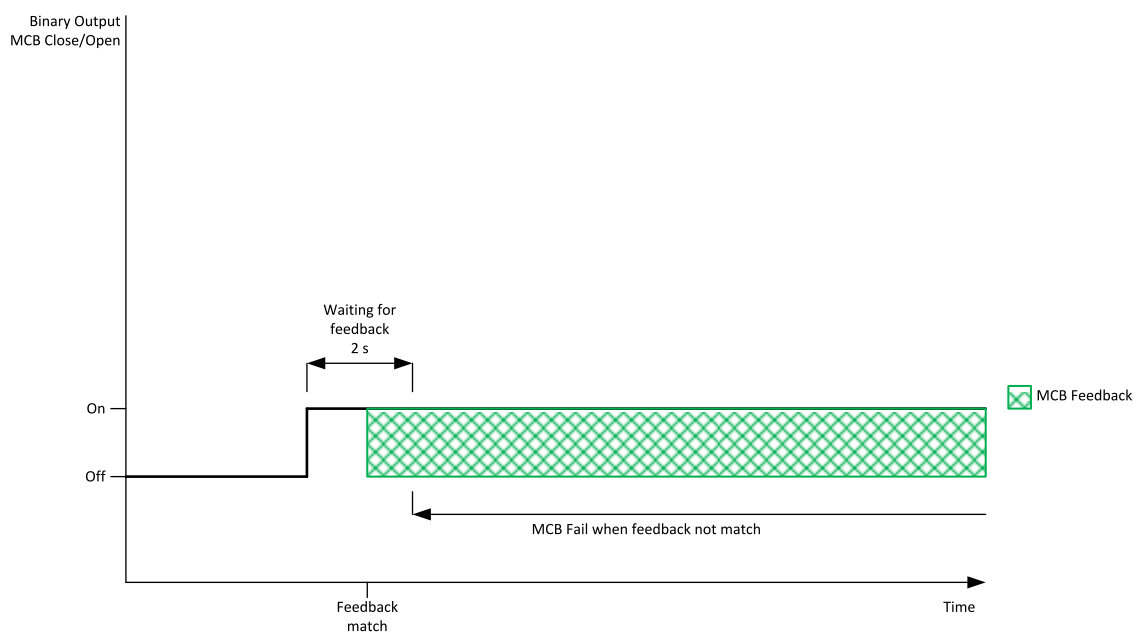


Image 8.83 MCB Feedback 2

**Note:** IntelliLite controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.

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## LBI: N

### Not Used

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	184		
<b>Description</b>			
Binary input has no function. Use this configuration when binary input is not used.			

🔍 back to Logical binary inputs alphabetically

## LBI: O

### Oil Pressure

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	43		
<b>Description</b>			
Binary input for <b>OIL PRESSURE (PAGE 514)</b> protection.			

#### Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Sd	Binary input is used for shutdown protection.

**IMPORTANT:** This binary input is also used for evaluating engine running condition.

**Example:** Normally close connection - when LBI is closed then oil pressure is OK and is higher than starting oil pressure.

**Note:** In case that you want to use binary input of oil pressure sensor just for protection please use one of the **BIN PROTECTION 1 (PAGE 405)**.

🔍 back to Logical binary inputs alphabetically

## LBI: P

### Pulse Counter 1

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	87		
<b>Description</b>			
This is the input of the Pulse Counter 1 function. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint <b>Conversion Coefficient Pulse 1 (page 214)</b> the counter value <b>Pulse Counter 1 (page 384)</b> is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

🔍 back to Logical binary inputs alphabetically

## Pulse Counter 2

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	88		
<b>Description</b>			
<p>This is the input of the Pulse Counter 2 function. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint <b>Conversion Coefficient Pulse 2 (page 214)</b> the counter value <b>Pulse Counter 2 (page 384)</b> is increased by 0,1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p>			

🔍 back to Logical binary inputs alphabetically

## LBI: R

### Regeneration Inhib

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	679		
<b>Description</b>			
<p>When this binary input is activated, the controller sends request to inhibit regeneration of DPF (diesel particulate filter) to ECU.</p> <p><i>Note: ECU with Tier IV support is required for proper functionality.</i></p>			

🔍 back to Logical binary inputs alphabetically

### Remote AUTO

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	620		
<b>Description</b>			
<p>The controller is switched to the AUTO mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs</p> <p>Remote control priority:</p> <ul style="list-style-type: none"> <li>▶ Remote OFF (Highest priority)</li> <li>▶ Remote TEST</li> <li>▶ Remote MAN</li> <li>▶ Remote AUTO (Lowest Priority)</li> </ul>			

🔍 back to Logical binary inputs alphabetically

### Remote Ctrl Lock

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	4		
<b>Description</b>			
<p>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.</p>			

🔍 back to Logical binary inputs alphabetically

## Remote MAN

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	618		
<b>Description</b>			
<p>The controller is switched to the MAN mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none"> <li>▶ Remote OFF (Highest priority)</li> <li>▶ Remote TEST</li> <li>▶ Remote MAN</li> <li>▶ Remote AUTO (Lowest Priority)</li> </ul>			

⬅ back to Logical binary inputs alphabetically

## Remote OFF

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	617		
<b>Description</b>			
<p>The controller is switched to the OFF mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none"> <li>▶ Remote OFF (Highest priority)</li> <li>▶ Remote TEST</li> <li>▶ Remote MAN</li> <li>▶ Remote AUTO (Lowest Priority)</li> </ul>			

⬅ back to Logical binary inputs alphabetically

## Remote Start/Stop

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	38		

### Description

Use this input to start and stop the gen-set in AUTO mode.

**Note:** If the binary input Remote Start/Stop is active and engine is running and mains failure occurs, the MCB breaker opens, after **Transfer Delay** (page 223) the GCB breaker is closed. Once the mains is OK, the **Mains Return Delay** (page 222) elapses and the GCB breaker is opened. Then after **Transfer Delay** (page 223) 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.

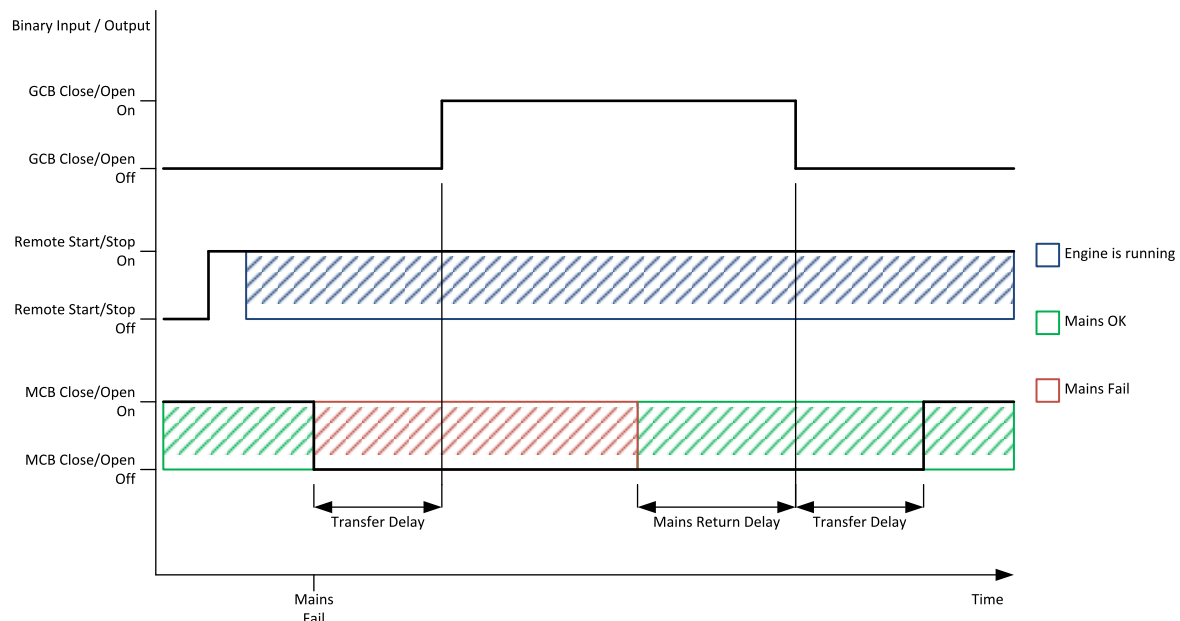


Image 8.84 Remote Start/Stop

⬅ back to Logical binary inputs alphabetically

## Rem TEST On Load

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	61		

### Description

When input is closed, the controller automatically transfers load from the mains to the gen-set. Load is automatically transferred back to the mains when any gen-set shut down protection activates.

⬅ back to Logical binary inputs alphabetically



## Remote TEST

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	621		
<b>Description</b>			
<p>The controller is switched to the TEST mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none"> <li>▶ Remote OFF (Highest priority)</li> <li>▶ Remote TEST</li> <li>▶ Remote MAN</li> <li>▶ Remote AUTO (Lowest Priority)</li> </ul>			

⬅ back to Logical binary inputs alphabetically


## LBI: S

### Sd Override

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	44		
<b>Description</b>			
<p>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.</p> <p><b>Note:</b> <i>Sd Override (page 443)</i> is indicated in the alarm list if Sd Override mode is active to inform the operator that the engine is not protected.</p> <p><b>IMPORTANT: MISUSE OF THIS INPUT CAN CAUSE DAMAGE TO THE GEN-SET!</b></p>			


⬅ back to Logical binary inputs alphabetically

### Start Button

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	189		
<b>Description</b>			
<p>Binary input has the same function as Start Button  on the IntelliLite front panel. It is evaluated in MAN mode only.</p>			

⬅ back to Logical binary inputs alphabetically

### Stop Button

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	190		
<b>Description</b>			
<p>Binary input has the same function as Stop Button  on the IntelliLite front panel. It is evaluated in MAN Mode only.</p>			

⬅ back to Logical binary inputs alphabetically

## 8.1.4 Logical binary outputs

### What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

### Alphabetical groups of Logical binary outputs

LBO: A .....	446
LBO: B .....	456
LBO: C .....	460
LBO: E .....	461
LBO: F .....	464
LBO: G .....	465
LBO: H .....	472
LBO: I .....	473
LBO: M .....	474
LBO: N .....	480
LBO: P .....	481
LBO: R .....	482
LBO: S .....	484
LBO: V .....	487

For full list of Logical binary outputs go to the chapter **Logical binary outputs alphabetically (page 445)**.

## Logical binary outputs alphabetically

Air Valves .....	446	AL Overload BOC .....	454	Generator Healthy .....	470
AL AIN 1 Sd+BOC .....	446	AL Overload Wrm .....	454	Glow Plugs .....	470
AL AIN 1 Wrm .....	446	AL Overspeed .....	454	Heartbeat .....	472
AL AIN 2 Sd+BOC .....	447	AL Start Fail .....	454	Horn .....	472
AL AIN 2 Wrm .....	447	AL Stop Fail .....	454	Idle/Nominal .....	473
AL AIN 3 Sd+BOC .....	447	AL Underspeed .....	454	Ignition On .....	473
AL AIN 3 Wrm .....	447	Alarm .....	455	Mains Healthy .....	474
AL Battery Flat .....	447	ATT DEF Level Lamp .....	455	Manual Ready .....	474
AL Battery Charger .....	448	ATT Filter Lamp .....	455	MCB Close/Open .....	474
AL Battery Overvoltage .....	448	ATT HEST Lamp .....	455	MCB OFF Coil .....	476
AL Battery Undervoltage .....	448	ATT Inhibited Lamp .....	455	MCB ON Coil .....	477
AL Battery Voltage .....	448	ATT SCR Error Lamp .....	456	MCB UV Coil .....	478
AL Common BOC .....	448	BIN 1 Status .....	456	Mode AUTO .....	479
AL Common Fls .....	449	BIN 2 Status .....	457	Mode MAN .....	480
AL Common Sd .....	449	BIN 3 Status .....	457	Mode OFF .....	480
AL Common Wrm .....	449	BIN 4 Status .....	458	Mode TEST .....	480
AL CoolantTemp Low .....	449	BIN 5 Status .....	458	Not In AUTO .....	480
AL CoolantTemp Sd .....	450	BIN 6 Status .....	459	Not Used .....	480
AL CoolantTemp Wrm .....	450	BIN 7 Status .....	459	Prestart .....	481
AL Fuel Level Sd .....	450	Choke .....	460	Ready To AMF .....	482
AL Fuel Level Wrm .....	450	Cooling Pump .....	460	Ready To Load .....	482
AL Gen Freq Wrm .....	450	Cooling .....	461	Ready .....	483
AL Gen Frequency .....	451	ECU Communic Error .....	461	Regen Needed .....	483
AL Gen Overfrequency .....	451	ECU Communic OK .....	461	Running .....	483
AL Gen Overvoltage .....	451	ECU Power Relay .....	462	Sd Override .....	484
AL Gen Underfrequency .....	451	ECU Red Lamp .....	462	Starter .....	484
AL Gen Undervoltage .....	451	ECU Run Stop .....	463	Still Log 0 .....	485
AL Gen Voltage Wrm .....	452	ECU Wait To Start .....	463	Still Log 1 .....	485
AL Gen Voltage .....	452	ECU Yellow Lamp .....	463	Stop Pulse .....	485
AL Mains Fail .....	452	Exercise Timer 1 .....	463	Stop Solenoid .....	485
AL Mains Frequency .....	452	Fault Reset .....	464	Supplying Load .....	487
AL Mains Voltage .....	452	Frequency Select .....	464	Swap Start .....	487
AL Maintenance 1 .....	453	Fuel Solenoid .....	464	Ventilation .....	487
AL Maintenance 2 .....	453	GCB Close/Open .....	465	Ventilation Off Pulse .....	487
AL Maintenance 3 .....	453	GCB OFF Coil .....	467	Ventilation On Pulse .....	488
AL Oil Press Sd .....	453	GCB ON Coil .....	468		
AL Oil Press Wrm .....	453	GCB UV Coil .....	468		

## LBO: A

### Air Valves

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1247		
<b>Description</b>			
<p>This output closes together with binary output <b>PRESTART (PAGE 481)</b> and opens after the engine is stopped or in case that engine is not ready.</p>			
<p>The diagram shows the timing of binary outputs for air valves. It includes signals for Prestart On/Off, Air Valves On/Off, and a green shaded area representing 'Engine is running'. Key time intervals marked are 'Prestart Time', 'Cooling', and 'Engine is ready'. The 'Start' event is indicated on the time axis.</p>			
Image 8.85 Air Valves			

⬅ back to Logical binary outputs alphabetically

### AL AIN 1 Sd+BOC

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1386		
<b>Description</b>			
<p>The output is closed when there is the shutdown or BOC alarm from the analog input 1 of the controller present in the alarmlist or isn't confirmed.</p>			

⬅ back to Logical binary outputs alphabetically

### AL AIN 1 Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1382		
<b>Description</b>			
<p>The output is closed when there is the warning alarm from the analog input 1 of the controller present in the alarmlist or isn't confirmed.</p>			

⬅ back to Logical binary outputs alphabetically

### AL AIN 2 Sd+BOC

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1387		
<b>Description</b>			
The output is closed when there is the shutdown or BOC alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed.			

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### AL AIN 2 Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1383		
<b>Description</b>			
The output is closed when there is the warning alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed.			

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### AL AIN 3 Sd+BOC

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1388		
<b>Description</b>			
The output is closed when there is the shutdown or BOC alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed.			

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### AL AIN 3 Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1384		
<b>Description</b>			
The output is closed when there is the warning alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed.			

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### AL Battery Flat

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1292		
<b>Description</b>			
This output is active when the <b>Sd Battery Flat (page 542)</b> or <b>Wrn Battery &lt; Voltage (page 527)</b> alarm is present in the alarmlist or isn't confirm.			

[⬅ back to Logical binary outputs alphabetically](#)

## AL Battery Charger

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1272		
<b>Description</b>			
This output is active when the <b>Battery Charger Fail (page 526)</b> alarm is present in the alarmlist or isn't confirmed.			

⬅ back to Logical binary outputs alphabetically

## AL Battery Overvoltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1995		
<b>Description</b>			
This output is active when the <b>Wrn Battery &gt; Voltage (page 527)</b> alarm is present in the alarmlist or isn't confirm.			

⬅ back to Logical binary outputs alphabetically

## AL Battery Undervoltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1994		
<b>Description</b>			
This output is active when the <b>Wrn Battery &lt; Voltage (page 527)</b> alarm is present in the alarmlist or isn't confirm.			


⬅ back to Logical binary outputs alphabetically

## AL Battery Voltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1293		
<b>Description</b>			
This output is active when the <b>Wrn Battery &gt; Voltage (page 527)</b> or <b>Wrn Battery &lt; Voltage (page 527)</b> alarm is present in the alarmlist or isn't confirm.			


⬅ back to Logical binary outputs alphabetically

## AL Common BOC

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9		
<b>Description</b>			
Output closes when any BOC alarm appears.			
The output opens, if:			
<ul style="list-style-type: none"> <li>▶ No BOC alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul>			


⬅ back to Logical binary outputs alphabetically

### AL Common Fls

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	6		
<b>Description</b>			
Output closes when any sensor fail alarm appears.			
The output opens, if:			
<ul style="list-style-type: none"> <li>▶ No sensor fail alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul>			


 [back to Logical binary outputs alphabetically](#)

### AL Common Sd

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	4		
<b>Description</b>			
Output closes when any shutdown alarm appears.			
The output opens, if:			
<ul style="list-style-type: none"> <li>▶ No shutdown alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul>			

 [back to Logical binary outputs alphabetically](#)

### AL Common Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	3		
<b>Description</b>			
Output closes when any warning alarm appears.			
The output opens, if:			
<ul style="list-style-type: none"> <li>▶ No warning alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul>			

 [back to Logical binary outputs alphabetically](#)

### AL CoolantTemp Low

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1295		
<b>Description</b>			
The output is closed when there is the <b>Wrn Coolant Temperature Low (page 528)</b> alarm from the COOLANT TEMP (PAGE 511) in the alarmlist or isn't confirmed.			

 [Logical binary outputs alphabetically \(page 445\)](#)

### AL CoolantTemp Sd

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1421		
<b>Description</b>			
The output is closed when there is the shutdown or BOC alarm from the <b>COOLANT TEMP (PAGE 511)</b> in the alarmlist or isn't confirmed.			

🔍 [Logical binary outputs alphabetically \(page 445\)](#)

### AL CoolantTemp Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1420		
<b>Description</b>			
The output is closed when there is the warning alarm from the <b>COOLANT TEMP (PAGE 511)</b> in the alarmlist or isn't confirmed.			
<p><i>Note: Binary output is also active if protection type is set to HistRecOnl and threshold level for history record is reach.</i></p>			

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### AL Fuel Level Sd

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1423		
<b>Description</b>			
The output is closed when there is the shutdown or BOC alarm from the <b>FUEL LEVEL (PAGE 512)</b> in the alarmlist or isn't confirmed.			

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### AL Fuel Level Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1422		
<b>Description</b>			
The output is closed when there is the warning alarm from the <b>FUEL LEVEL (PAGE 512)</b> in the alarmlist or isn't confirmed.			
<p><i>Note: Binary output is also active if protection type is set to HistRecOnl and threshold level for history record is reach.</i></p>			

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### AL Gen Freq Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1267		
<b>Description</b>			
This output is active generator frequency warning alarm is present in alarmlist or isn't confirm.			

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### AL Gen Frequency

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1266		
<b>Description</b>			
This output is active when at least one generator frequency BOC or Sd alarm is present in alarmlist or isn't confirm.			

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### AL Gen Overfrequency

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1264		
<b>Description</b>			
This output is active when at least one generator overfrequency alarm is present in alarmlist or isn't confirm.			

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### AL Gen Overvoltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1261		
<b>Description</b>			
This output is active when at least one generator overvoltage alarm is present in alarmlist or isn't confirm.			

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### AL Gen Underfrequency

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1265		
<b>Description</b>			
This output is active when at least one generator underfrequency alarm is present in alarmlist or isn't confirm.			

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### AL Gen Undervoltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1262		
<b>Description</b>			
This output is active when at least one generator undervoltage alarm is present in alarmlist or isn't confirm.			

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### AL Gen Voltage Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1289		
<b>Description</b>			
This output is active when at least one generator voltage warning alarm is present in alarmlist or isn't confirm.			

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### AL Gen Voltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1263		
<b>Description</b>			
This output is active when at least one generator voltage BOC or Sd alarm is present in alarmlist or isn't confirm.			

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### AL Mains Fail

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	197		
<b>Description</b>			
Output for signaling Mains Failure. This output is active when at least one mains frequency BOC or Sd alarm or at least one mains voltage BOC or Sd alarm is present in alarmlist or isn't confirmed.			

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### AL Mains Frequency

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	1271		
<b>Description</b>			
This output is active when at least one mains frequency BOC or Sd alarm is present in alarmlist or isn't confirm.			

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### AL Mains Voltage

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	1270		
<b>Description</b>			
This output is active when at least one mains voltage BOC or Sd alarm is present in the alarmlist or isn't confirm.			

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### AL Maintenance 1

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1254		
<b>Description</b>			
This output is active when the Alarm Maintenance 1 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 1 isn't confirm.			

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### AL Maintenance 2

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1255		
<b>Description</b>			
This output is active when the Alarm Maintenance 2 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 2 isn't confirm.			

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### AL Maintenance 3

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1256		
<b>Description</b>			
This output is active when the Alarm Maintenance 3 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 3 isn't confirm.			

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### AL Oil Press Sd

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1419		
<b>Description</b>			
The output is closed when there is the shutdown alarm from the <b>OIL PRESSURE (PAGE 514)</b> in the alarmlist or isn't confirmed.			

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### AL Oil Press Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1418		
<b>Description</b>			
The output is closed when there is the warning alarm from the <b>OIL PRESSURE (PAGE 514)</b> in the alarmlist or isn't confirmed.			
<p><b>Note:</b> Binary output is also active if protection type is set to <i>HistRecOnl</i> and threshold level for history record is reach.</p>			

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### AL Overload BOC

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1268		
<b>Description</b>			
This output is active when the <b>Sd Overload (page 548)</b> alarm is present in the alarmlist or isn't confirm.			

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### AL Overload Wrn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1269		
<b>Description</b>			
This output is active when the <b>Wrn Overload (page 535)</b> alarm is present in alarmlist or isn't confirm.			

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### AL Overspeed

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	779		
<b>Description</b>			
This output is active when the <b>Sd Overspeed (page 548)</b> alarm is present in the alarmlist or isn't confirm.			

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### AL Start Fail

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1291		
<b>Description</b>			
This output is active when the <b>Sd Start Fail (page 549)</b> alarm is present in the alarmlist or isn't confirm.			

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### AL Stop Fail

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	339		
<b>Description</b>			
This output is active when the <b>Wrn Stop Fail (page 536)</b> alarm is present in the alarmlist or isn't confirm.			

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### AL Underspeed

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1296		
<b>Description</b>			
This output is active when the <b>Sd Underspeed (page 549)</b> alarm is present in the alarmlist or isn't confirm.			

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## Alarm

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2		
<b>Description</b>			
The output is designed to be used as external alarm indication such as a red bulb in the control room etc. The output is active when at least one unconfirmed alarm is present in the alarmlist and remains active until confirmation of alarm.			

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## ATT DEF Level Lamp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2154		
<b>Description</b>			
This output is active when ATT DEF Level Lamp is active.			

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## ATT Filter Lamp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2152		
<b>Description</b>			
This output is active when ATT Filter Lamp is active.			

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## ATT HEST Lamp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1373		
<b>Description</b>			
This output is closed if ECU send signal HEST Lamp. If ECU stop send HEST LAMP signal binary input will be opened without no matter if alarms in alarmlist are confirmed or not.			

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## ATT Inhibited Lamp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2155		
<b>Description</b>			
This output is active when ATT Inhibited Lamp is active.			

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## ATT SCR Error Lamp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2153		
<b>Description</b>			
This output is active when ATT SCR Error Lamp is active.			

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## LBO: B

### BIN 1 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1374		

#### Description

This output is closed, when Binary Input 1 is active and open when Binary Input 1 is inactive. When Binary Input 1 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

**Note:** When LBI 1 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.

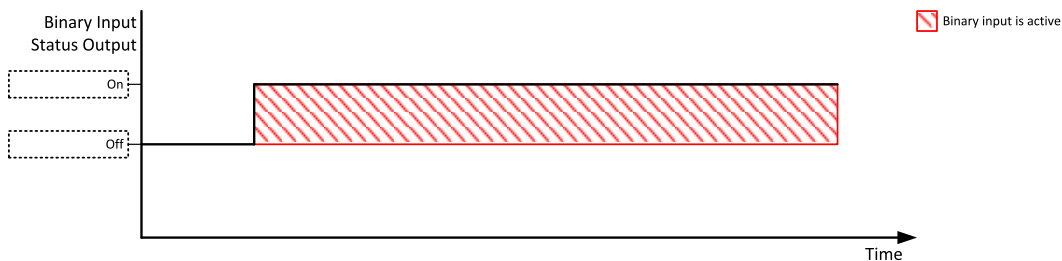


Image 8.86 Binary Input 1 Status

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### BIN 2 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1375		
<b>Description</b>			
<p>This output is closed, when Binary Input 2 is active and open when Binary Input 2 is inactive. When Binary Input 2 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 2 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p>			
Image 8.87 Binary Input 2 Status			

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### BIN 3 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1376		
<b>Description</b>			
<p>This output is closed, when Binary Input 3 is active and open when Binary Input 3 is inactive. When Binary Input 3 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 3 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p>			
Image 8.88 Binary Input 3 Status			

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## BIN 4 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1377		
<b>Description</b>			
<p>This output is closed, when Binary Input 4 is active and open when Binary Input 4 is inactive. When Binary Input 4 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 4 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p>			
Image 8.89 Binary Input 4 Status			

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## BIN 5 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1378		
<b>Description</b>			
<p>This output is closed, when Binary Input 5 is active and open when Binary Input 5 is inactive. When Binary Input 5 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 5 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p>			
Image 8.90 Binary Input 5 Status			

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## BIN 6 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1379		
<b>Description</b>			
<p>This output is closed, when Binary Input 6 is active and open when Binary Input 6 is inactive. When Binary Input 6 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 6 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p>			
Image 8.91 Binary Input 6 Status			

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## BIN 7 Status

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1380		
<b>Description</b>			
<p>This output is closed, when Binary Input 7 is active and open when Binary Input 7 is inactive. When Binary Input 7 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 7 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p>			
Image 8.92 Binary Input 7 Status			

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## LBO: C

### Choke

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2091		
<b>Description</b>			
<p>Logical binary output for choke valve control. Output CHOKE is activated every time when logical binary output <b>STARTER (PAGE 484)</b> is activated. Output is deactivated when one of these conditions is fulfilled:</p> <ul style="list-style-type: none"> <li>▶ Choke Time is elapsed</li> <li>▶ Generator voltage is higher than Choke Voltage</li> <li>▶ Logical binary input Choke Inhibit is activated</li> </ul> <p>Or when some of these situations during start occurs:</p> <ul style="list-style-type: none"> <li>▶ Any second level alarm</li> <li>▶ Emergency stop</li> <li>▶ Stop command</li> <li>▶ Cranking pause</li> </ul>			

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### Cooling Pump

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	40		
<b>Description</b>			
<p>This output is dedicated for coolant pump control. It is closed in the moment the gen-set is started and remains closed until the gen-set is stopped and <b>After Cooling Time (page 201)</b> elapses or the cranking pause or the Emergency Stop occurs or the controller is switched to OFF mode.</p>			
Image 8.93 Cooling Pump			

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## Cooling

Related FW	1.9.0	Related applications	AMF, MRS
Comm object	74		
<b>Description</b>			
The output closes when gen-set is in Cooling state.			

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## LBO: E

### ECU Communic Error

Related FW	1.9.0	Related applications	AMF, MRS
Comm object	114		
<b>Description</b>			
This output is active when an ECU is configured, but the communication with the ECU is not established or has dropped out.			
<p><b>Note:</b> When ECU POWER RELAY (PAGE 462) is not configured, output is evaluated all the time. If ECU POWER RELAY (PAGE 462) is configured, output is evaluated only when engine is not stop (ECU POWER RELAY (PAGE 462) is active).</p>			

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### ECU Communic OK

Related FW	1.9.0	Related applications	AMF, MRS
Comm object	347		
<b>Description</b>			
This output is active when an ECU is configured, connected and the communication with the ECU is established.			
<p><b>Note:</b> When ECU POWER RELAY (PAGE 462) is not configured, output is evaluated all the time. If ECU POWER RELAY (PAGE 462) is configured, output is evaluated only when engine is not stop (ECU POWER RELAY (PAGE 462) is active).</p>			

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## ECU Power Relay

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	116		

### Description

This output is to be used for control of “keyswitch” input of an ECU. If the particular ECU does not have keyswitch or a similar input, it can be used for control of DC power for the ECU.

The output closes together with **PRESTART (PAGE 481)** and remains closed for the entire duration that the engine is running. It is opened at the moment that the engine comes to a stop (i.e. together with the **FUEL SOLENOID (PAGE 464)**).

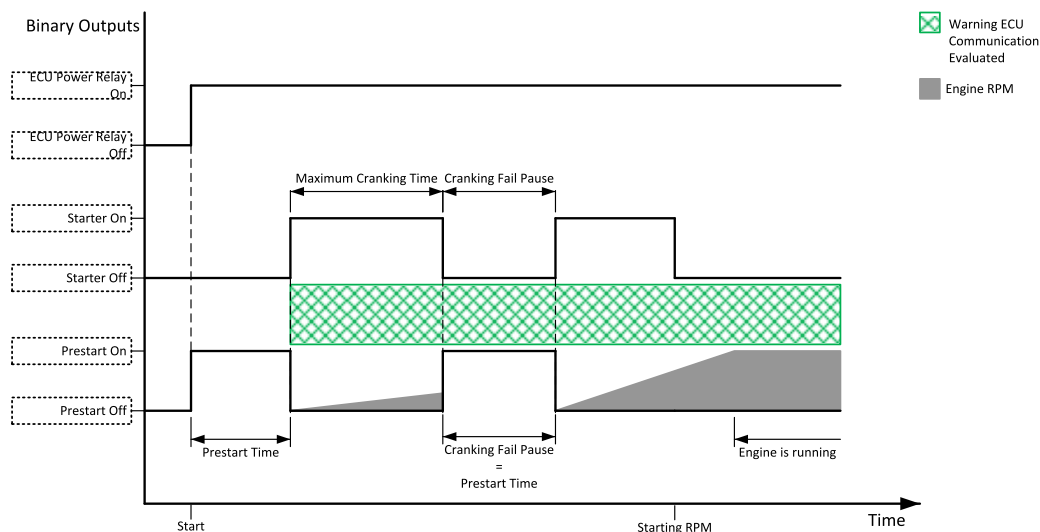


Image 8.94 ECU Power Relay

**IMPORTANT:** This LBO also affects evaluation of **Sd ECU Communication Fail (page 543)** or **Wrn ECU Communication Fail (page 529)** 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

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	350		

### Description

This output is active when the ECU sends an active “red lamp” flag, i.e. it has detected a critical malfunction and the engine should not be operated until a service check is performed. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.

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## ECU Run Stop

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	958		
<b>Description</b>			
Signal for starting and stopping of ECU.			

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## ECU Wait To Start

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	959		
<b>Description</b>			
This output is active when ECU Wait To Start Lamp is active.			

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## ECU Yellow Lamp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	349		
<b>Description</b>			
This output is active when the ECU sends an active “yellow lamp” flag, i.e. it has detected a non-critical malfunction. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.			

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## Exercise Timer 1

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1250		
<b>Description</b>			
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 <b>Subgroup: Timer 1 (page 261)</b> subgroup. This output is active when Timer 1 is active.			

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## LBO: F

### Fault Reset

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	592		
<b>Description</b>			
<p>This output provides 1s pulse when:</p> <ul style="list-style-type: none"> <li>▶ Fault Reset button is pressed on the controller front fascia or</li> <li>▶ Fault Reset button is pressed on any of external local/remote terminals or</li> <li>▶ Fault Reset command is received via communication line or</li> <li>▶ the input FAULT RESET BUTTON is activated.</li> </ul>			

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### Frequency Select

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1815		
<b>Description</b>			
<p>The Frequency select output is opened when Nominal Frequency (Frequency Settings) is equal to 50Hz and closed when Nominal Frequency (Frequency Settings) is equal to 60Hz.</p>			

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### Fuel Solenoid

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	22		
<b>Description</b>			
<p>This output controls the fuel solenoid valve.</p> <p>The output closes before binary output <b>STARTER</b> (PAGE 484). The lead time is adjusted by setpoint <b>Fuel Solenoid Lead</b> (page 195).</p>			
<p style="text-align: center;">Image 8.95 Fuel Solenoid 1</p>			

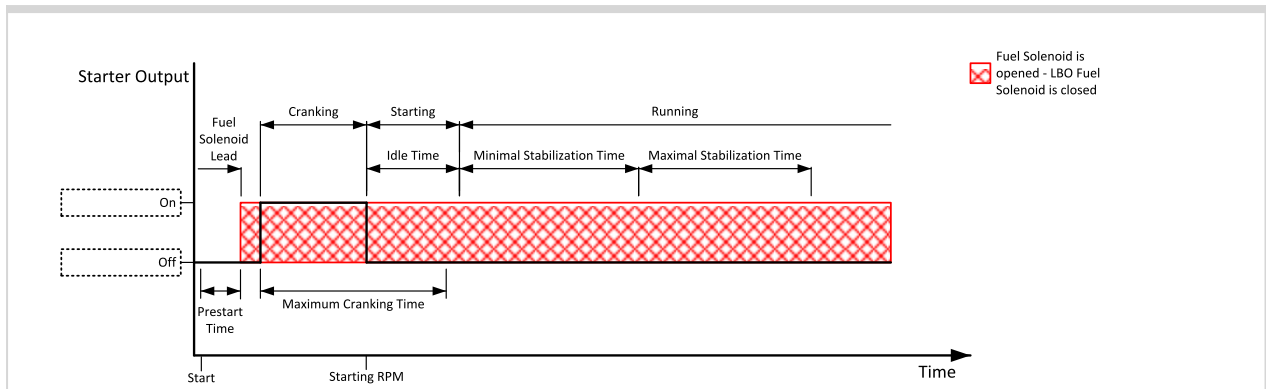


Image 8.96 Fuel Solenoid 2

The output opens when:

- ▶ Emergency Stop comes
- ▶ cooled gen-set is stopped
- ▶ in pause between repeated starts

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## LBO: G

### GCB Close/Open

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	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:** IntelliLite controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.

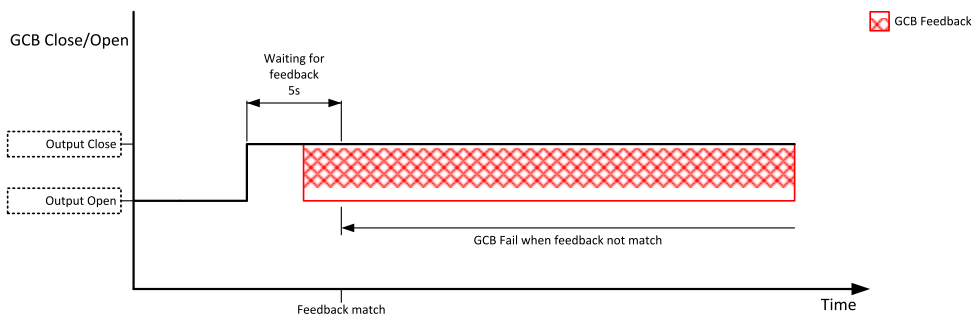
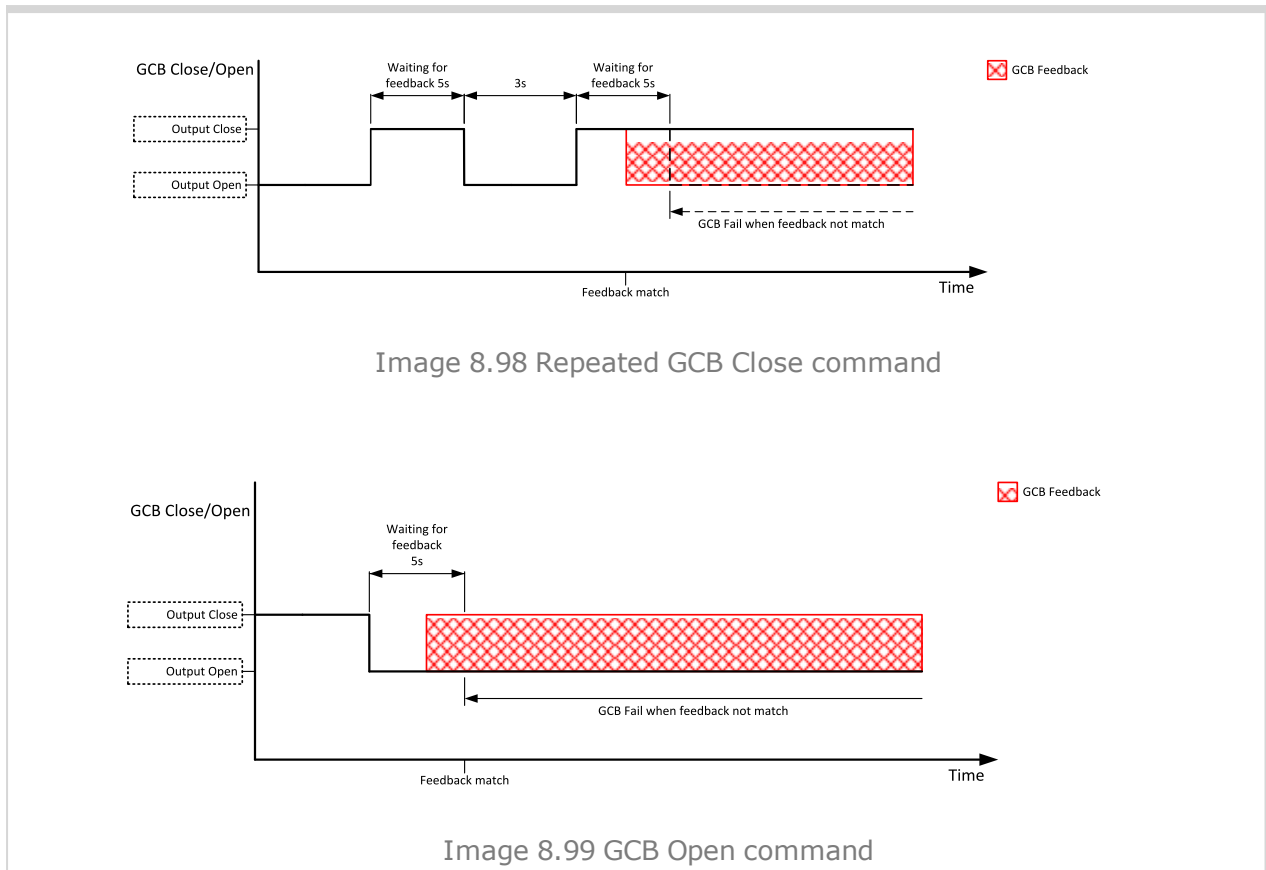


Image 8.97 GCB Close command



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## GCB OFF Coil

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	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.

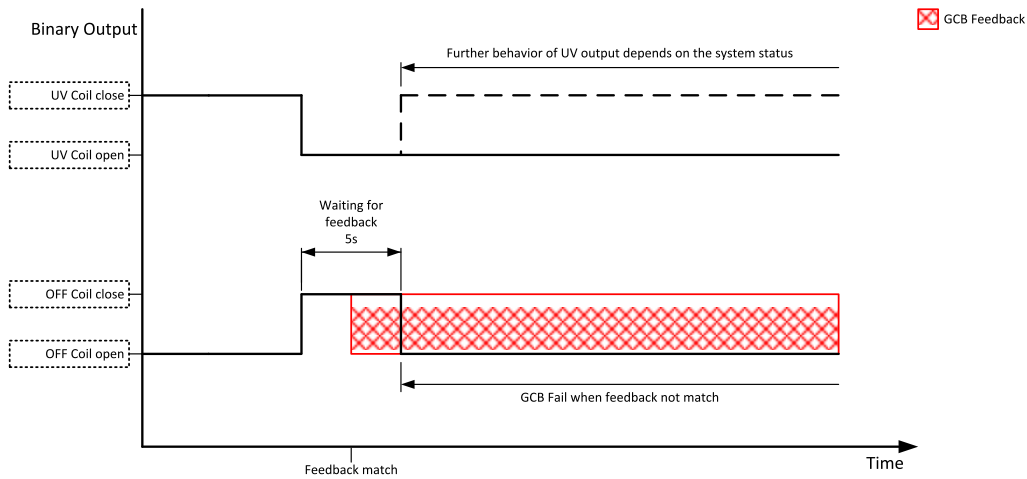


Image 8.100 GCB OFF Coil command

Image 8.101 GCB OFF Coil command

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## GCB ON Coil

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	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.

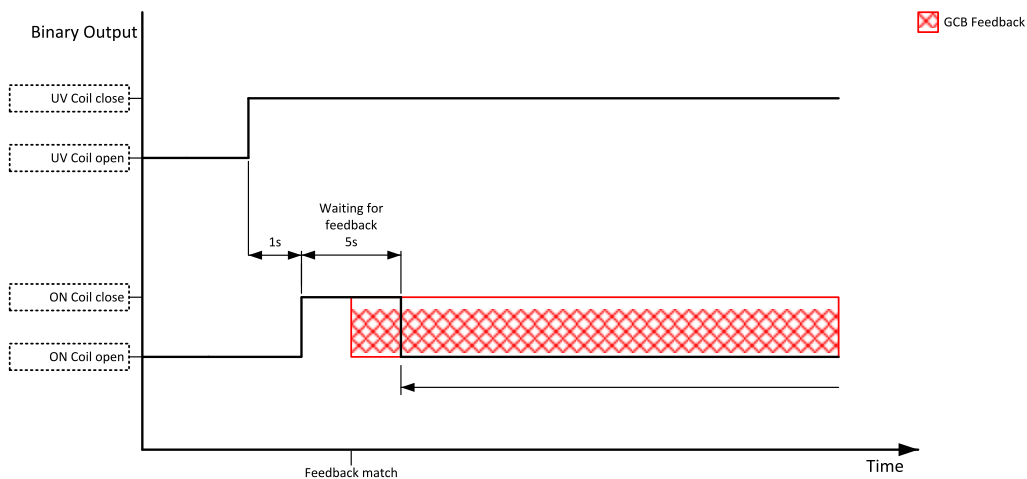


Image 8.102 GCB ON Coil close command

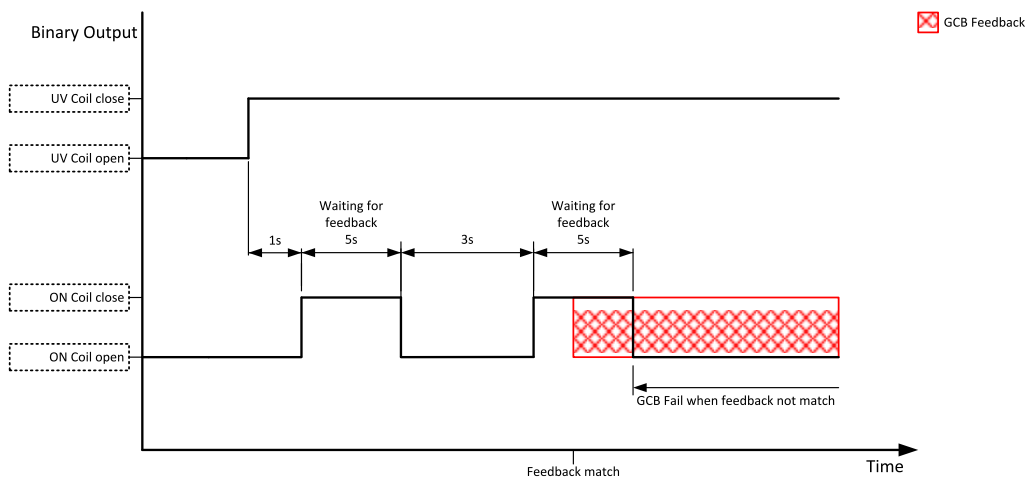


Image 8.103 Repeated GCB ON coil close command

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## GCB UV Coil

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	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.

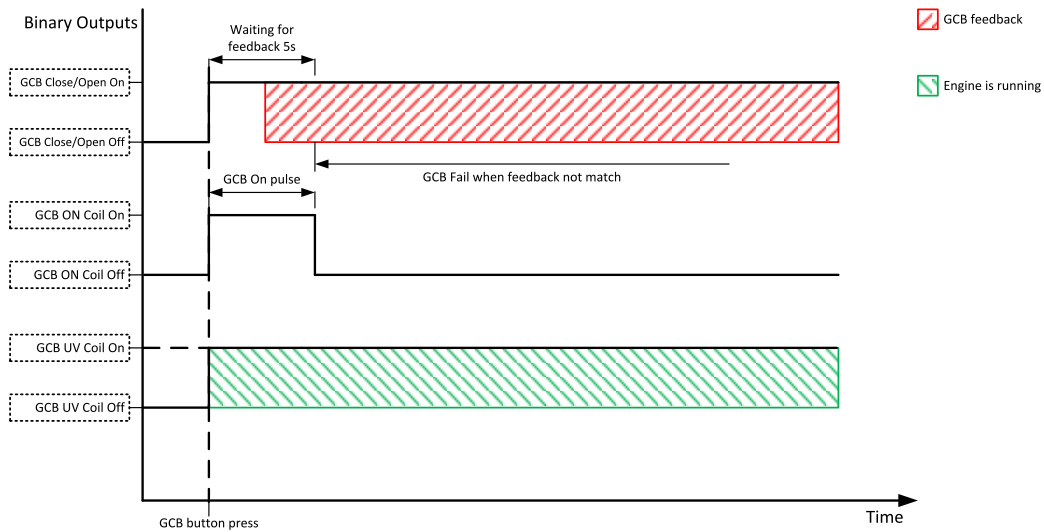


Image 8.104 GCB UV Coil close command

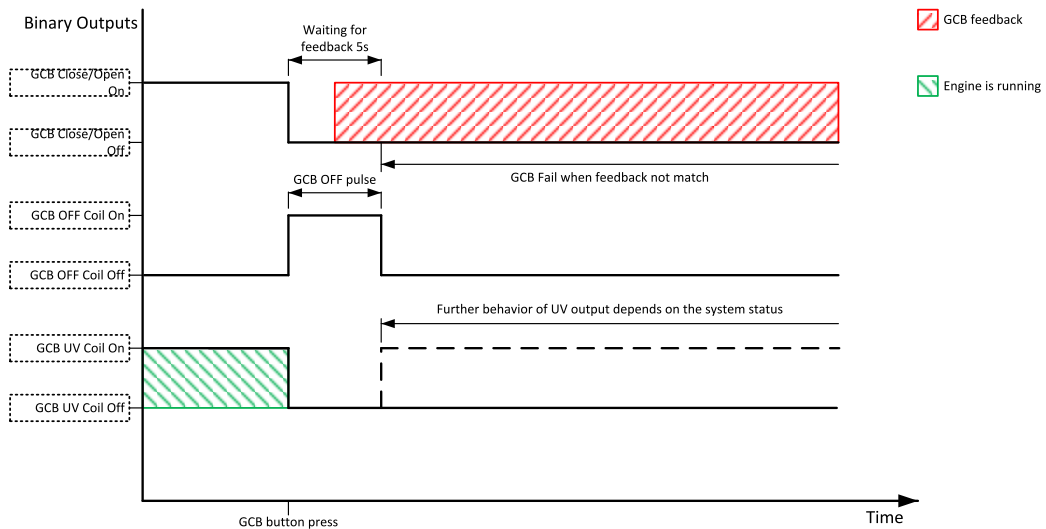


Image 8.105 GCB UV Coil open command

⬅️ back to Logical binary outputs alphabetically

## Generator Healthy

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	77		
<b>Description</b>			
<p>This output is active when the generator voltage, frequency and voltage unbalance is within limits. It is deactivated:</p> <ul style="list-style-type: none"> <li>▶ immediately when the voltage/frequency/voltage unbalance gets out of limits (when GCB is not closed)</li> <li>or</li> <li>▶ with an appropriate delay after the voltage/frequency/voltage unbalance has got out of limits (when GCB is closed)</li> </ul>			

◀ back to Logical binary outputs alphabetically

## Glow Plugs

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1252		
<b>Description</b>			
<p>This output is dedicated for diesel engine only. This output will close for exact time pre-set by setpoint <b>Glow Plugs Time</b> (page 189) before every starting attempt. The output opens in same time as the <b>STARTER</b> (PAGE 484) output closes (100 ms after <b>PRESTART</b> (PAGE 481) output opens).</p>			
<p>The diagram shows the timing of binary outputs and engine RPM during a starting attempt. The y-axis represents Binary Outputs and the x-axis represents Time. The outputs shown are Glow Plugs On/Off, Starter On/Off, and Prestart On/Off. The engine RPM is shown as a shaded area that ramps up from 0 to a 'Starting RPM' level. Key time intervals are marked: 'Prestart Time' (from Prestart On to Prestart Off), '100 ms' (from Prestart Off to Starter On), 'Glow Plugs Time' (from Glow Plugs On to Glow Plugs Off), and '100 ms' (from Starter On to Starter Off). The period after Starter Off is labeled 'Engine is running'.</p>			
Image 8.106 Glow Plugs			

When the Glow Plugs Time (page 189) is longer than Cranking Fail Pause (page 187) then the Glow Plugs Time (page 189) in Cranking Fail Pause (page 187) is long as Cranking Fail Pause (page 187).

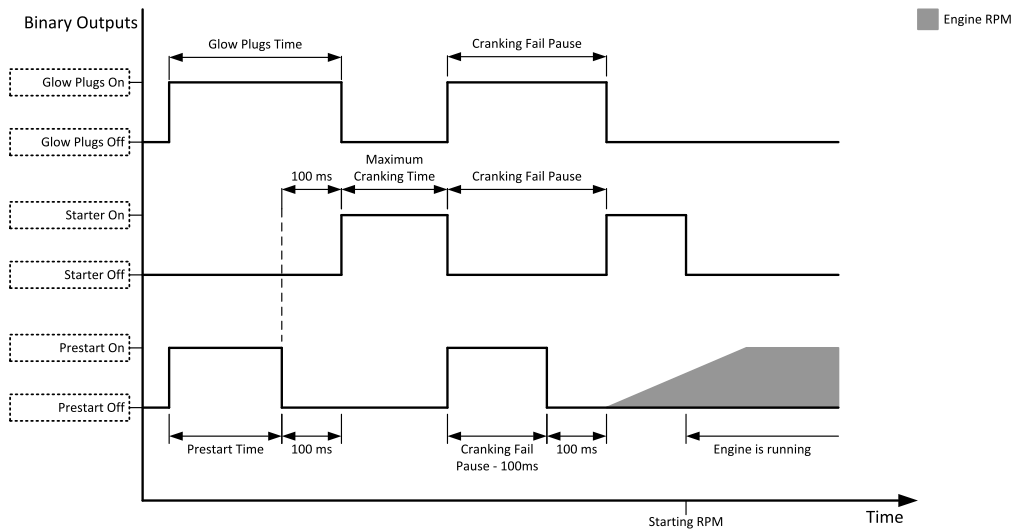


Image 8.107 Glow Plugs in Cranking Fail Pause 1

When the Glow Plugs Time (page 189) is shorter than Cranking Fail Pause (page 187) then the Glow Plugs Time (page 189) in Cranking Fail Pause (page 187) is long as normal Glow Plugs Time (page 189).

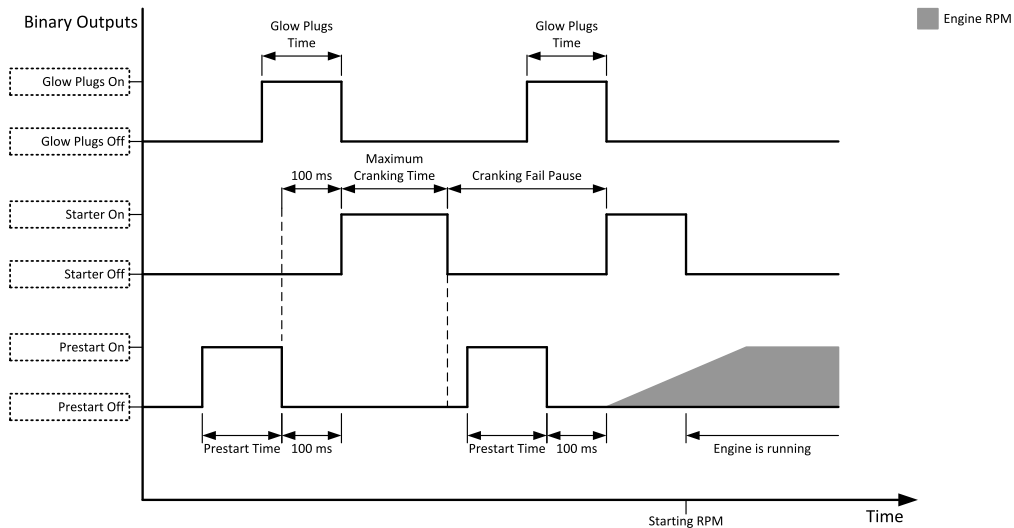


Image 8.108 Glow Plugs in Cranking Fail Pause 2

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## LBO: H

### Heartbeat

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	81		
<b>Description</b>			
This output toggles on/off in a period of 500 ms whenever the controller is switched on and functional.			

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### Horn

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1		
<b>Description</b>			
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:			
<ul style="list-style-type: none"> <li>▶ Fault reset  is pressed</li> <li>▶ Horn reset  is pressed</li> <li>▶ Horn Timeout (page 183) has elapsed</li> </ul>			

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## LBO: I

### Idle/Nominal

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	39		
<b>Description</b>			
<p>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.</p> <p>The output Idle/Nominal closes after the timer <b>Idle Time (page 195)</b> elapses. The <b>Idle Time (page 195)</b> starts to countdown when <b>Starting RPM (page 188)</b> reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching <b>Starting RPM (page 188)</b>. A Start Fail protection occurs if the RPM drop below 2RPM during idle.</p>			
Image 8.109 Idle/Nominal			
<p><b>Note:</b> Connect binary output Idle/Nominal to speed governor to switch the speed:  <i>opened = Idle</i>  <i>closed = Nominal</i>  <i>(for normally open contact type)</i></p>			

⬅ back to Logical binary outputs alphabetically

### Ignition On

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1257		
<b>Description</b>			
<p>This input is on since start button is pressed till the unit is completely stopped (or the engine doesn't start or Sd or E-Stop becomes active)</p>			
<p><b>Note:</b> This function is the same as <b>ECU POWER RELAY (PAGE 462)</b> . Ignition ON stays there from historical reasons.</p>			

⬅ back to Logical binary outputs alphabetically

## LBO: M

### Mains Healthy

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	78		
<b>Description</b>			
<p>This output is active while mains failure is not detected and mains voltage and frequency is within limits.</p> <p>This output is active when the mains voltage and frequency are within limits. The limits for under/overvoltage and under/overfrequency are the same as for mains voltage/frequency and can be found in the Mains Settings setpoint group.</p> <p>It works only with Application Mode Select = SPTM, the output is always inactive with Application Mode Select = MINT.</p>			

⬅ back to Logical binary outputs alphabetically

### Manual Ready

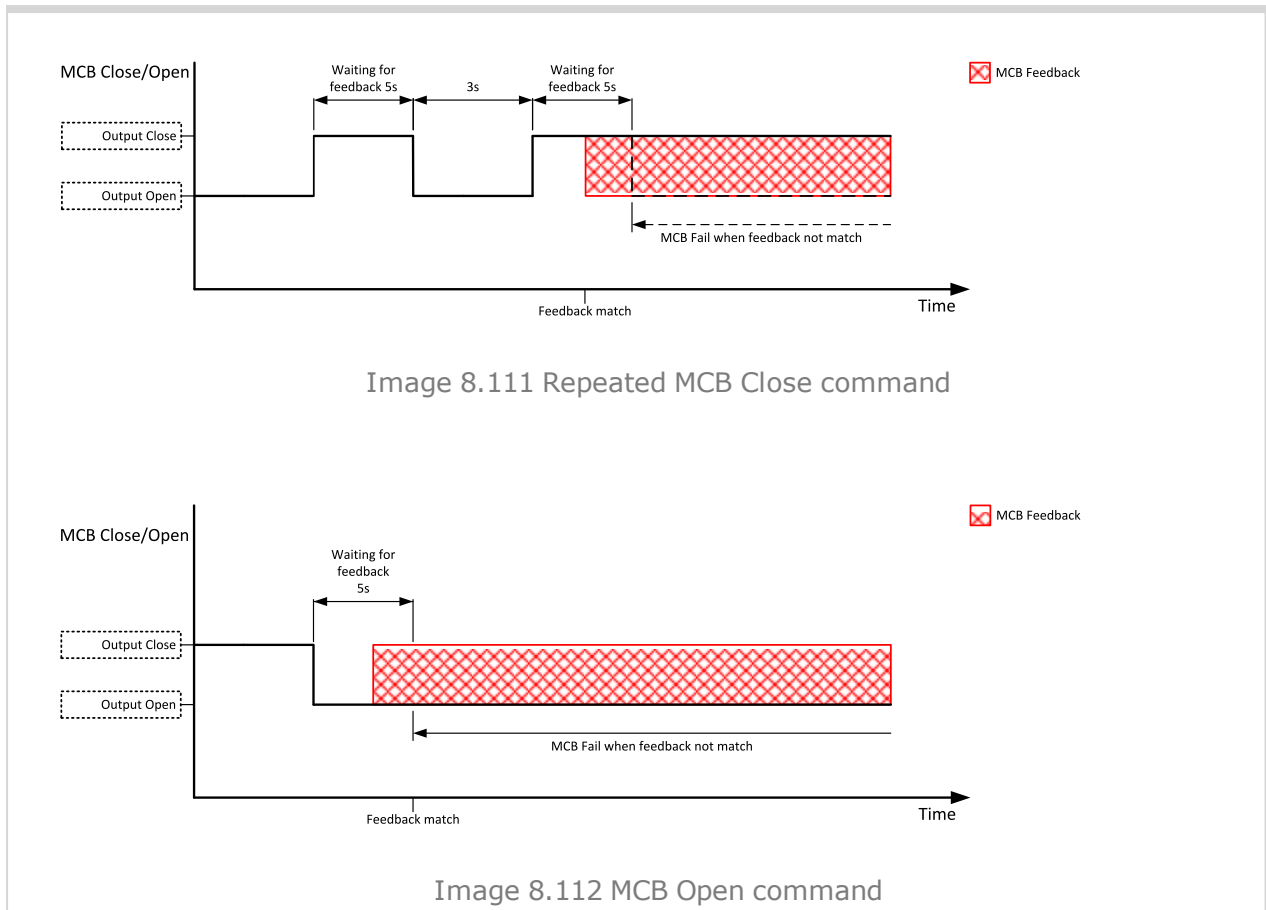
<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1258		
<b>Description</b>			
<p>This output is active when controller is in MAN mode and the engine is stopped and it is possible to start it i.e. no red alarm is activated or <b>SD OVERRIDE (PAGE 443)</b> is active (<b>Output READY (PAGE 483)</b> is active).</p>			

⬅ back to Logical binary outputs alphabetically

### MCB Close/Open

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	45		
<b>Description</b>			
<p>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.</p> <p><b>Note:</b> <i>InteliLite controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.</i></p>			
Image 8.110 MCB Close command			





[back to Logical binary outputs alphabetically](#)

## MCB OFF Coil

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	47		

### Description

The output is intended for control of open coil of mains circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.

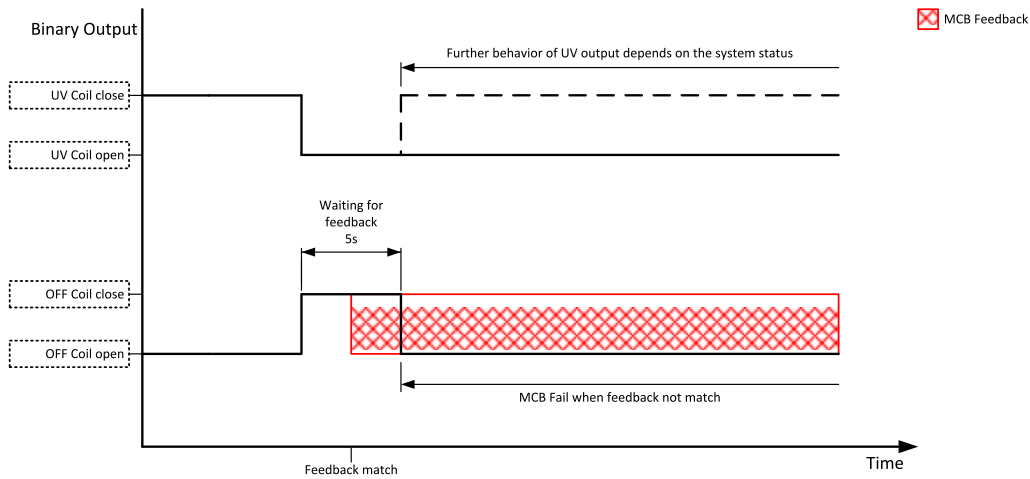


Image 8.113 MCB OFF Coil command

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## MCB ON Coil

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	46		

### Description

The output is intended for control of close coil of mains circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.

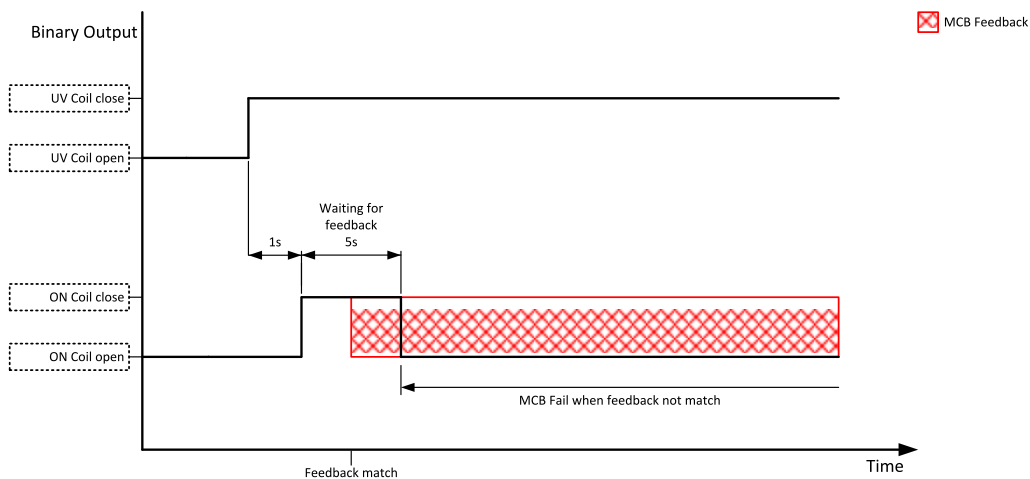


Image 8.114 MCB ON Coil close command

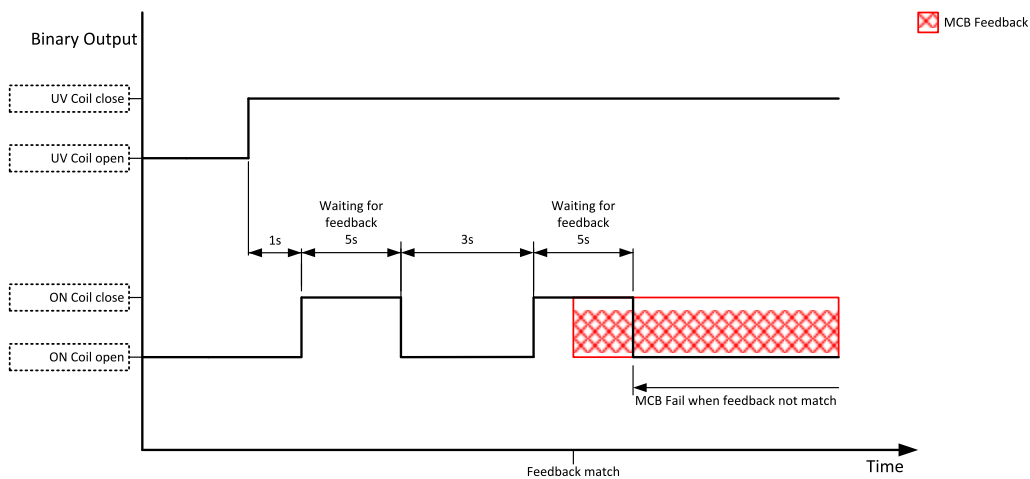


Image 8.115 Repeated MCB ON coil close command

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**MCB UV Coil**

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	48		

**Description**

The output is intended for control of undervoltage coil of mains circuit breaker. The output is active the whole time when the controller is switched on. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.

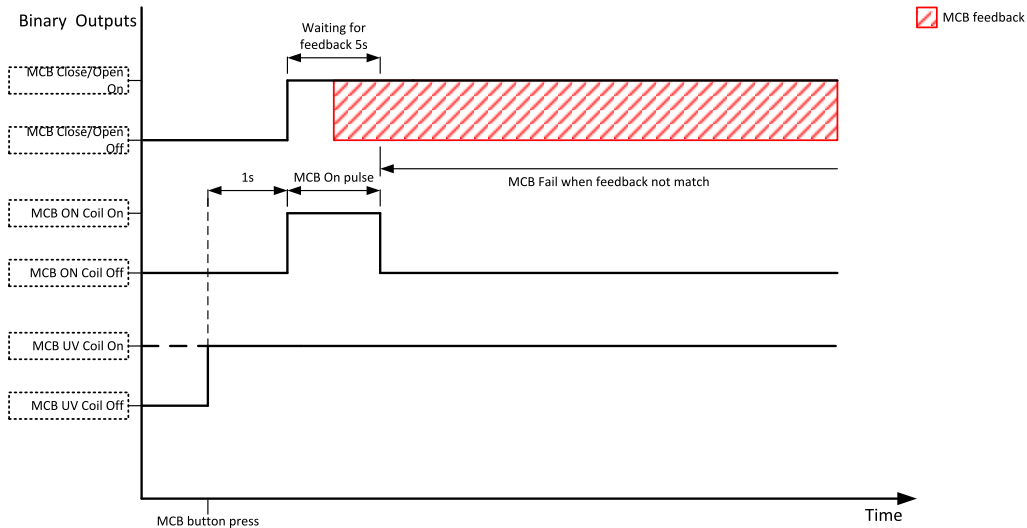


Image 8.116 MCB UV Coil close command

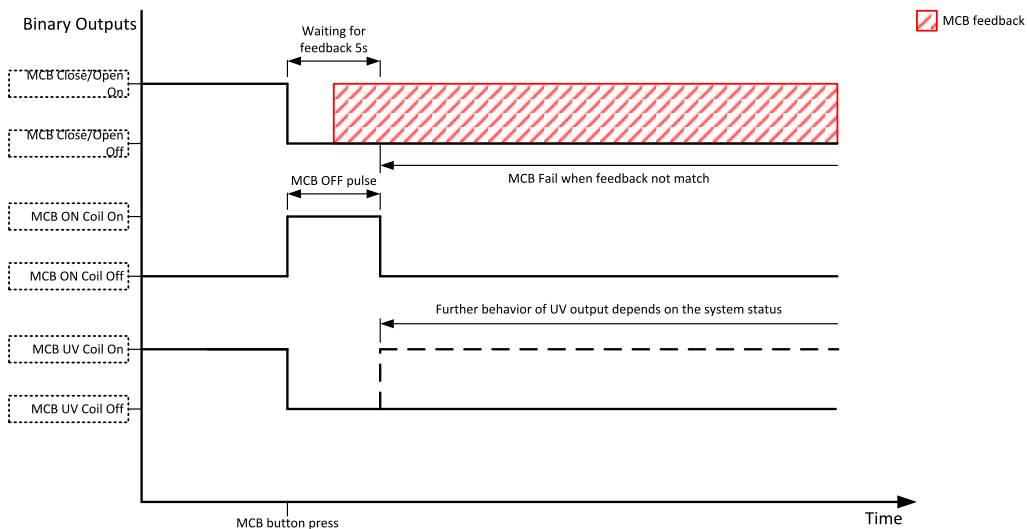


Image 8.117 MCB UV Coil open command

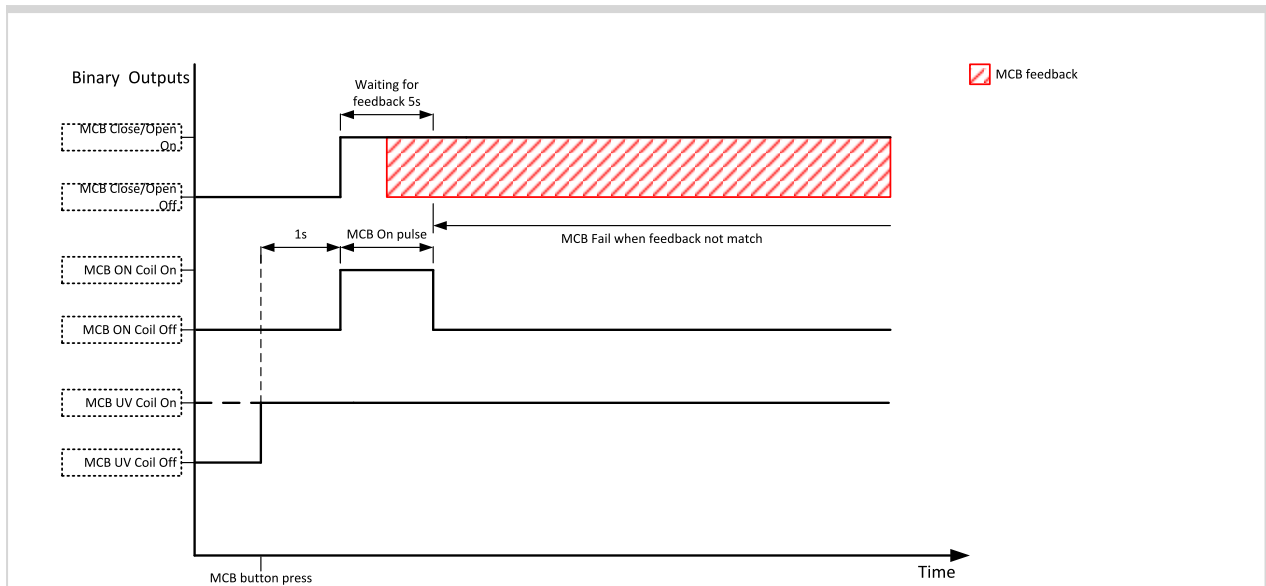


Image 8.118 MCB UV Coil close command

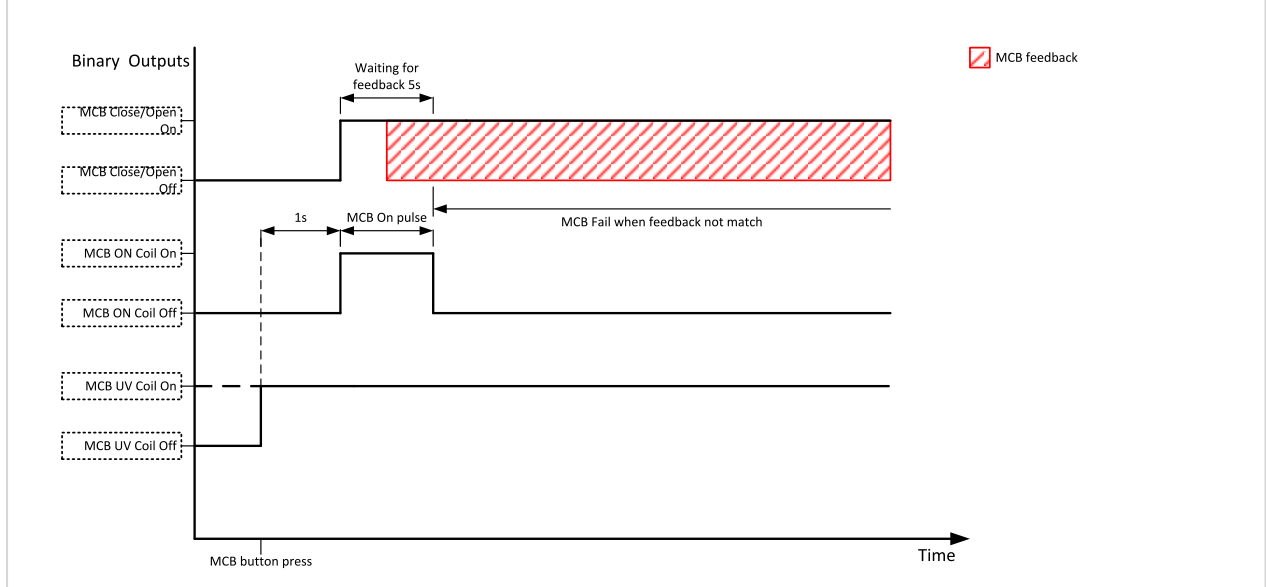


Image 8.119 MCB UV Coil close command

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### Mode AUTO

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	19		
<b>Description</b>			
This output is active whenever the controller is in AUTO mode.			

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### Mode MAN

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	18		
<b>Description</b>			
This output is active whenever the controller is in MAN mode.			

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### Mode OFF

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	17		
<b>Description</b>			
This output is active whenever the controller is in OFF mode.			

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### Mode TEST

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	20		
<b>Description</b>			
This output is active whenever the controller is in TEST mode.			

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## LBO: N

### Not In AUTO

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1248		
<b>Description</b>			
This output is active when controller isn't in AUTO mode.			

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### Not Used

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	286		
<b>Description</b>			
Output has no function.			

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## LBO: P

### Prestart

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	36		

#### Description

This output can be used for control of any device, which has to be activated just before start. The output is closed for time period of **Prestart Time (page 188)**. The output opens 100 ms before the **STARTER (PAGE 484)** output closes.

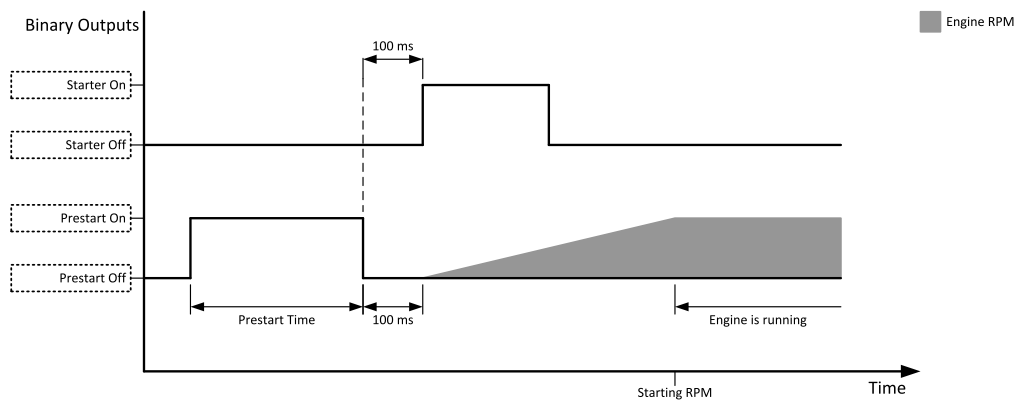


Image 8.120 Engine start

When the **Prestart Time (page 188)** is longer than **Cranking Fail Pause (page 187)** then the **Prestart Time (page 188)** in **Cranking Fail Pause (page 187)** is long as **Cranking Fail Pause (page 187)** minus 100ms.

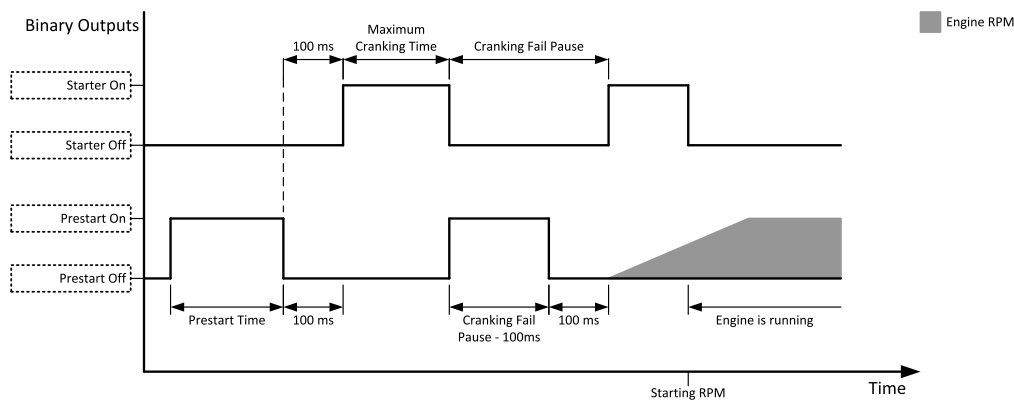


Image 8.121 Prestart in Cranking Fail Pause 1

When the **Prestart Time** (page 188) is shorter than **Cranking Fail Pause** (page 187) then the **Prestart Time** (page 188) in **Cranking Fail Pause** (page 187) is long as normal **Prestart Time** (page 188).

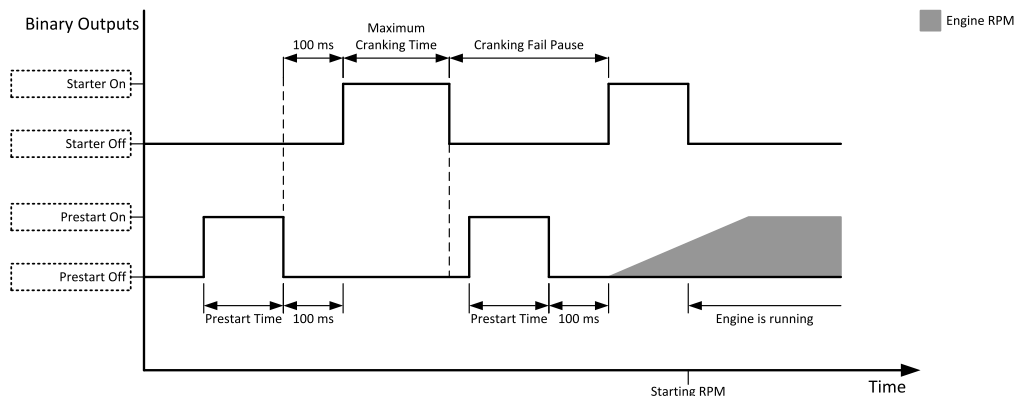


Image 8.122 Prestart in Cranking Fail Pause 2

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## LBO: R

### Ready To AMF

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF
<b>Comm object</b>	324		
<b>Description</b>			
The output is closed if the gen-set is ready to start automatically and take the load if the mains fails, i.e.:			
<ul style="list-style-type: none"> <li>▶ the controller is in AMF operating mode</li> <li>▶ the controller is in AUTO controller mode and</li> <li>▶ no red alarm is present in the alarmlist</li> <li>▶ when the red alarm is confirmed during Stop Valve and other requirements are fulfilled then the LBO is still inactive until the state ready</li> </ul>			

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### Ready To Load

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	58		
<b>Description</b>			
The output is closed whenever the GCB is closed or can be closed i.e. the stabilization phase is finished, the gen-set is running and the <b>Minimal Stabilization Time</b> (page 197) timer has elapsed. and the gen-set voltage and frequency are within limits.			
If GCB is open then gen-set voltage and frequency must be in limits.			
If GCB is close then gen-set voltage and frequency can be out of limits, but protection delay can't be count down. If gen-set voltage and frequency will return into limits until delay is count down then output is still closed.			

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## Ready

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	62		
<b>Description</b>			
The binary output is closed, when the engine is stopped and it is possible to start it i.e. no red alarm is activated or <b>SD OVERRIDE (PAGE 443)</b> 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

## Regen Needed

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1372		
<b>Description</b>			
This output is closed when DPF lamp from ECU is active.			

◀ back to Logical binary outputs alphabetically

## Running

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	67		
<b>Description</b>			
The output is designed to be used as an indication that the gen-set is running. The output closes if <b>FUEL SOLENOID (PAGE 464)</b> is closed and <b>STARTER (PAGE 484)</b> and <b>PRESTART (PAGE 481)</b> are open. The out remains close until engine stop and cooling period elapses.			
<p>The diagram illustrates the timing of the Running state. It shows the following sequence of events:</p> <ul style="list-style-type: none"> <li><b>Start:</b> The initial point of the timeline.</li> <li><b>Prestart Time:</b> A period where the Starter Output is on and the Fuel Solenoid is off.</li> <li><b>Fuel Solenoid Lead:</b> A 1-second period where the Fuel Solenoid turns on while the Starter Output is still on.</li> <li><b>Cranking Time:</b> The period during which the engine is being cranked. The Starter Output is on, and the Fuel Solenoid is on.</li> <li><b>Engine Running:</b> Once cranking is complete, the Starter Output turns off, and the Running status (indicated by a green hatched area) becomes active. A legend indicates that the green hatched area represents 'Engine is running'.</li> </ul>			
Image 8.123 Running			

◀ back to Logical binary outputs alphabetically

## LBO: S

### Sd Override

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	962		
<b>Description</b>			
The output is closed if <b>SD OVERRIDE (PAGE 443)</b> input is active and open if <b>SD OVERRIDE (PAGE 443)</b> input is inactive. This output is usually used to send information about <b>SD OVERRIDE (PAGE 443)</b> input into ECU.			

◀ back to Logical binary outputs alphabetically

### Starter

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	24		
<b>Description</b>			
This output is dedicated for starter motor control. The number of cranking attempts is adjusted by setpoint <b>Cranking Attempts (page 186)</b> in Engine Settings group. Cranking fail pause is adjusted by setpoint <b>Cranking Fail Pause (page 187)</b> .			

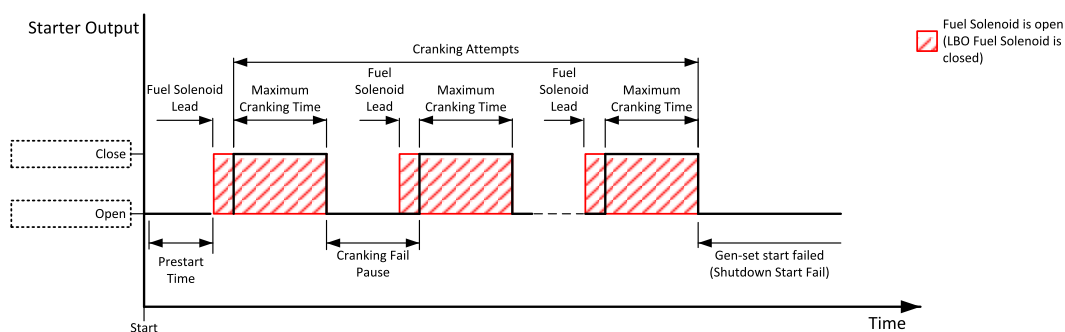


Image 8.124 Starter

The starter output opens when:

- ▶ the “firing” speed is reached
- ▶ maximum time of cranking is exceeded
- ▶ request to stop comes up
- ▶ D+ value is higher than **D+ Threshold (page 202)**
- ▶ Oil pressure value is higher than **Starting Oil Pressure (page 189)**
- ▶ Generator voltage > 25% of **Nominal Voltage Ph-N (page 177)** or **Nominal Voltage Ph-Ph (page 177)** (any phase)

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### Still Log 0

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	26		
<b>Description</b>			
Logical binary output which is still in logical 0.			

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### Still Log 1

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	27		
<b>Description</b>			
Logical binary output which is still in logical 1.			

◀ back to Logical binary outputs alphabetically

### Stop Pulse

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	25		
<b>Description</b>			

Output is active for 1 second after **STOP SOLENOID (PAGE 485)** output activation. This signal is sent to ECU in case of engine stop request.

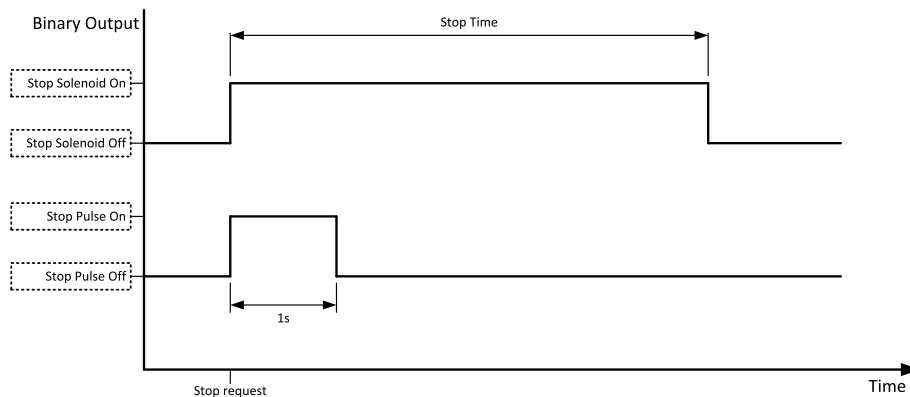


Image 8.125 Stop Pulse

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### Stop Solenoid

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	23		
<b>Description</b>			

This output is dedicated to control the stop solenoid (valve). The output closes when an engine stop command is received and is deactivated 12 s after last running engine indication went off, i.e. engine is stopped.

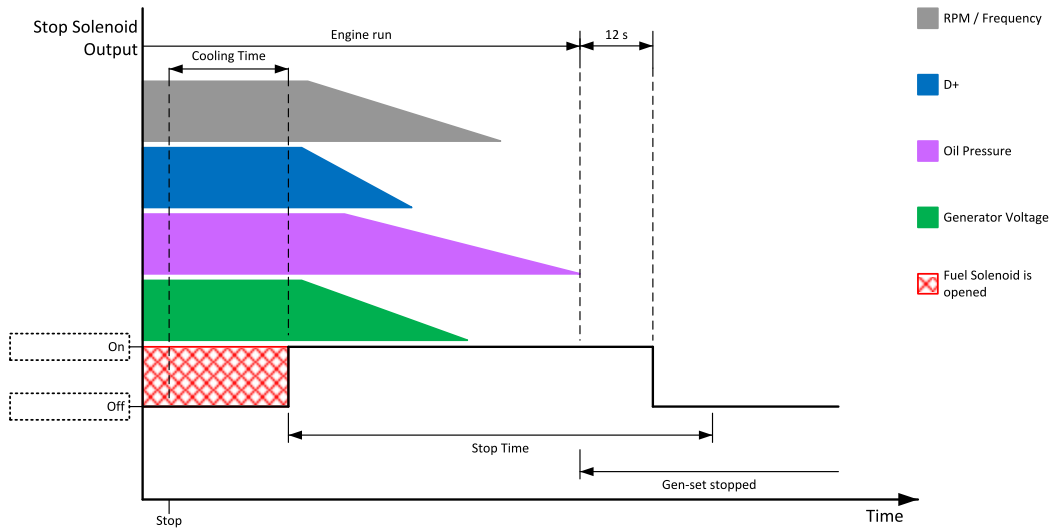


Image 8.126 Stop Solenoid 1

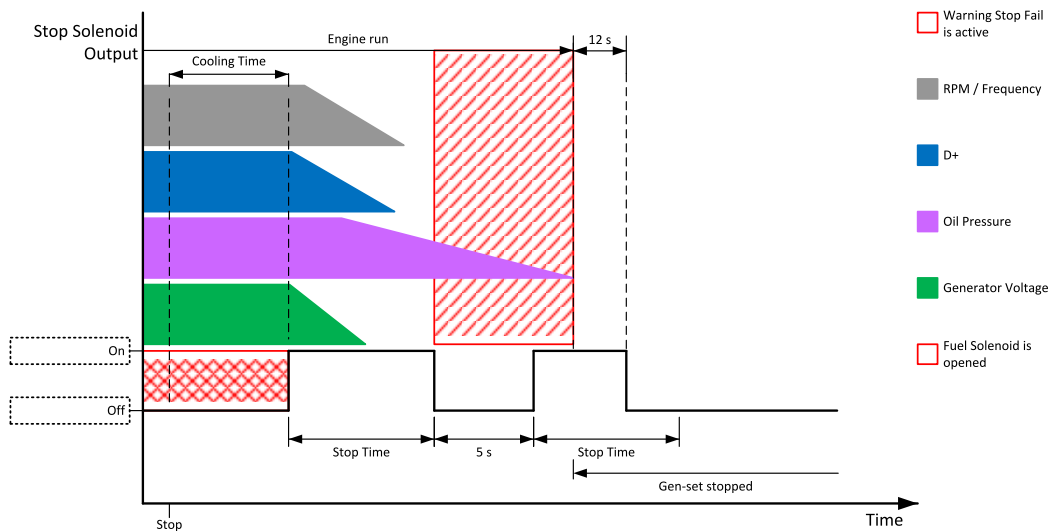


Image 8.127 Stop Solenoid 2

**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.

▲ Logical binary outputs alphabetically (page 445)

## Supplying Load

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1249		
<b>Description</b>			
<p>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.</p> <p>When the measured active power is equal to or bigger than 5 % of <b>Nominal Power (page 173)</b> for 1 s then the binary output is closed.</p> <p>When the measured active power is equal to or lower than 3 % of <b>Nominal Power (page 173)</b> for 1 s then the binary output is opened.</p>			

🔍 back to Logical binary outputs alphabetically

## Swap Start

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	1997		
<b>Description</b>			
<p>This logical binary output is result of internal comparator which compares statistic values <b>Running Hours (page 385)</b> and <b>Pulse Counter 2 (page 384)</b>. Binary output is active when <b>Running Hours (page 385)</b> are equal or higher than the <b>Pulse Counter 2 (page 384)</b>.</p>			

🔍 back to Logical binary outputs alphabetically

## LBO: V

### Ventilation

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	38		
<b>Description</b>			
<p>This logical binary output is activated at the beginning of start procedure together with <b>PRESTART (PAGE 481)</b> LBO. Ventilation output is deactivated when engine stops revolving.</p> <p>Ventilation LBO is also deactivated immediately when <b>EMERGENCY STOP (PAGE 432)</b> (or E-Stop) is activated or when controller is switched to OFF mode.</p> <p><b>Note:</b> <i>The output is intended for control of an engine room ventilation fan, engine container ventilation fan, container louvres or similar running gen-set technology.</i></p>			

🔍 back to Logical binary outputs alphabetically

### Ventilation Off Pulse

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2090		
<b>Description</b>			
<p>This logical binary output is activated on falling edge of <b>VENTILATION (PAGE 487)</b> LBO (when engine stops). The pulse duration is adjusted by <b>Ventilation Pulse Time (page 215)</b> setpoint.</p> <p><b>Note:</b> <i>The output is intended for control of an engine room ventilation fan, engine container ventilation fan, container louvres or similar running gen-set technology.</i></p>			

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### Ventilation On Pulse

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	2089		
<b>Description</b>			
This logical binary output is activated on rising edge of <b>VENTILATION (PAGE 487)</b> LBO (at the beginning of prestart period). The pulse duration is adjusted by <b>Ventilation Pulse Time (page 215)</b> setpoint.			
<i><b>Note:</b> The output is intended for control of an engine room ventilation fan, engine container ventilation fan, container louvres or similar running gen-set technology.</i>			

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## 8.1.5 Logical analog inputs

### What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

### Alphabetical groups of Logical analog inputs

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## Logical analog inputs alphabetically

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## LAI: A

### AIN Prot01

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9999		
<b>Description</b>			
<p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 47</b>. Limits for this protection are adjusted by setpoints <b>Analog Protection 1 Wrn (page 229)</b> and <b>Analog Protection 1 Sd (page 230)</b>. Delay is adjusted by setpoint <b>Analog Protection 1 Delay (page 230)</b>.</p>			
<b>Protection types</b>			
Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.		
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.		
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.		
Wrn	Analog value is used for warning protection only.		
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.		
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.		
Wrn + Sd	Analog value is used for warning and shutdown protection.		
Sd	Analog value is used for shutdown protection.		
<b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .			
<b>Alarm</b>			
Under limit	Alarm is activated when value of analog input is under adjusted limits		
Over limit	Alarm is activated when value of analog input is over adjusted limits		
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
<p><b>Example:</b> Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.</p>			
<b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .			

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## AIN Prot02

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9998		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 2 Wrn (page 231)** and **Analog Protection 2 Sd (page 231)**. Delay is adjusted by setpoint **Analog Protection 2 Delay (page 232)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot03

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9997		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 3 Wrn (page 232)** and **Analog Protection 3 Sd (page 233)**. Delay is adjusted by setpoint **Analog Protection 3 Delay (page 233)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot04

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9996		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 4 Wrn (page 234)** and **Analog Protection 4 Sd (page 234)**. Delay is adjusted by setpoint **Analog Protection 4 Delay (page 235)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot05

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9995		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 5 Wrn (page 235)** and **Analog Protection 5 Sd (page 236)**. Delay is adjusted by setpoint **Analog Protection 5 Delay (page 236)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot06

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9994		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 6 Wrn (page 237)** and **Analog Protection 6 Sd (page 237)**. Delay is adjusted by setpoint **Analog Protection 6 Delay (page 238)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot07

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9993		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 7 Wrn (page 238)** and **Analog Protection 7 Sd (page 239)**. Delay is adjusted by setpoint **Analog Protection 7 Delay (page 239)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot08

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9992		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 8 Wrn (page 240)** and **Analog Protection 8 Sd (page 240)**. Delay is adjusted by setpoint **Analog Protection 8 Delay (page 241)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot09

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9991		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 9 Wrn (page 241)** and **Analog Protection 9 Sd (page 242)**. Delay is adjusted by setpoint **Analog Protection 9 Delay (page 242)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot10

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9990		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 10 Wrn (page 243)** and **Analog Protection 10 Sd (page 243)**. Delay is adjusted by setpoint **Analog Protection 10 Delay (page 244)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot11

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9989		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 11 Wrn (page 244)** and **Analog Protection 11 Sd (page 245)**. Delay is adjusted by setpoint **Analog Protection 11 Delay (page 245)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot12

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9988		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 12 Wrn (page 246)** and **Analog Protection 12 Sd (page 246)**. Delay is adjusted by setpoint **Analog Protection 12 Delay (page 247)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot13

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9987		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 13 Wrn (page 247)** and **Analog Protection 13 Sd (page 248)**. Delay is adjusted by setpoint **Analog Protection 13 Delay (page 248)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot14

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9986		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 14 Wrn (page 249)** and **Analog Protection 14 Sd (page 249)**. Delay is adjusted by setpoint **Analog Protection 14 Delay (page 250)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot15

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9985		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 15 Wrn (page 250)** and **Analog Protection 15 Sd (page 251)**. Delay is adjusted by setpoint **Analog Protection 15 Delay (page 251)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot16

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9984		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 16 Wrn (page 252)** and **Analog Protection 16 Sd (page 252)**. Delay is adjusted by setpoint **Analog Protection 16 Delay (page 253)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot17

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9983		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 17 Wrn (page 253)** and **Analog Protection 17 Sd (page 254)**. Delay is adjusted by setpoint **Analog Protection 17 Delay (page 254)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot18

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9982		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 18 Wrn (page 255)** and **Analog Protection 18 Sd (page 255)**. Delay is adjusted by setpoint **Analog Protection 18 Delay (page 256)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot19

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9981		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 19 Wrn (page 256)** and **Analog Protection 19 Sd (page 257)**. Delay is adjusted by setpoint **Analog Protection 19 Delay (page 257)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot20

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9980		

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 47**. Limits for this protection are adjusted by setpoints **Analog Protection 20 Wrn (page 258)** and **Analog Protection 20 Sd (page 258)**. Delay is adjusted by setpoint **Analog Protection 20 Delay (page 259)**.

### Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## LAI: C

### Coolant Temp

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	67		
<b>Description</b>			
<p>Logical analog input designed for coolant temperature value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 47</b>. Limits for this protection are adjusted by setpoints <b>Coolant Temperature Wrn (page 207)</b> and <b>Coolant Temperature Sd (page 207)</b>. Delay is adjusted by setpoint <b>Coolant Temperature Delay (page 207)</b>.</p>			
<b>Protection types</b>			
Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.		
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.		
Wrn	Analog value is used for warning protection only.		
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.		
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.		
Wrn + Sd	Analog value is used for warning and shutdown protection.		
Sd	Analog value is used for shutdown protection.		
<b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .			
<b>Alarm</b>			
Under limit	Alarm is activated when value of analog input is under adjusted limits		
Over limit	Alarm is activated when value of analog input is over adjusted limits		
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
<p><b>Example:</b> Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.</p>			
<b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .			
<p><b>Note:</b> This analog function can by also configured on binary input as binary function. In this case chose <b>COOLANT TEMP (PAGE 430)</b> binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.</p>			
<b>IMPORTANT:</b> Value from analog input has higher priority than value from ECU.			

🔍 back to Logical analog inputs alphabetically

## LAI: F

### Fuel Level

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	78		
<b>Description</b>			
<p>Logical analog input designed for fuel level value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 47</b>. Limits for this protection are adjusted by setpoints <b>Fuel Level Wrn (page 209)</b> and <b>Fuel Level Sd (page 210)</b>. Delay is adjusted by setpoint <b>Fuel Level Delay (page 210)</b>.</p>			
<b>Protection types</b>			
Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.		
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.		
Wrn	Analog value is used for warning protection only.		
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.		
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.		
Wrn + Sd	Analog value is used for warning and shutdown protection.		
Sd	Analog value is used for shutdown protection.		
<b>Note:</b> This parameter has to be adjusted via IntelliConfig.			
<b>Alarm</b>			
Under limit	Alarm is activated when value of analog input is under adjusted limits		
Over limit	Alarm is activated when value of analog input is over adjusted limits		
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
<p><b>Example:</b> Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.</p>			
<b>Note:</b> This parameter has to be adjusted via IntelliConfig.			
<p><b>IMPORTANT:</b> For right behavior of this function, curve for analog input has to be in percentage.</p>			
<p><b>Note:</b> This analog function can be also configured on binary input as binary function. In this case choose <b>FUEL LEVEL (PAGE 433)</b> binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.</p>			
<p><b>IMPORTANT:</b> Value from analog input has higher priority than value from ECU.</p>			

🔍 back to Logical analog inputs alphabetically

**LAI: N****Not Used**

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	230		
<b>Description</b>			
Input has no function.			

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## LAI: O

### Oil Pressure

<b>Related FW</b>	1.9.0	<b>Related applications</b>	AMF, MRS
<b>Comm object</b>	9		
<b>Description</b>			
<p>Logical analog input designed for oil pressure value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 47</b>. Limits for this protection are adjusted by setpoints <b>Oil Pressure Wrn (page 205)</b> and <b>Oil Pressure Sd (page 205)</b>. Delay is adjusted by setpoint <b>Oil Pressure Delay (page 205)</b>.</p>			
<b>Protection types</b>			
Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.		
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.		
Wrn	Analog value is used for warning protection only.		
Wrn + Sd	Analog value is used for warning and Sd protection.		
Sd	Analog value is used for Sd protection.		
<b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .			
<b>Alarm</b>			
Under limit	Alarm is activated when value of analog input is under adjusted limits		
Over limit	Alarm is activated when value of analog input is over adjusted limits		
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.		
<p><b>Example:</b> Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.</p>			
<b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .			
<p><b>Note:</b> This analog function can by also configured on binary input as binary function. In this case chose <b>OIL PRESSURE (PAGE 439)</b> binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.</p>			
<b>IMPORTANT:</b> Value from analog input has higher priority than value from ECU.			

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## 8.1.6 PLC

### List of PLC groups

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For full list of PLC blocks go to the chapter **List of PLC blocks (page 516)**.

## List of PLC blocks

### Group: Basic logical functions

OR/AND .....517

### Group: Comparison of analog inputs

Comparator With Hysteresis .....518

Comparator With Delay ..519

### Group: Time functions

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## Group: Basic Logical functions

### OR/AND

<b>PLC group</b>	Basic logical functions	
<b>Related FW</b>	1.9.0	
<b>Related applications</b>	AMF, MRS	
<b>Comm object</b>	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.

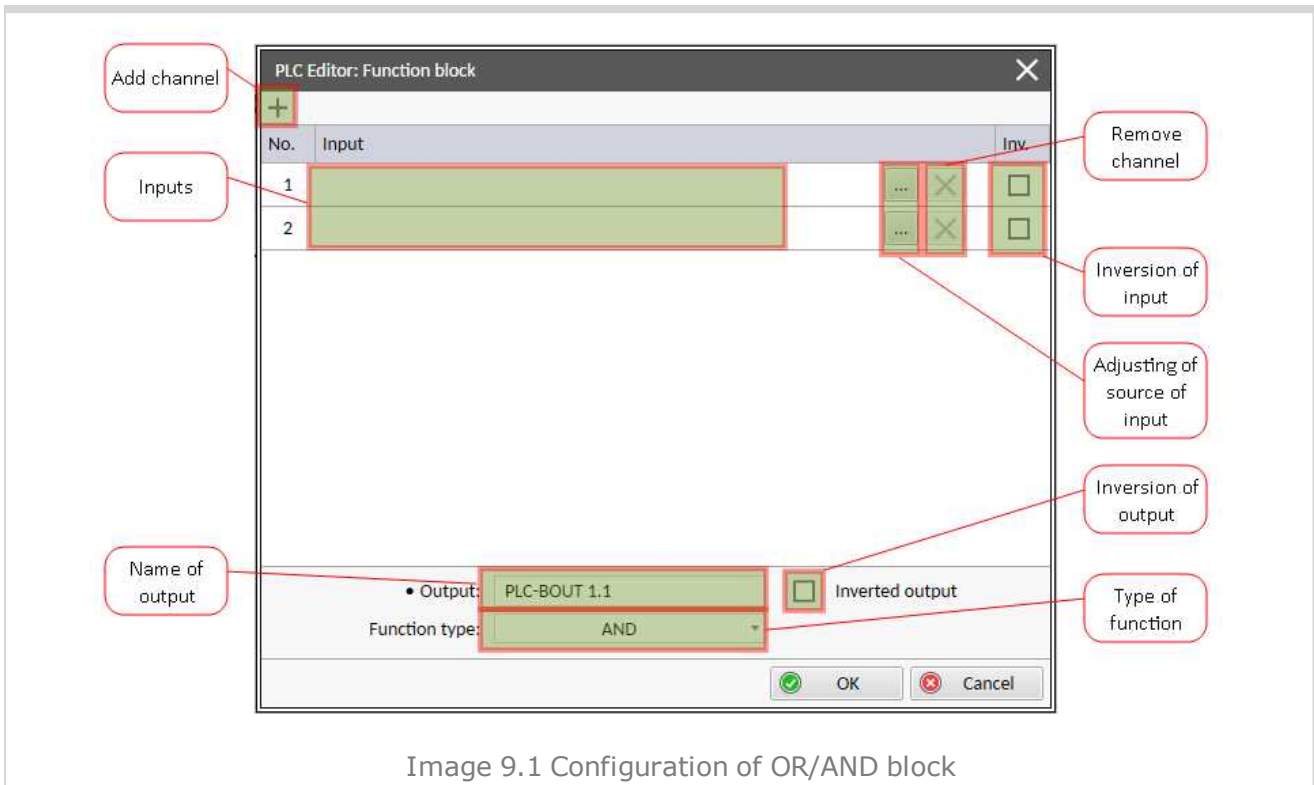


Image 9.1 Configuration of OR/AND block

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## Group: Comparison of analog inputs

### Comparator With Hysteresis

<b>PLC group</b>	Comparison of analog inputs			
<b>Related FW</b>	1.9.0			
<b>Related applications</b>	AMF, MRS			
<b>Comm object</b>	3			
<b>Inputs</b>				
<b>Input</b>	<b>Type</b>	<b>Negation</b>	<b>Range</b>	<b>Function</b>
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
<b>Outputs</b>				
<b>Output</b>	<b>Type</b>	<b>Negation</b>	<b>Range</b>	<b>Function</b>
Output	Binary	No	0/1	Comparator output
<b>Description</b>				
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.				

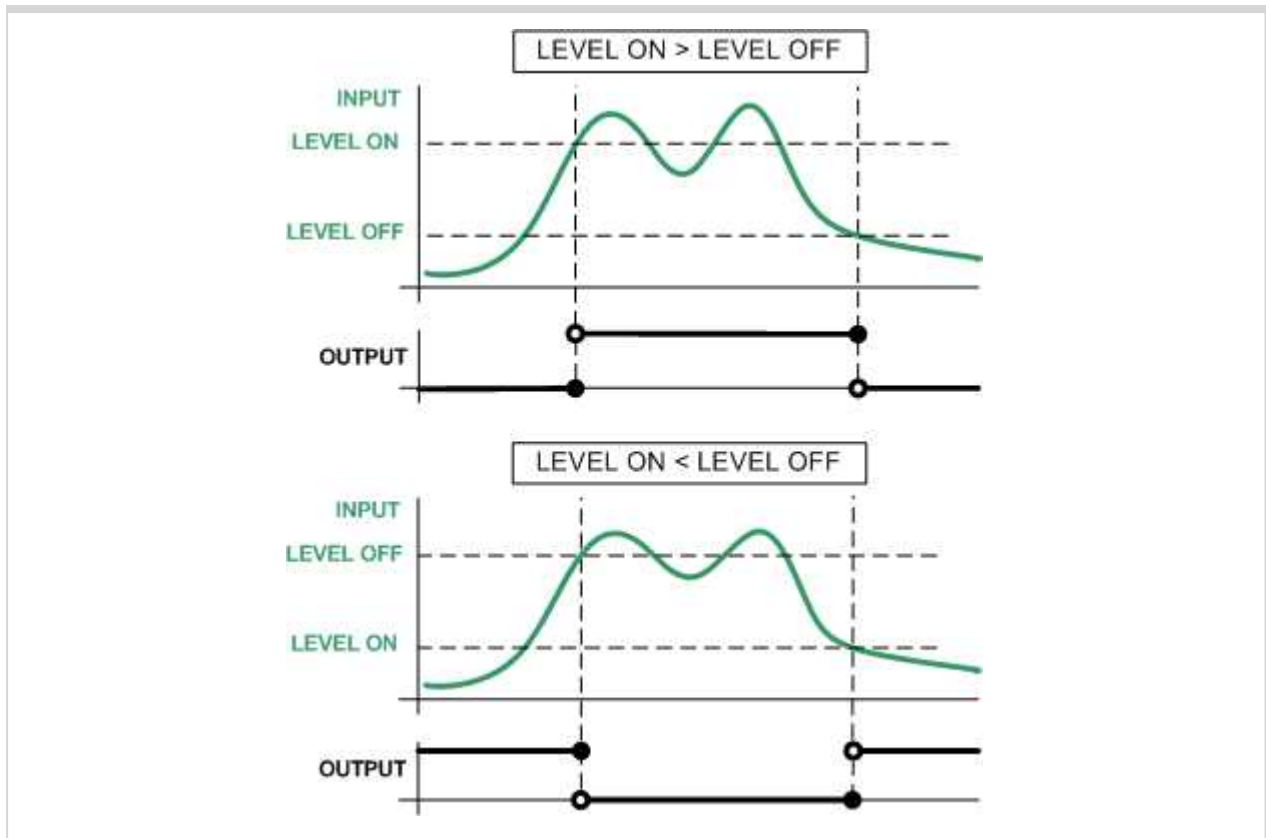


Image 9.2 Different On and Off levels

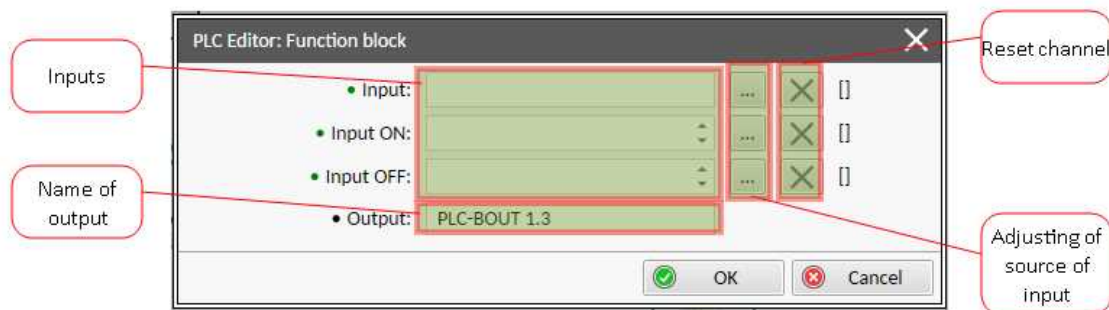



Image 9.3 Configuration of Comp Hyst block

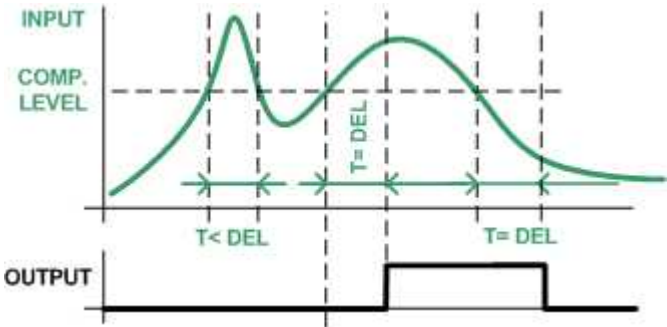
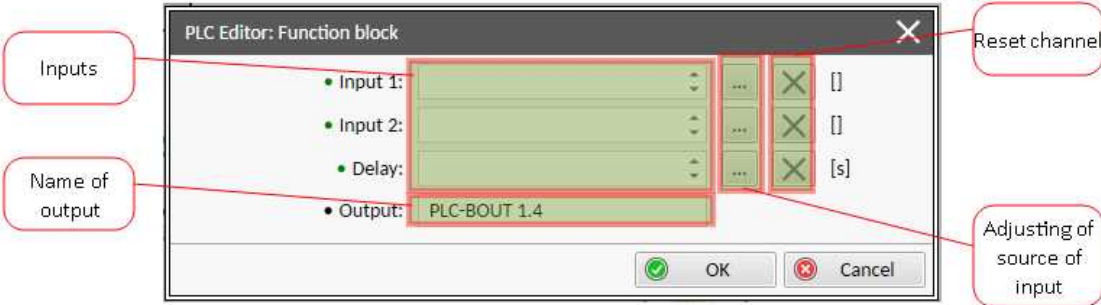
**Note:** Level On and Level Off can be constants or values from controller.

**IMPORTANT:** In case that values on inputs have different decimal numbers than the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.

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### Comparator With Delay

PLC group	Comparison of analog inputs	
Related FW	1.9.0	
Related applications	AMF, MRS	

<b>Comm object</b>	4			
<b>Inputs</b>				
<b>Input</b>	<b>Type</b>	<b>Negation</b>	<b>Range</b>	<b>Function</b>
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
<b>Outputs</b>				
<b>Output</b>	<b>Type</b>	<b>Negation</b>	<b>Range</b>	<b>Function</b>
Output	Binary	No	0/1	Comparator output
<b>Description</b>				
<p>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.</p>				
				
<p>Image 9.4 Principle of delay</p>				
				
<p>Image 9.5 Configuration of Comp Time block</p>				
<p><b>Note:</b> <i>Input 2 and Delay can be constants or values from controller.</i></p>				

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## Group: Time functions

### Timer

<b>PLC group</b>	Time functions	
<b>Related FW</b>	1.9.0	
<b>Related applications</b>	AMF, MRS	
<b>Comm object</b>	14	

**Inputs**

Input	Type	Negation	Range	Function
Run	Binary	No	0/1	The timer runs only if this input is active or not connected
Reload	Binary	No	0/1	This input reloads the timer to the initial value
Reload value	Analog	No	0,0..3276,7 [s]	Initial value of the timer

**Outputs**

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Timer output

**Description**

The block works as a countdown timer which is decreased by 1 every PLC cycle. The timer initial value is adjustable by the "Reload value" input. The timer is automatically reloaded with the initial value when it reaches zero or it can be reloaded in any other moment using the "reload" input. The timer is held at reload value until the reload input is deactivated. The timer output is inverted always when the timer is reloaded.

Image 9.6 Principle of timer

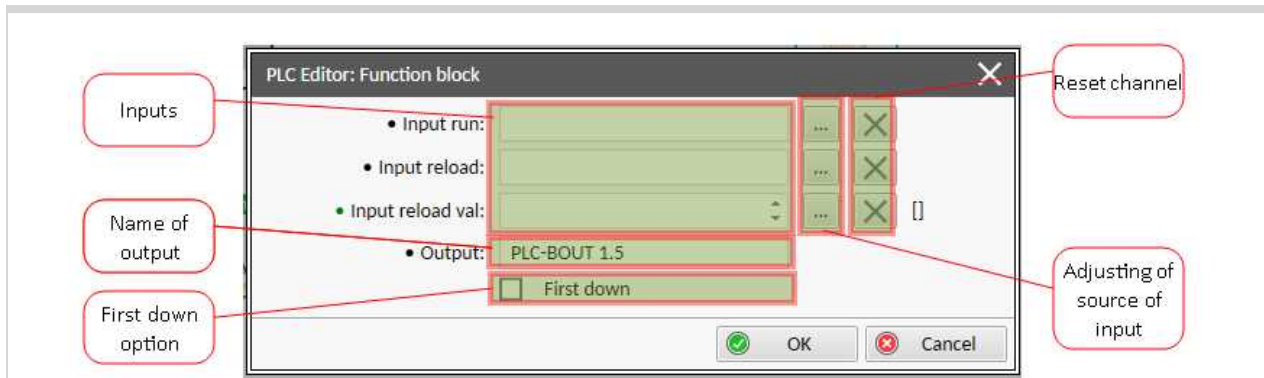


Image 9.7 Configuration of Timer block


**Note:** Input reload value can be constant or value from controller.

**Note:** If you want the output to start at logical 0, tick First down option. Otherwise the output will start at logical 1.

**IMPORTANT:** In case that inputs are not connected and First down option isn't tick, than output is active.

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## Delay

<b>PLC group</b>	Time functions			
<b>Related FW</b>	1.9.0			
<b>Related applications</b>	AMF, MRS			
<b>Comm object</b>	33			
<b>Item 8</b>				
<b>Inputs</b>				
<b>Input</b>	<b>Type</b>	<b>Negation</b>	<b>Range</b>	<b>Function</b>
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)
<b>Outputs</b>				
<b>Output</b>	<b>Type</b>	<b>Negation</b>	<b>Range</b>	<b>Function</b>
Output	Binary	No	0/1	Output signal
<b>Description</b>				
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.

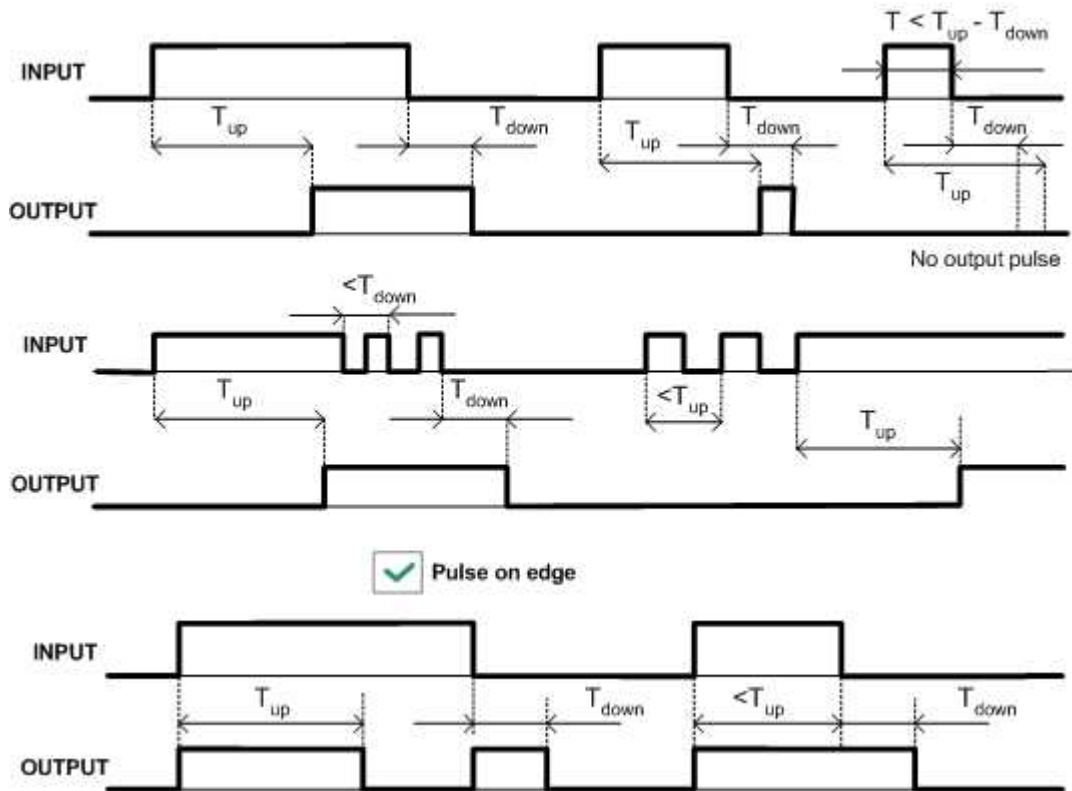


Image 9.8 Delay modes principles

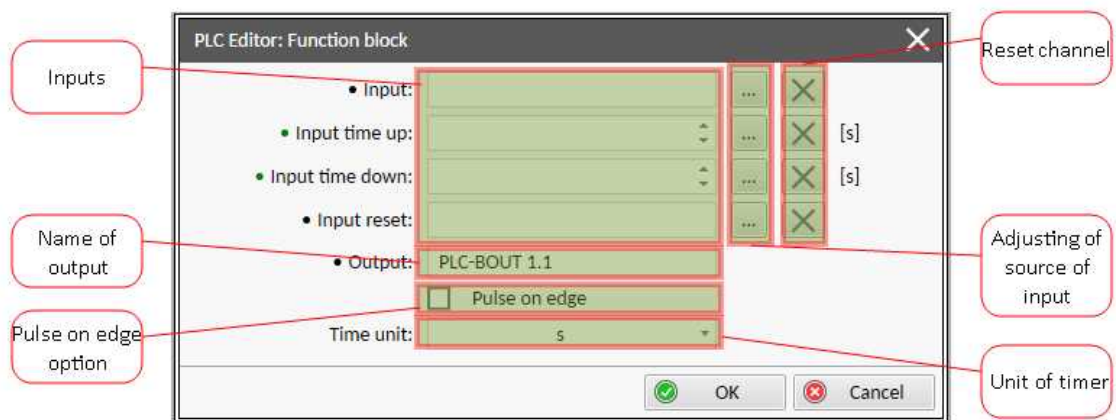


Image 9.9 Configuration of Delay block

**Note:** If Input time up or Input time down value is <0, this input is internally set to zero.

**Note:** *Input time up and Input time down values can be constants or values from controller.*

**Note:** *Use Pulse on edge option to choose between delay and pulse mode.*

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## 8.2 Alarms

8.2.1 Alarms level 1 .....	524
8.2.2 Alarms level 2 .....	539
8.2.3 Fail sensor and other types .....	554

### What alarms are:

The controller evaluates two levels of alarms. For more information see **Alarm management on page 101**.

### 8.2.1 Alarms level 1

Warnings .....	526
Other type .....	536

For full list of Alarms level 1 go to **List of alarms level 1 (page 525)**.

### What alarms level 1 are:

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level. For more information see **Alarm types - Level 1 on page 103**.

## List of alarms level 1

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## Warnings

### Alarm Email 1 Fail

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Alarm Email 1 Fail
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint <b>Email Address 1 (page 291)</b> and email wasn't send.

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### Alarm SMS 1 Fail

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Alarm SMS 1 Fail
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint <b>Telephone Number 1 (page 291)</b> and SMS wasn't send.

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### Battery Charger Fail

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Battery Charge Fail
<b>Alarm evaluated</b>	Mains is OK
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm is activated when logical binary input <b>BATTERY CHARGER (PAGE 405)</b> is active.

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### Event Email 1 Fail

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Event Email 1 Fail
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint <b>Email Address 1 (page 291)</b> and email wasn't send.

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### Event SMS 1 Fail

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Event SMS 1 Fail
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint <b>Telephone Number 1 (page 291)</b> and SMS wasn't send.

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### Wrn AIN Prot

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn + Name of analog input
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that value the general analog protection is out of warning protection limit.

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### Wrn Battery > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	All the time
<b>Alarm evaluated</b>	Wrn Battery > Voltage
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm informs the operator that the controller supply voltage is too high. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Battery Overvoltage (page 213)</b></li> <li>▶ <b>Battery &lt;&gt; Voltage Delay (page 213)</b></li> </ul>

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### Wrn Battery < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Battery < Voltage
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm informs the operator that the controller supply voltage is too low. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Battery Undervoltage (page 212)</b></li> <li>▶ <b>Battery &lt;&gt; Voltage Delay (page 213)</b></li> </ul>

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## Wrn BIN Protection

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn + Name of binary input
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - Wrn and binary input name. This alarm occurs, when appropriate binary input is active.

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## Wrn Charging Alternator Fail

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Charging Alternator Fail
<b>Alarm evaluated</b>	Engine running only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than <b>D+ Threshold (page 202)</b> of the controller supply voltage. This alarm works similar to the red “battery” alarm indicator on a vehicle dashboard.  The setpoint has to be in Charge Fail or Enabled position to enable this alarm.

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## Wrn Coolant Temperature Low

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Coolant Temperature Low
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the coolant temperature is lower than the temperature set in <b>Coolant Temperature Low Wrn (page 209)</b> setpoint.

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## Wrn Coolant Temp

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Coolant Temp
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the coolant temperature is higher than the temperature set in <b>Coolant Temperature Wrn (page 207)</b> setpoint.

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## Wrn ECU Communication Fail

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn ECU Communication Fail
<b>Alarm evaluated</b>	With configured LBO ECU POWER RELAY (PAGE 462) - only when this LBO is active Without configured LBO ECU POWER RELAY (PAGE 462) - all the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	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 Fuel Level

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Fuel Level
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the fuel level is lower than the level set in <b>Fuel Level Wrn (page 209)</b> setpoint.

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## Wrn Generator L1 > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L1 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ Generator Overvoltage Wrn (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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## Wrn Generator L1 < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L1 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ Generator Undervoltage Wrn (page 219)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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### Wrn Generator L1L2 > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L1L2 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Overvoltage Wrn (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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### Wrn Generator L1L2 < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L1L2 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage Wrn (page 219)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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### Wrn Generator L2 > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L2 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Overvoltage Wrn (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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### Wrn Generator L2 < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L2 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage Wrn (page 219)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>



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### Wrn Generator L2L3 > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L2L3 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

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### Wrn Generator L2L3 < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L2L3 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 219)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

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### Wrn Generator L3 > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L3 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

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### Wrn Generator L3 < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L3 < Voltage
<b>Alarm evaluated</b>	Generator excited only

<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 219)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

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### Wrn Generator L3L1 > Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L3L1 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

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### Wrn Generator L3L1 < Voltage

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator L3L1 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 219)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

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### Wrn Generator > Frequency

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator > Frequency
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Overfrequency Wrn (page 220)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 221)</b></li> </ul>

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### Wrn Generator < Frequency

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Generator < Frequency
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Underfrequency Wrn (page 220)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 221)</b></li> </ul>

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### Wrn Check DPF Status

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Check DPF Status
<b>Alarm evaluated</b>	When ECU is configured
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm occurs when ECU send alarm message about Tier IV protection.</p> <p><b>Note:</b> Tier IV protection have to be supported by ECU.</p>

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### Wrn Mains Voltage Detected

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Mains Voltage Detected
<b>Alarm evaluated</b>	Gen-set is running
<b>Related applications</b>	AMF
<b>Description</b>	<p>This alarm occurs when setpoint <b>Operation Mode (page 181)</b> is adjusted to MRS and voltage is detected on mains.</p>

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### Wrn Maintenance 1

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Maintenance 1
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>Adjust the setpoint <b>Maintenance Timer 1 (page 211)</b> to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value.</p>

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## Wrn Maintenance 2

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Maintenance 2
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	Adjust the setpoint <b>Maintenance Timer 2 (page 212)</b> to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value.

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## Wrn Maintenance 3

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Maintenance 3
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	Adjust the setpoint <b>Maintenance Timer 3 (page 212)</b> to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value.

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## Wrn MCB Fail

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn MCB Fail
<b>Alarm evaluated</b>	All the time

<b>Related applications</b>	AMF
<b>Description</b>	<p>This alarm will occur when the <b>MCB FEEDBACK (PAGE 438)</b> input does not match the expected position given by the <b>MCB CLOSE/OPEN (PAGE 474)</b> output. It stays active until the mismatch between the output and feedback disappears.</p> <ul style="list-style-type: none"> <li>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.</li> <li>▶ 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 <b>Mains Return Delay (page 222)</b> has elapsed.</li> <li>▶ The alarm will be also issued, if the breaker does not respond to the close command within 2 seconds. After this period has elapsed the output MCB Close/Open is deactivated again and the next attempt to close the breaker will occur first after the alarm is reset.</li> <li>▶ The alarm will be also issued if the breaker does not respond to the open command within 2 seconds. The output MCB Close/Open will stay deactivated. Closing of GCB is blocked until this alarm becomes inactive.</li> </ul>

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### Wrn Oil Pressure

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Oil Pressure
<b>Alarm evaluated</b>	Gen-set is running
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the oil pressure is lower than the pressure set in <b>Oil Pressure Wrn (page 205)</b> setpoint.

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### Wrn Overload

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Overload
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>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:</p> <ul style="list-style-type: none"> <li>▶ <b>Overload Wrn (page 216)</b> adjusts the overload limit.</li> <li>▶ <b>Overload Delay (page 216)</b> Overload Del adjusts the delay.</li> </ul>

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### Wrn Override All Sd

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Override All Sd
<b>Alarm evaluated</b>	All the time

<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm occurs when binary input <b>Sd OVERRIDE (PAGE 443)</b> is activated.

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### Wrn Stop Fail

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	Wrn Stop Fail
<b>Alarm evaluated</b>	While the engine shall be stopped
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>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 <b>FUEL SOLENOID (PAGE 464)</b> has been switched off and time delay <b>Stop Time (page 199)</b> has elapsed and lasts for the entire time the <b>FUEL SOLENOID (PAGE 464)</b> or <b>STARTER (PAGE 484)</b> are off.</p> <p style="text-align: center;">Image 9.10 Stop Fail</p> <p><b>Note:</b> Gen-set cannot be started until this alarm is inactive and reset.</p>

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### Other type

#### After-Treatment

<b>Alarm Type</b>	Alarm indication
<b>Alarmlist message</b>	After-Treatment
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm occurs when appropriate after-treatment lamp is active.

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### ECU Wait To Start

<b>Alarm Type</b>	Warning
<b>Alarmlist message</b>	ECU Wait To Start
<b>Alarm evaluated</b>	Only when ECU is connected

<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm is activated when ECU send information that ECU Wait To Start lamp is activated. LBO ALARM (PAGE 455)is not activated, after deactivation of lamp, alarm automatically disappear.

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### ECU Yellow Lamp

<b>Alarm Type</b>	Alarm indication + history record
<b>Alarmlist message</b>	ECU Yellow Lamp
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm is activated when ECU send information that ECU Yellow lamp is activated. LBO ALARM (PAGE 455)is not activated, after deactivation of lamp, alarm automatically disappear.

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### EM(A) - a message lost

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	EM(A) - a message lost
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that there is a problem with communication between controller and module in slot.

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### EM(A) - configuration mistake

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	EM(A) - configuration mistake
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

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### EM(A) - insufficient

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	EM(A) - insufficient
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that module does not support all required features.

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### EM(A) - missing or damaged

Alarm Type	Other
Alarmlist message	EM(A) - missing or damaged
Alarm evaluated	All the time
Related applications	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).

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### Generator CCW Rotation

Alarm Type	Warning
Alarmlist message	Generator CCW Rotation
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The controller detects phase sequence on generator voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in IntelliLite controller: T35 = N, T36 = L1, T37 = L2 and T38 = L3. When the phases are connected in a different order, alarms are detected. This alarm prevent circuit breaker closing.

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### Mains CCW Rotation

Alarm Type	Alarm indication
Alarmlist message	Mains CCW Rotation
Alarm evaluated	All the time
Related applications	AMF
Description	The controller detects phase sequence on mains voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in IntelliLite controller: T39 = N, T40 = L1, T41 = L2 and T42 = L3. When the phases are connected in a different order, alarms are detected. This alarm prevent circuit breaker closing.

⬅ back to List of alarms level 1

### Manual Restore

Alarm Type	Warning
Alarmlist message	Manual Restore
Alarm evaluated	All the time
Related applications	AMF
Description	Alarm is activated when controller is in AUTO mode, <b>Return From Island (page 227)</b> setpoint is set to manual, load is on gen-set a mains has returned.

⬅ back to List of alarms level 1



### Module(slotA) - comm. outage

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Module(slotA) - comm. outage
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that there is a problem with communication between controller and module in slot.

⬅ back to List of alarms level 1

### Module(slotA) - false module

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Module(slotA) - fake module
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that false module is inserted in slot.

⬅ back to List of alarms level 1

### Module(slotA) - unexpected

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Module(slotA) - unexpected
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

⬅ back to List of alarms level 1

### Module(slotA) - unknown module

<b>Alarm Type</b>	Other
<b>Alarmlist message</b>	Module(slotA) - unknown module
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that unknown module is inserted in slot.

⬅ back to List of alarms level 1

## 8.2.2 Alarms level 2

Shutdown .....	542
Other type .....	550

For full list of Alarms level 2 go to [List of alarms level 2 \(page 541\)](#).

### What alarms level 2 are:

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

more information see **Alarm types - Level 2** on page 103.

## List of alarms level 2

Emergency Stop .....	542	BOC Coolant Temp .....	550
Sd AIN Protec .....	542	BOC Fuel Level .....	550
Sd Battery Flat .....	542	BOC Generator L1 < Voltage .....	551
Sd BIN Protection .....	542	BOC Generator L1L2 < Voltage .....	551
Sd Coolant Temp .....	543	BOC Generator L2 < Voltage .....	551
Sd ECU Communication Fail .....	543	BOC Generator L2L3 < Voltage .....	551
Sd Fuel Level .....	543	BOC Generator L3 < Voltage .....	552
Sd GCB Fail .....	543	BOC Generator L3L1 < Voltage .....	552
Sd Generator L1 > Voltage	544	BOC Generator > Frequency .....	552
Sd Generator L1 < Voltage	544	BOC Generator < Frequency .....	552
Sd Generator L1L2 > Voltage .....	544	BOC Overload .....	553
Sd Generator L1L2 < Voltage .....	545	BOC Short Circuit .....	553
Sd Generator L2 > Voltage	545	ECU Red Lamp .....	553
Sd Generator L2 < Voltage	545		
Sd Generator L2L3 > Voltage .....	545		
Sd Generator L2L3 < Voltage .....	546		
Sd Generator L3 > Voltage	546		
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Sd Generator L3L1 < Voltage .....	547		
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Sd RPM Measurement Fail .....	548		
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Sd Start Fail .....	549		
Sd Underspeed .....	549		
BOC AIN Prot .....	550		
BOC BIN Protection .....	550		

## Shutdown

### Emergency Stop

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Emergency Stop
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>Alarm is activated when binary input <b>EMERGENCY STOP (PAGE 432)</b> 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.</p> <p><b>Note:</b> 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.</p> <p><b>Note:</b> The MCB control is not affected by this alarm.</p>

⬅ back to List of alarms level 2

### Sd AIN Protec

<b>Alarm Type</b>	Sd
<b>Alarmlist message</b>	Sd + Name of analog input
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that value the general analog protection is out of shutdown protection limit.

⬅ back to List of alarms level 2

### Sd Battery Flat

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Battery Flat
<b>Alarm evaluated</b>	During cranking
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm will be issued if the controller was reset during cranking of the gen-set. If this situation occurs, the controller supposes the starting battery is so exhausted that its voltage drops so low when starter motor is energized that it causes controller reset.

⬅ back to List of alarms level 2

### Sd BIN Protection

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd + Name of binary input
<b>Alarm evaluated</b>	All the time

<b>Related applications</b>	AMF, MRS
<b>Description</b>	Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - Sd and binary input name. This alarm occurs, when appropriate binary input is active.

🔍 back to List of alarms level 2

### Sd Coolant Temp

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Coolant Temp
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the coolant temperature is higher than the temperature set in <b>Coolant Temperature Sd (page 207)</b> setpoint.

🔍 back to List of alarms level 2

### Sd ECU Communication Fail

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd ECU Communication Fail
<b>Alarm evaluated</b>	With configured LBO <b>ECU POWER RELAY (PAGE 462)</b> - only when this LBO is active Without configured LBO <b>ECU POWER RELAY (PAGE 462)</b> - all the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out.

🔍 back to List of alarms level 2

### Sd Fuel Level

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Fuel Level
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the fuel level is lower than the level set in <b>Fuel Level Sd (page 210)</b> setpoint.

🔍 back to List of alarms level 2

### Sd GCB Fail

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd GCB Fail
<b>Alarm evaluated</b>	All the time

<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm will occur when the <b>GCB FEEDBACK (PAGE 434)</b> input does not match the expected position given by the <b>GCB CLOSE/OPEN (PAGE 465)</b> output. It stays active until the mismatch between the output and feedback persists.</p> <ul style="list-style-type: none"> <li>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.</li> <li>▶ The alarm will be also issued if the breaker does not respond to an open or close command within 2 seconds.</li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L1 > Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L1 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 217)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L1 < Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L1 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L1L2 > Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L1L2 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 217)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

[◀ back to List of alarms level 2](#)

### Sd Generator L1L2 < Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L1L2 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

[◀ back to List of alarms level 2](#)

### Sd Generator L2 > Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L2 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Overvoltage Sd (page 217)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

[◀ back to List of alarms level 2](#)

### Sd Generator L2 < Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L2 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

[◀ back to List of alarms level 2](#)

### Sd Generator L2L3 > Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L2L3 > Voltage
<b>Alarm evaluated</b>	Generator excited only

<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 217)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L2L3 < Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L2L3 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L3 > Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L3 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 217)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L3 < Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L3 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2



### Sd Generator L3L1 > Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L3L1 > Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 217)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator L3L1 < Voltage

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator L3L1 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 218)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 219)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator > Frequency

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator > Frequency
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overfrequency BOC (page 219)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 221)</b></li> </ul>

⬅ back to List of alarms level 2

### Sd Generator < Frequency

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Generator < Frequency
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Underfrequency BOC (page 220)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 221)</b></li> </ul>

◀ back to List of alarms level 2

### Sd Oil Pressure

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Oil Pressure
<b>Alarm evaluated</b>	Gen-set is running
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the oil pressure is lower than the pressure set in <b>Oil Pressure Sd (page 205)</b> setpoint.

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### Sd Overload

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Overload
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>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:</p> <ul style="list-style-type: none"> <li>▶ <b>Overload BOC (page 216)</b> adjusts the overload limit.</li> <li>▶ <b>Overload Delay (page 216)</b> adjusts the delay</li> </ul>

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### Sd Overspeed

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Overspeed
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm occurs immediately when the engine speed has exceeded the limit. The behavior of the overspeed alarm is adjusted by the following setpoints:</p> <ul style="list-style-type: none"> <li>▶ <b>Overspeed Sd (page 203)</b> adjust the overspeed limit</li> <li>▶ <b>Overspeed Overshot (page 204)</b> adjust the additional overspeed limit</li> <li>▶ <b>Overspeed Overshot Period (page 204)</b> adjust the time period of additional overspeed limit</li> </ul>

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### Sd RPM Measurement Fail

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd RPM Measurement Fail
<b>Alarm evaluated</b>	During cranking

<b>Related applications</b>	AMF, MRS
<b>Description</b>	The alarm is issued if the engine speed has not exceeded the <b>Starting RPM (page 188)</b> within the <b>Maximum Cranking Time (page 187)</b> , although some of additional running engine indication sources indicate that the engine has started.

🔍 back to List of alarms level 2

### Sd Short Circuit

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Short Circuit
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This is a fast overcurrent protection. The following setpoints are related to this alarm:</p> <ul style="list-style-type: none"> <li>▶ <b>Short Circuit BOC (page 217)</b> adjusts the short current limit</li> <li>▶ <b>Short Circuit BOC Delay (page 217)</b> adjusts the delay in fine steps</li> </ul>

🔍 back to List of alarms level 2

### Sd Start Fail

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Start Fail
<b>Alarm evaluated</b>	When the gen-set is being started
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>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:</p> <ul style="list-style-type: none"> <li>▶ <b>Cranking Attempts (page 186)</b> adjust the number of attempts</li> </ul>

🔍 back to List of alarms level 2

### Sd Underspeed

<b>Alarm Type</b>	Shutdown
<b>Alarmlist message</b>	Sd Underspeed
<b>Alarm evaluated</b>	Engine running only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>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 <b>Underspeed Sd (page 204)</b>.</p> <p>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.</p>

🔍 back to List of alarms level 2

## Other type

### BOC AIN Prot

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC + Name of analog input
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the value of general analog protection is out of BOC protection limit.

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### BOC BIN Protection

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC + Name of binary input
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - BOC and binary input name. This alarm occurs, when appropriate binary input is active.

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### BOC Coolant Temp

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Coolant Temperature
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the coolant temperature is higher than the temperature set in <b>Coolant Temperature Sd (page 207)</b> setpoint.

[◀ back to List of alarms level 2](#)

### BOC Fuel Level

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Fuel Level
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the fuel level is lower than the level set level in <b>Fuel Level Sd (page 210)</b> setpoint.

[◀ back to List of alarms level 2](#)

### BOC Generator L1 < Voltage

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator L1 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

⬅ back to List of alarms level 2

### BOC Generator L1L2 < Voltage

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator L1L2 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

⬅ back to List of alarms level 2

### BOC Generator L2 < Voltage

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator L2 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

⬅ back to List of alarms level 2

### BOC Generator L2L3 < Voltage

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator L2L3 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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### BOC Generator L3 < Voltage

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator L3 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

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### BOC Generator L3L1 < Voltage

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator L3L1 < Voltage
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 218)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 219)</li> </ul>

[◀ back to List of alarms level 2](#)

### BOC Generator > Frequency

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator > Frequency
<b>Alarm evaluated</b>	Generator excited only
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Overfrequency BOC (page 219)</li> <li>▶ Generator &lt;&gt; Frequency Delay (page 221)</li> </ul>

[◀ back to List of alarms level 2](#)

### BOC Generator < Frequency

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Generator < Frequency
<b>Alarm evaluated</b>	Generator excited only

<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Underfrequency BOC (page 220)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 221)</b></li> </ul>

⬅ back to List of alarms level 2

### BOC Overload

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Overload
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>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:</p> <ul style="list-style-type: none"> <li>▶ <b>Overload BOC (page 216)</b> adjusts the overload limit.</li> <li>▶ <b>Overload Delay (page 216)</b> adjusts the delay</li> </ul>

⬅ back to List of alarms level 2

### BOC Short Circuit

<b>Alarm Type</b>	BOC
<b>Alarmlist message</b>	BOC Short Circuit
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This is a fast overcurrent protection. The following setpoints are related to this alarm:</p> <ul style="list-style-type: none"> <li>▶ <b>Short Circuit BOC (page 217)</b> adjusts the short current limit</li> <li>▶ <b>Short Circuit BOC Delay (page 217)</b> adjusts the delay in fine steps</li> </ul>

⬅ back to List of alarms level 2

### ECU Red Lamp

<b>Alarm Type</b>	Alarm indication + history record
<b>Alarmlist message</b>	ECU Red Lamp
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	<p>This alarm is activated when ECU send information that ECU Red lamp is activated. LBO ALARM (PAGE 455) is not activated, after deactivation of lamp, alarm automatically disappear.</p> <p><b>Note:</b> This alarm doesn't stop the engine.</p>

⬅ back to List of alarms level 2

## 8.2.3 Fail sensor and other types

FIs AIN Prot 1 .....	556
FIs Coolant Temp .....	556
FIs Fuel Level .....	556
FIs Oil Pressure .....	556

For full list of Fails sensor and other types of alarms go to **List of fail sensor alarms (page 555)**.

### **What Fail sensor and other types of alarms are**

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the Alarmlist. For more information **see Sensor fail detection (FLS) on page 104**.



## List of fail sensor alarms

FIs AIN Prot 1 .....	556
FIs Coolant Temp .....	556
FIs Fuel Level .....	556
FIs Oil Pressure .....	556

## Fail sensor

### FIs AIN Prot 1

<b>Alarm Type</b>	FIs
<b>Alarmlist message</b>	FIs + name of analog input 1
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm indicates that the value of general analog protection is out of range or is missing.

[◀ back to List of fail sensor alarms](#)

### FIs Coolant Temp

<b>Alarm Type</b>	FIs
<b>Alarmlist message</b>	FIs Coolant Temperature
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm occurs when measurement value of coolant temperature is out of range or is missing.

[◀ back to List of fail sensor alarms](#)

### FIs Fuel Level

<b>Alarm Type</b>	FIs
<b>Alarmlist message</b>	FIs Fuel Level
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm occurs when measurement value of fuel level is out of range or is missing.

[◀ List of fail sensor alarms \(page 555\)](#)

### FIs Oil Pressure

<b>Alarm Type</b>	FIs
<b>Alarmlist message</b>	FIs Oil Pressure
<b>Alarm evaluated</b>	All the time
<b>Related applications</b>	AMF, MRS
<b>Description</b>	This alarm occurs when measurement value of oil pressure is out of range or is missing.

[◀ back to List of fail sensor alarms](#)

## 8.3 Modules

8.3.1 Plug-In modules .....	557
8.3.2 CAN modules .....	569

## 8.3.1 Plug-In modules

Communication modules .....	557
Extension modules .....	566

**IMPORTANT: 2nd generation of IntelliLite controllers does not support new modules and 3rd generation does not support all old modules.**

The available communication plug-in modules are:

- ▶ CM-RS232-485 - communication module for connection via RS232 or RS485 line
- ▶ CM-4G-GPS - communication module for connection via 4G
- ▶ CM-GPRS - communication module for connection via GPRS
- ▶ CM-Ethernet - communication module for internet connection via Ethernet

The available extension plug-in modules are:

- ▶ EM-BIO8-EFCP - extension module with 8 binary inputs/outputs

**Note:** Controller has 1 plug-in module slot.

### Communication modules

CM-RS232-485 .....	557
CM-Ethernet .....	559
CM-GPRS .....	561
CM-4G-GPS .....	564

#### CM-RS232-485

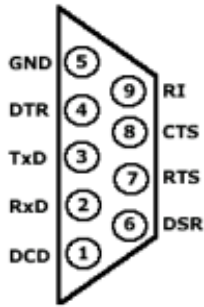
CM-RS232-485 is optional plug-in card to enable IntelliLite the RS232 and RS485 communication. This is required for computer or MODBUS connection. The CM-RS232-485 is a dual port module with RS232 and RS485 interfaces at independent COM channels. The RS232 is connected to COM1 and RS485 to COM2.



Image 9.11 CM-RS232-485 interface

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

**RS-232 DB-9 Male Pinout**



- PIN 1: Data Carrier Detect**
- PIN 2: Receive Data**
- PIN 3: Transmit Data**
- PIN 4: Data Terminal Ready**
- PIN 5: Signal Ground**
- PIN 6: Data Set Ready**
- PIN 7: Request to Send**
- PIN 8: Clear to Send**
- PIN 9: Ring Indicator**

**SERIAL "CROSS-WIRED" CABLE**

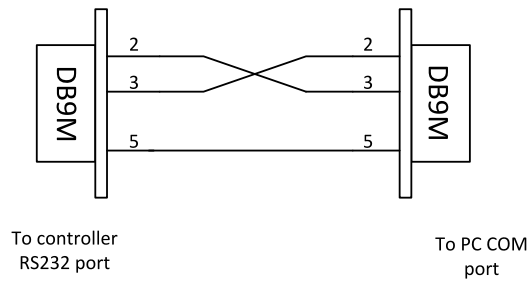


Image 9.12 Pinout of RS-232 line

**RS485 internal wiring**

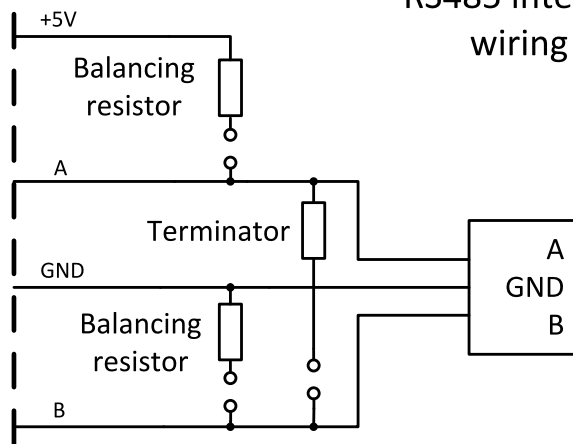


Image 9.13 Pinout of RS-485 line



Image 9.14 Jumpers description

**Note:** Balancing resistors shall be both closed at only one device in whole RS485 network.

Maximal distance of line is 10m for RS232 line and 1200m for RS485 line.

Terminator 120Ω

Balancing resistor +5V

## Technical data

Power consumption	40 mA / 8 VDC
	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)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## CM-Ethernet

CM-Ethernet is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. It provides an interface for connecting a PC with through ethernet/internet network, for sending active e-mails and for integration of the controller into a building management (MODBUS TCP and SNMP protocols). This card also enables to monitor and control the gen-set over web browser from any location with internet access using appropriate security measures.

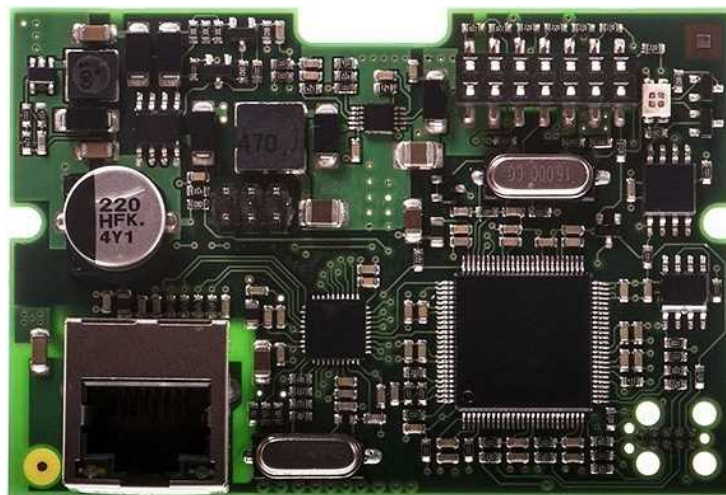


Image 9.15 CM-Ethernet interface

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

Use an Ethernet UTP cable with a RJ45 connector for linking the module with your Ethernet network. The module can also be connected directly to a PC using cross-wired UTP cable.

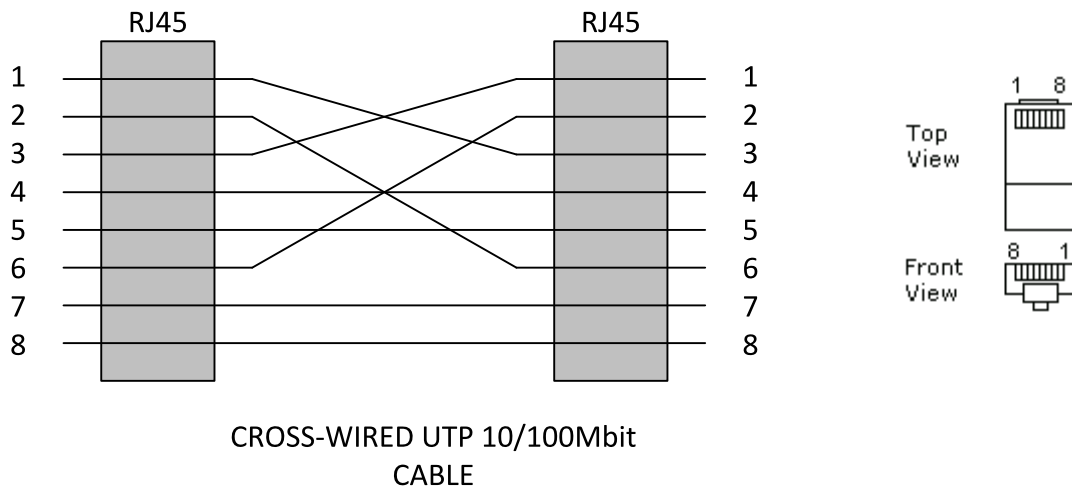


Image 9.16 Cross-wired cable

### Technical data

<b>Power consumption</b>	120 mA / 8 VDC
	82 mA / 12 VDC
	35 mA / 24 VDC
	25 mA / 36 VDC

### Module setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint **Group: CM-Ethernet (page 291)**.

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:
	<ul style="list-style-type: none"> <li>▶ unplugged ethernet cable</li> <li>▶ module cannot connect to AirGate</li> <li>▶ module can not obtain IP address from DHCP</li> </ul>
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)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## CM-GPRS



Image 9.17 CM-GPRS module

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

**IMPORTANT:** CM-4G-GPS and CM-GPRS modules can't be used in one controller in the same time.

**Note:** GPRS and CSD services must be provided by your GSM/GPRS operator for successful operation.

**Note:** The GPRS and CSD connection should not be used for the firmware update process.

## Technical data

Power consumption	32 mA / 8 VDC
	18 mA / 12 VDC
	10 mA / 24 VDC
	12 mA / 36 VDC

## SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- ▶ SMS service enabled
- ▶ Packet data (Internet access) enabled (when required for the selected mode of operation)
- ▶ PIN code security disabled

## How to start using CM-GPRS module

- ▶ You will need a controller, CM-GPRS module, antenna and SIM card with SMS and packet data service.

Make sure that your SIM supports the packet data network type you want to use. I.e. if you want to use the module in GPRS (2,5G) network you have to confirm with the operator that the particular SIM card does support 2,5G network.

- ▶ Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- ▶ Place the SIM card into slot on CM-GPRS card
- ▶ Connect the antenna to Cellular module antenna connector.



- ▶ Switch off the controller.
- ▶ Insert CM-GPRS module into controller
- ▶ Power up the controller.



Image 9.18 Main screen of CM-GPRS module

GSM Diag Code – Diagnostic code for CM-GPRS modem

### GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network



21	SIMCom/ME909s: can't read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can't detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

### Firmware upgrade

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## CM-4G-GPS



Image 9.19 CM-4G-GPS module

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

**IMPORTANT:** CM-4G-GPS and CM-GPRS modules cant be used in one controller in the same time.

**IMPORTANT:** Operating temperature of module is from -30°C to +75°C.

**Note:** Cellular data service must be enabled in your SIM card by your mobile operator for successful operation.

Supported 4G bands are as follows:

- ▶ FDD LTE: Band 1, Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 20, all bands with diversity
- ▶ WCDMA/HSDPA/HSUPA/HSPA+: Band 1, Band 2, Band 5, Band 8, all bands with diversity
- ▶ GSM/GPRS/EDGE: 850 MHz/900 MHz/1800 MHz/1900 MHz

### Technical data

Power consumption	55 mA / 8 VDC
	35 mA / 12 VDC
	8 mA / 24 VDC
	5 mA / 36 VDC

### SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- ▶ SMS service enabled
- ▶ Packet data (Internet access) enabled (when required for the selected mode of operation)
- ▶ PIN code security disabled

### How to start using CM-4G-GPS module

- ▶ You will need a controller, CM-4G-GPS module, antenna and SIMs 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 CM-4G-GPS card

- ▶ Connect the antenna to Cellular module antenna connector.
- ▶ Switch off the controller.
- ▶ Insert CM-4G-GPS module into controller
- ▶ Power up the controller.

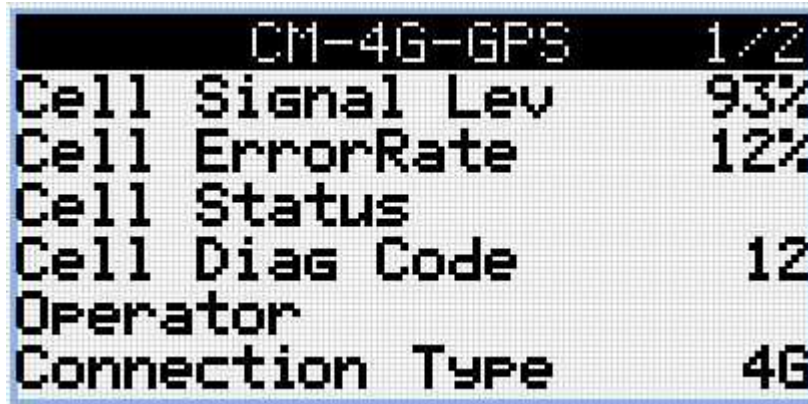


Image 9.20 Main screen of CM-4G-GPS module

GSM Diag Code – Common list of diagnostic codes for cellular modules

### GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected

19	No CDMA network
20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can't read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can't detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

### Firmware upgrade

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

### Extension modules

EM-BIO8-EFCP .....	567
--------------------	-----

## EM-BIO8-EFCP

EM-BIO8-EFCP is optional plug-in card. Through this card controller can accommodate up to 8 binary inputs or outputs. In IntelConfig PC configuration tool it is possible to easily choose if particular I/O will be binary input or output.

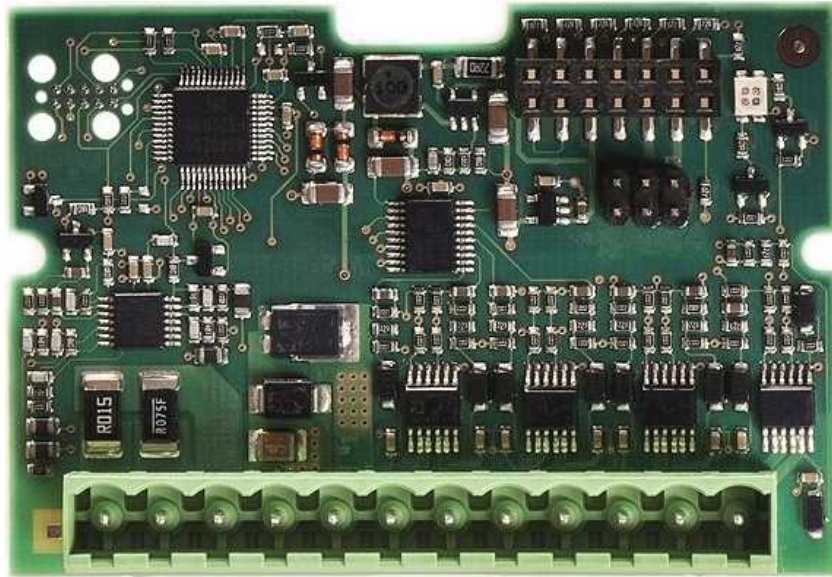


Image 9.21 EM-BIO8-EFCP interface

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

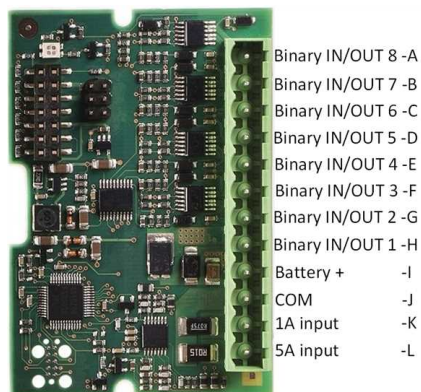


Image 9.22 Overview of EM-BIO8-EFCP

**Note:** Current inputs are supported only in MRS16 and AMF25 controllers.

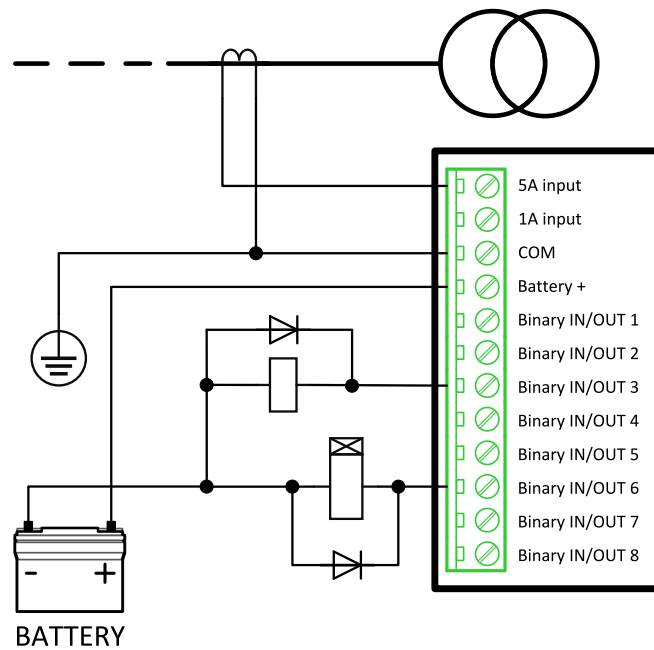


Image 9.23 EM-BIO8-EFCP wiring

**Note:** Current inputs are supported only in MRS16 and AMF25 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

#### Firmware upgrade

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into IntelliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via IntelliConfig
- ▶ 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 IntelliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

### 8.3.2 CAN modules

Extension modules .....569

The available extension CAN modules are:

- ▶ Intel AIN8 - extension CAN module with 8 analog inputs
- ▶ Intel IO8/8 - extension CAN module with 8 binary inputs, 8 binary outputs and 2 analog outputs
  - this CAN module can be switched to Intel IO 16/0 - extension CAN module with 16 binary inputs and 2 analog outputs

#### Supported combinations of modules

Slot	Intel AIN8	Intel AIN8TC	Intel IO8/8	Intel IO 16/0	IGL-RA15	IGS-PTM	Intel AIO9/1
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✓	✗	✗
5	✗	✗	✓	✓	✗	✗	✗

**IMPORTANT:** In slot 3, 4 and 5 CAN modules Intel IO8/8 and Intel IO 16/0 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

Intel AIN8 .....569

Intel IO8/8 .....575

IGS-PTM .....582

Intel AIN8TC .....588

Intel AIO9/1 .....592

#### Intel AIN8

Intel AIN8 module is extension module equipped with analog inputs. Intel AIN8 module is connected to controller by CAN1 bus.





Image 9.24 IntelI AIN8

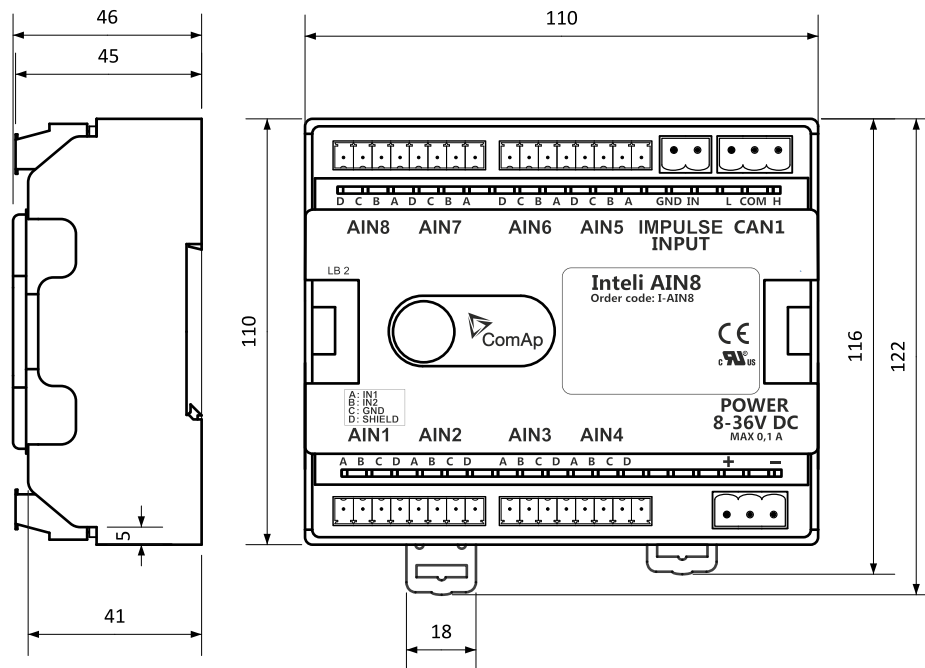
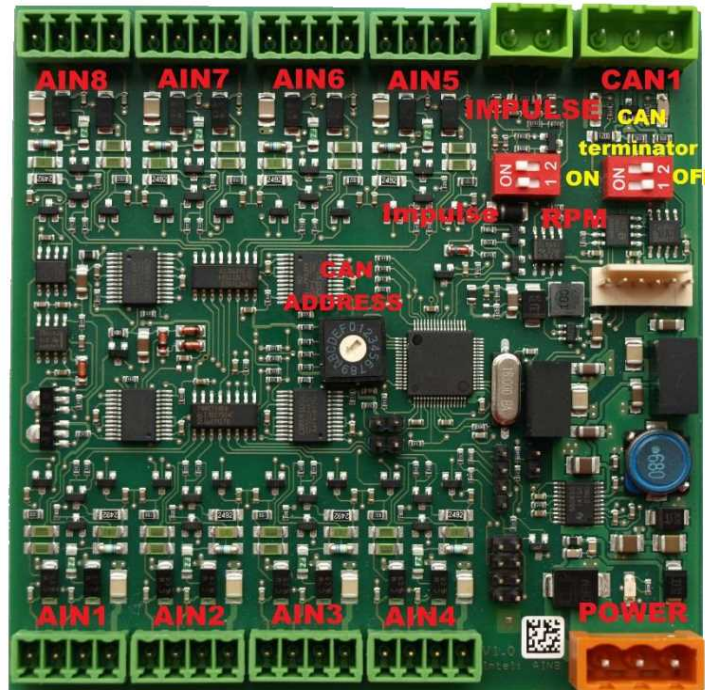


Image 9.25 IntelI AIN8 dimensions

**Note:** All dimensions are in mm.



**Terminals**



Analog input	8 analog Inputs
CAN	CAN1 line
Power	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" - switch both switches)

**Note:** Impulse input is not supported.

**Analog inputs**

- ▶ 8 channels
- ▶ can be configured as:
  - resistor three wire input
  - current input
  - voltage input

All inputs can be configured to any logical function or protection.

**IMPORTANT:** Impulse input is not supported in controller.

**Supported sensors**

Sensors		
User curves	NI100 [°F] (fix)	0-5V
PT100 [°C] (fix)	NI1000 [°F] (fix)	0-10V
PT1000 [°C] (fix)		4-20mA passive

Sensors		
NI100 [°C] (fix)	0-2400ohm	4-20mA active
NI1000 [°C] (fix)	0-10k ohm	0-20mA passive
PT100 [°F] (fix)	+ -1V	+ -20mA active
PT1000 [°F] (fix)	0-2.4V	

### CAN address

DIP switch determinates CAN address for analog inputs.

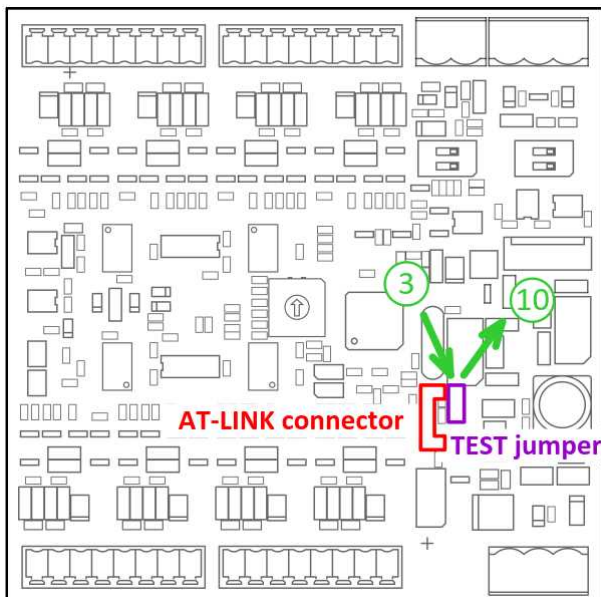


**Note:** In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

### Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins
4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli AIN8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button

9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
  - ▶ You have proper connection with the unit
  - ▶ COM port selection is correct
  - ▶ Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

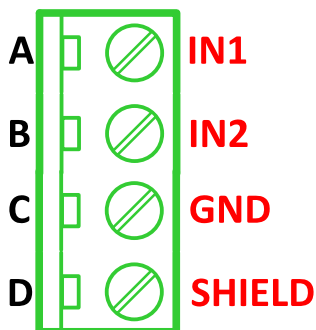
## LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli AIN8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

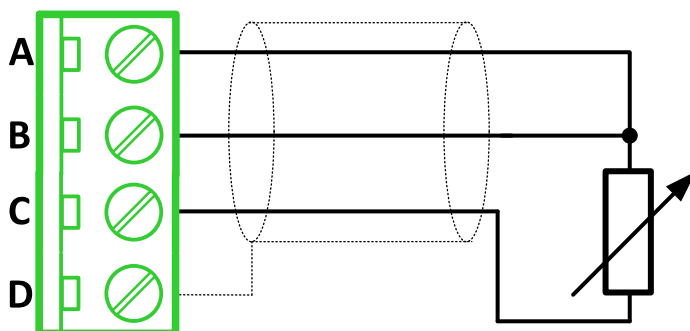
## Wiring

The following diagrams show the correct connection of sensors.

### Terminator

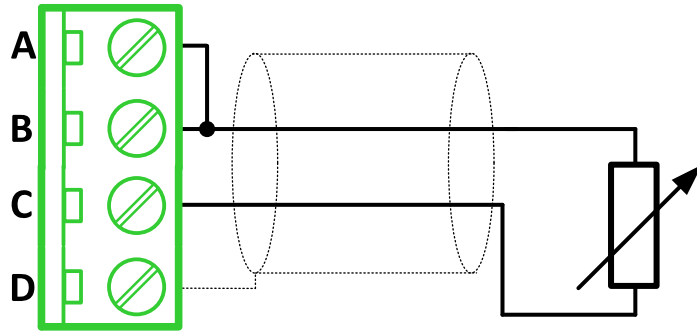


### Resistance sensor - 3 wires



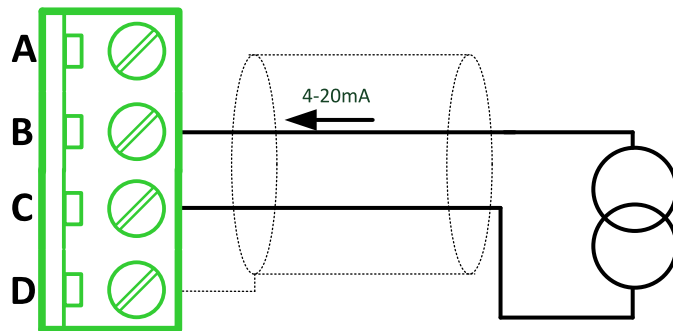
**Note:** Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω, 0 – 10 kΩ

**Resistance sensor - 2 wires**



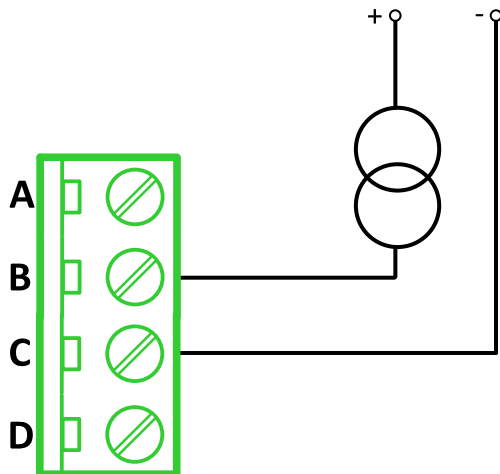
**Note:** Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω, 0 – 10 kΩ

**Current sensor - active**



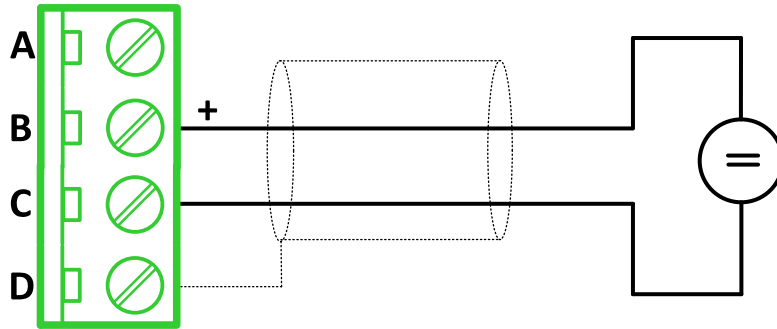
**Note:** Ranges: ±20 mA, 4 – 20 mA

**Current sensor - passive**



**Note:** Ranges: 0 – 20 mA, 4 – 20 mA

## Voltage sensor



**Note:** Ranges:  $\pm 1\text{ V}$ ,  $0-2,5\text{ V}$ ,  $0-5\text{ V}$ ,  $0-10\text{ V}$

## Technical data

### General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1
Protection	IP20
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Dimensions (WxHxD)	110x110x46 mm (4,3"x4,3"x1,8")
Weight	221,5 grams

### Analog inputs

Number of channels	8
Voltage	Range 0-10 V Accuracy: $\pm 0,25\%$ of actual value + $\pm 25\text{ mV}$
Current	Range: $\pm 20\text{ mA}$ Accuracy: $\pm 0,25\%$ of actual value + $\pm 50\text{ }\mu\text{A}$
Resistive	Range: 0- 10 k $\Omega$ Accuracy: $\pm 0,5\%$ of actual value + $\pm 2\text{ }\Omega$

### 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 IO 16/0 - 16 binary inputs, 0 binary outputs and 2 analog outputs

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 9.26 IntelI IO8/8

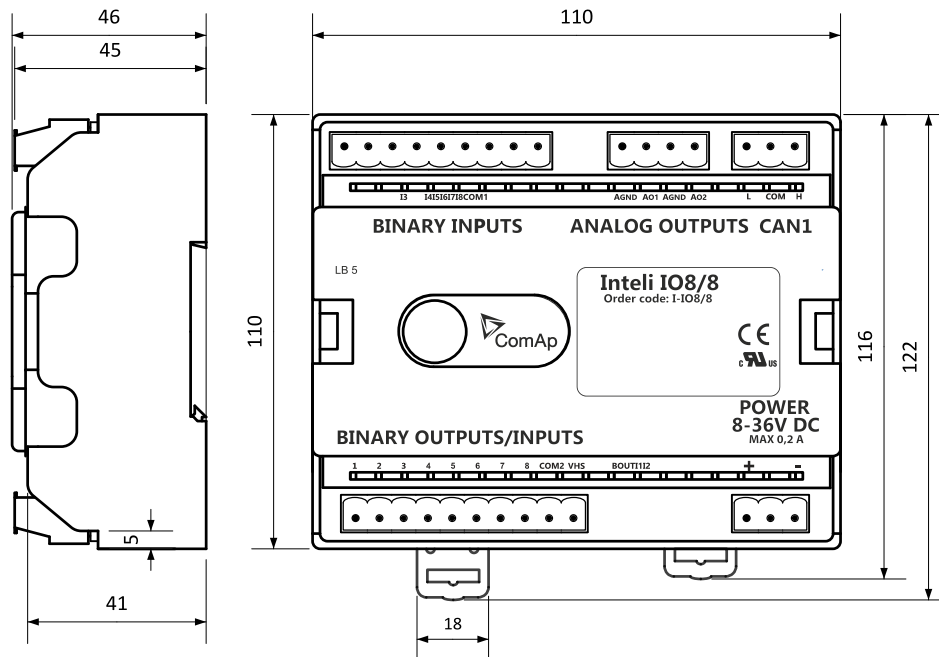
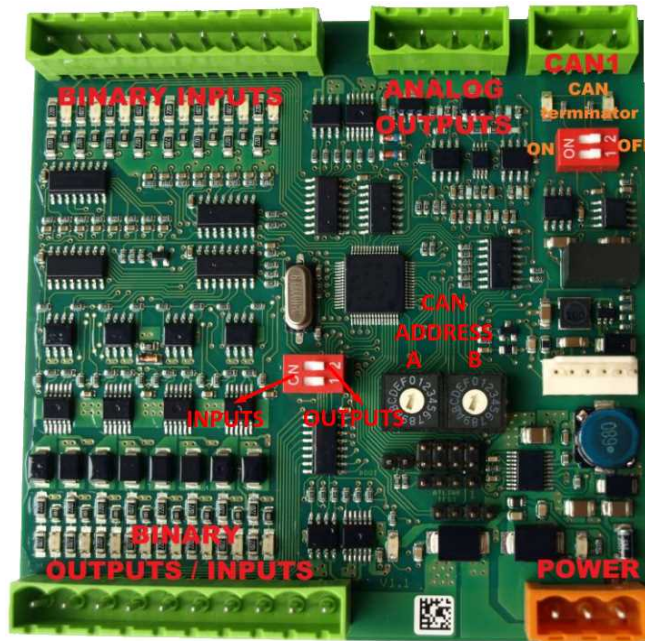


Image 9.27 IntelI IO8/8 dimensions

**Note:** All dimensions are in mm.

## Terminals



Binary inputs	8 binary inputs
Binary outputs	8 binary outputs (8 binary inputs)
Analog outputs	2 analog outputs
CAN	CAN1 line
Power	Power supply
Binary inputs LEDs	8 LEDs for binary input indication
Binary outputs LEDs	8 LEDs for binary output indication
CAN LED	Indication transmitted or received data
Status	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" - switch both switches)

## Inputs and outputs

### Binary inputs

- ▶ 8 channels
- ▶ can be configured as:
  - pull up
  - pull down

All 8 inputs are configured to one type together.

All inputs can be configured to any logical function or protection.

### Binary outputs



- ▶ 8 channels
- ▶ can be configured as:
  - High side switch
  - Low side switch

Always all 8 inputs are configured to one type (HSS/LSS) together. All 8 outputs can be modified to inputs by switch on the PCB ( Intel IO8/8 to Intel IO 16/0).

### Analog outputs

- ▶ 2 channels
- ▶ can be configured as:
  - voltage 0-10V
  - current 0-20mA
  - PWM (level 5V, with adjustable frequency from 200Hz to 2400Hz, with step 1Hz)

All inputs/outputs can be configured to any logical function or protection.

### Output state check

Output state check function evaluates in real time the state of binary outputs and adjusted (required) state. In case of failure (different state of required state and real state) history record and alarm are issued (type of the alarm is set by “Protection upon module failure” - (No protection / Warning / Shutdown)).

This function is designed for short-circuit or other failure, which causes change of set state of binary output.

### CAN address

In Intel 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 Intel IO 16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.



**Note:** In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

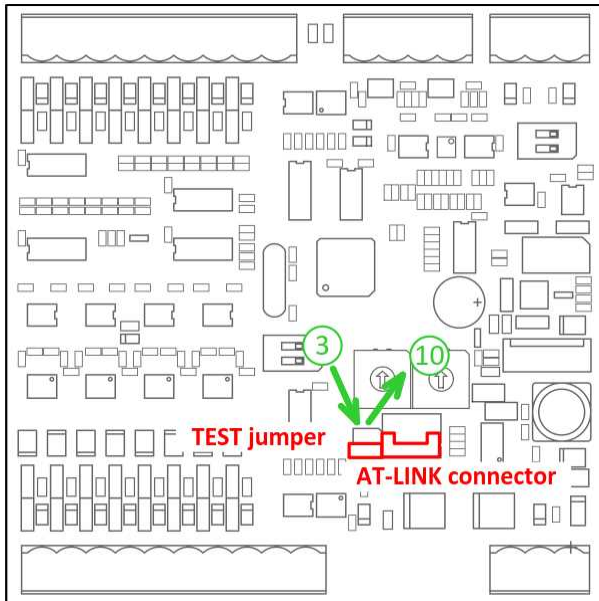
### Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins



4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli IO8/8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
  - ▶ You have proper connection with the unit
  - ▶ COM port selection is correct
  - ▶ Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

## LED indication

### Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

### Binary output

Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set. When this LED is shining, then module is configured as 8 binary inputs and 8 binary outputs. When this LED is dark, then the module is configured as 16 binary inputs.

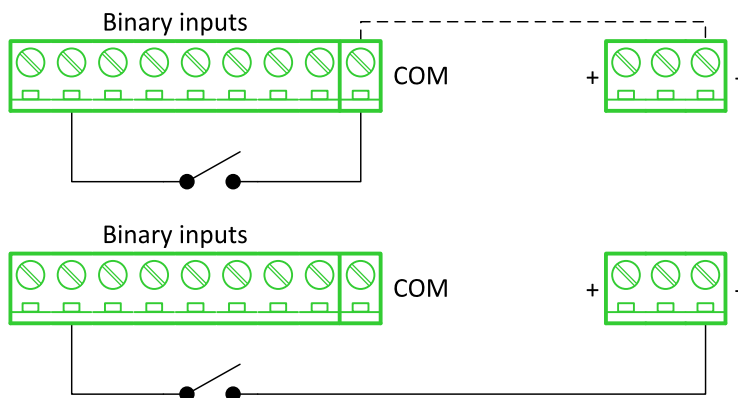
### LED at power connector - status LED

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between IntelI IO8/8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

## Wiring

The following diagrams show the correct connection of inputs and outputs.

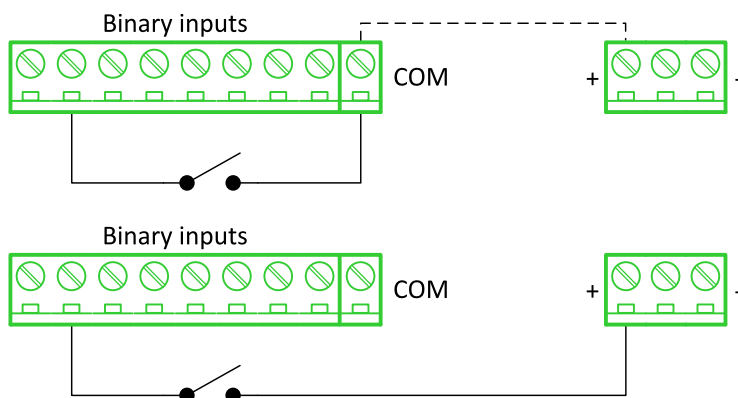
### Binary inputs - pull up



There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the GND (-) - dashed line).

On lower picture is case of wiring between BIN2 and GND (-). Both ways are correct.

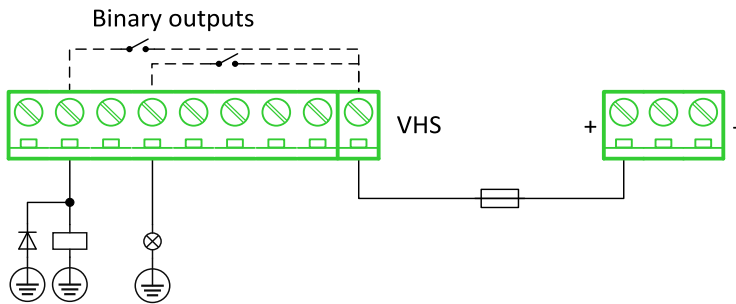
### Binary inputs - pull down



There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the Ucc (+) - dashed line).

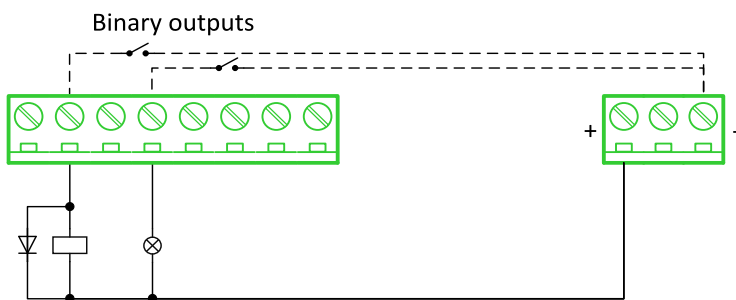
On lower picture is case of wiring between BIN2 and Ucc (+). Both ways are correct.

### Binary outputs - high side



When high side setting of outputs is chosen - binary output must be connected to the minus potential directly Terminal VHS (voltage High side) has to be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

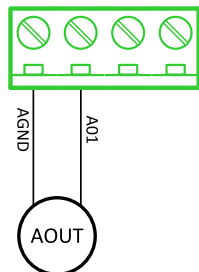
### Binary outputs - low side



When low side setting of outputs is chosen - binary output must be connected to the plus potential of power supply directly. Minus potential is connected internally - dashed line.

### Analog outputs

Analog outputs



**Note:** Limit of analog ground (AGND) is 100mA.

**IMPORTANT:** Terminator for analog output has special analog ground (AGND), which must not be connected to the GND.

### Technical data

#### General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V + 100 mA at 8 V
Interface to controller	CAN1
Protection	IP20
Storage temperature	- 40 °C to + 80 °C

Operating temperature	- 30 °C to + 70 °C
Dimensions (WxHxD)	110x110x46 mm (4,3"x4,3"x1,8")
Weight	240 grams

### Analog outputs

Number of channels	2
Voltage	Range 0-10 V Accuracy: $\pm 20$ mV + $\pm 0,5$ % of actual value I <sub>max</sub> 5 mA
Current	Range: 0-20 mA Accuracy: $\pm 100$ $\mu$ A + $\pm 0,5$ % of actual value R <sub>max</sub> 500 $\Omega$
PWM	Level 5 V Frequency - adjustable 200-2400 Hz I <sub>max</sub> 20 mA

### Binary inputs

Number of channels	8 for Intel IO8/8, 16 for Intel IO 16/0
Input resistance	4400 $\Omega$
Input range	0 to 36 V DC
Switching voltage level for open contact indication	0 to 2 V DC
Max voltage level for close contact indication	6 to 36 V DC

### Binary outputs

Number of channels	8 for Intel IO8/8, 0 for Intel IO 16/0
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 9.28 IGS-PTM

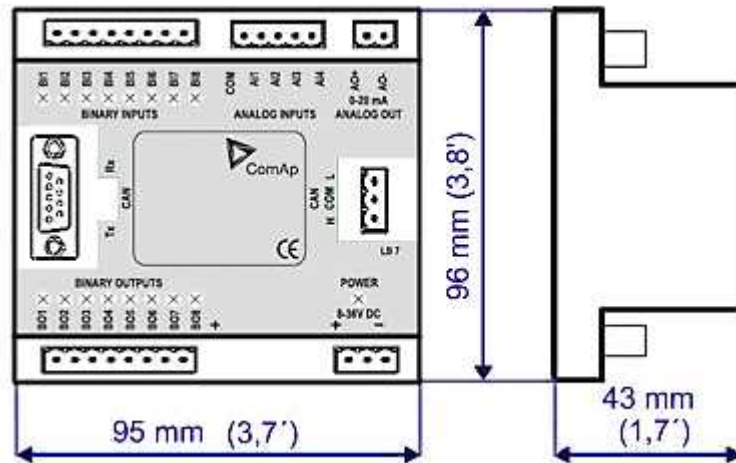
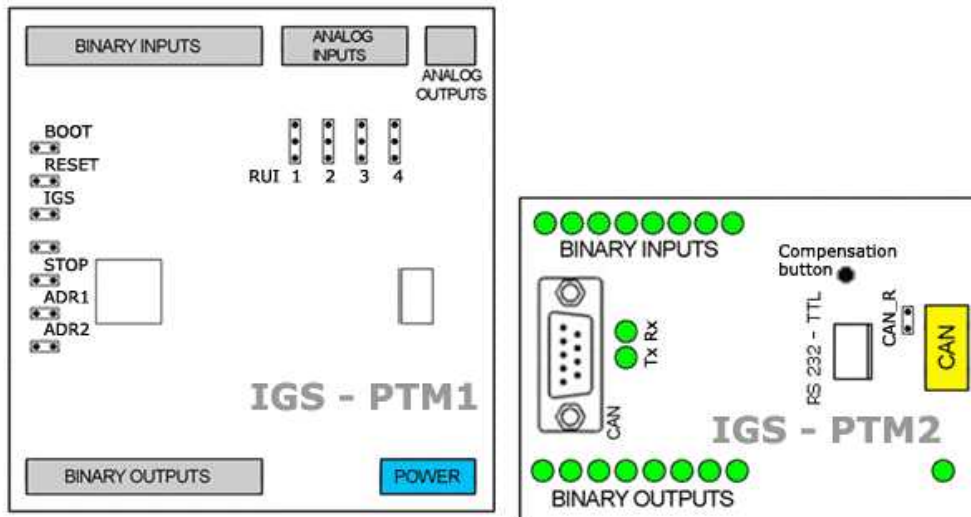


Image 9.29 IGS-PTM dimensions

## Terminals



Binary inputs	8 binary inputs
Analog inputs	4 analog inputs
Analog outputs	1 analog output
Binary outputs	8 binary outputs
CAN	CAN1 line
RS232-TTL	Interface for programming
Power	Power supply

## Analog inputs

Analog inputs can be configured for:

- ▶ Resistance measurement
- ▶ Current measurement
- ▶ Voltage measurement

The type of analog inputs is configured via jumpers RUI located on lower PCB.

RUI	Analog input configuration
1 - 2	Resistance measuring
2 - 3	Current measuring
no jumper	Voltage measuring

## Supported sensors

Sensors	
PT100 [°C] (fix)	User curves
NI100 [°C] (fix)	0-100 mV
PT100 [°F] (fix)	0-2400 ohm
NI100 [°F] (fix)	±20 mA

## CAN address

### Controller type selection

The type of controller to be used with IGS-PTM must be selected via jumper labeled IGS accessible at the lower PCB.

IGS jumper	Controller type
OPEN	IL-NT, IC-NT
CLOSE	IG-NT, IS-NT, IntelliLite

### Address configuration

If IntelliLite 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 via AT-link (TTL). For programming is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming is used FlashProg PC tool.

## LED indication

### Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

### Binary output

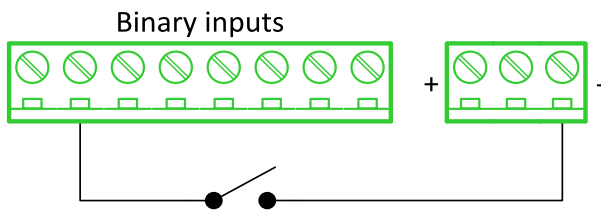
Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set.

### LED at power connector - status LED

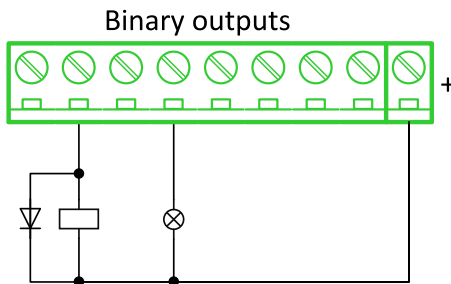
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

**Wiring**

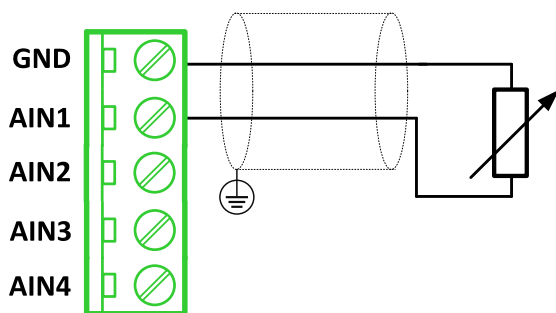
**Binary inputs**



**Binary outputs**



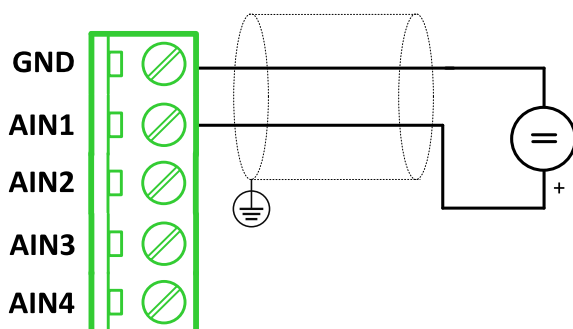
**Resistance sensor**



**Note:** Range: 0- 2400  $\Omega$

**IMPORTANT:** Physical analog input range is 0-250  $\Omega$ . In sensor configuration in PC tool it is necessary to chose 0-2400  $\Omega$  sensor HW type to ensure proper function of analog input.

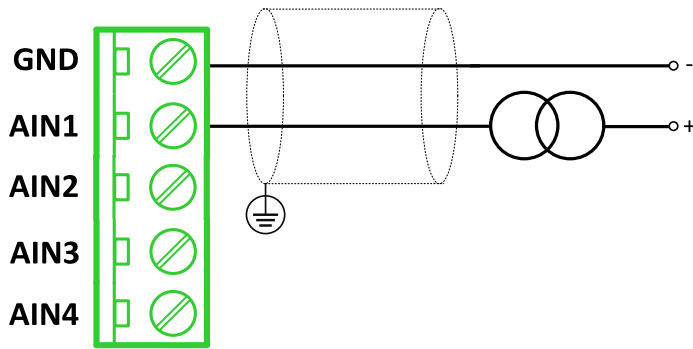
**Voltage sensor**



**Note:** Range 0-100 mV



### Current sensor - passive



**Note:** Range:  $\pm 0-20\text{ mA}$

**IMPORTANT:** Physical analog input range is 0-20mA. In sensor configuration in PC tool it is necessary to chose +- 20mA active sensor HW type to ensure proper function of analog input.

### Analog outputs

#### Analog output



**Note:** Range: 0 to 20 mA  $\pm 0,33\text{ mA}$

### Technical data

#### General data

Power supply	8 to 36 V DC
Current consumption	100 mA at 24V $\div$ 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 % $\pm$ 1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % $\pm$ 0,5 ohm out of measured value
Resistive	Range: 0- 250 $\Omega$ Accuracy: 1 % $\pm$ 2 ohm out of measured value

### Analog outputs

Number of channels	1
Current	Range: 0 to 20 mA $\pm$ 0,33 mA Resolution 10 bit

### Binary inputs

Number of channels	8
Input resistance	4700 $\Omega$
Input range	0 to 36 V DC
Switching voltage level for open contact indication	0 to 2 V DC
Max voltage level for close contact indication	8 to 36 V DC

### Binary outputs

Number of channels	8
Max current	500 mA
Max switching voltage	36 V DC
Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1,5 % $\pm$ 1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % $\pm$ 0,5 ohm out of measured value
Resistive	Range: 0- 250 $\Omega$ Accuracy: 1 % $\pm$ 2 ohm out of measured value

### Inteli AIN8TC

Inteli AIN8TC module is extension module equipped with 8 analog inputs dedicated for thermocouple sensors only.

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 9.30 IntelI AIN8TC

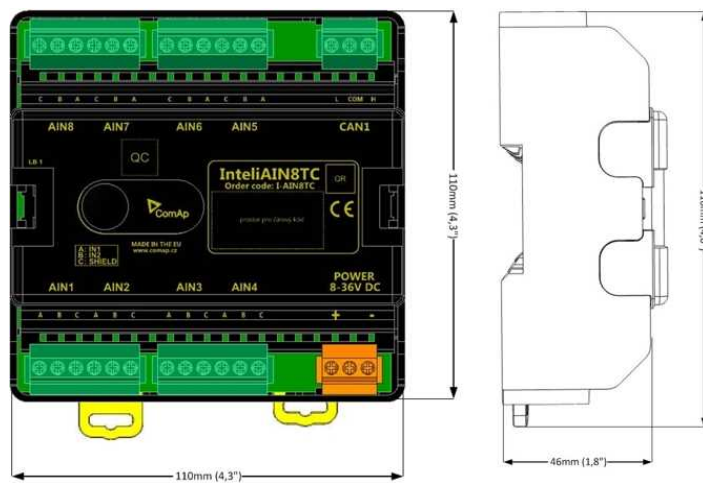
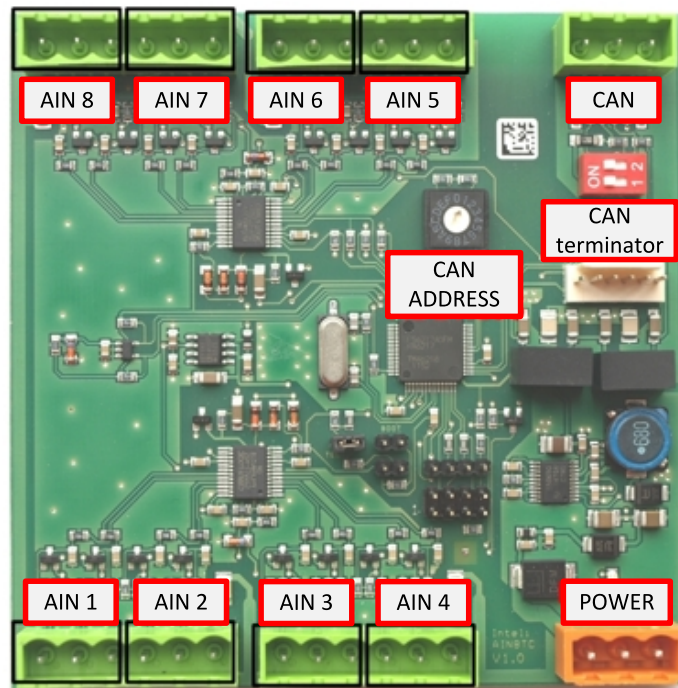


Image 9.31 IntelI AIN8TC dimensions

## 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 determinates CAN address for analog inputs.

### Programming firmware

Firmware is upgraded via AT-link (TTL). For programming it is necessary to close jumper TEST.

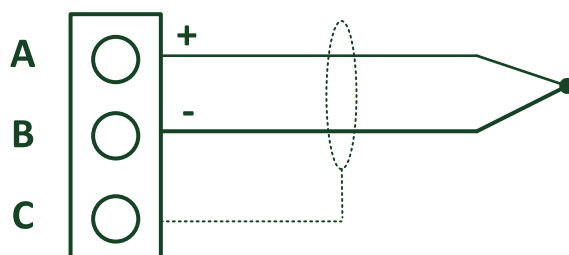
For programming FlashProg PC tool version 4.2 or higher must be used.

## LED indication

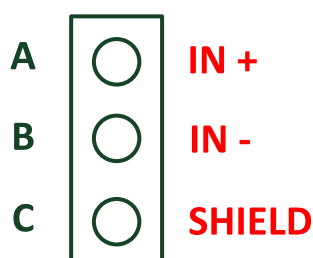
LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)
Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Inteli AIN8TC and controller works 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



### Terminaoor



## Technical data

<b>Dimension (W × H × D)</b>	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
<b>Weight</b>	237.5 grams
<b>Interface to controller</b>	CAN1

<b>Analog inputs (not electric separated)</b>	8, no galvanic separated
<b>Measuring</b>	±100 mV
<b>Accuracy</b>	± 0.1 % of actual value + ± 100 μV (± 3 °C)
<b>Internal sensor for measuring cold junction - Accuracy</b>	±1 °C in temperature range -20 °C ÷ +70 °C
<b>Galvanic separation</b>	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

<b>Power supply</b>	8 to 36 V DC
<b>Protection</b>	IP20
<b>Current consumption</b>	35 mA at 24 V ÷ 100 mA at 8 V
<b>Storage temperature</b>	- 40 °C to + 80 °C
<b>Operating temperature</b>	- 30 °C to + 70 °C
<b>Heat radiation</b>	2 W

Thermocouples galvanically separated and galvanically non-separated are supported.

### Inteli AIO9/1

Inteli AIO9/1 module is extension module equipped with analog inputs and outputs – designed for DC measurement.

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 9.32 Intel AIO9/1

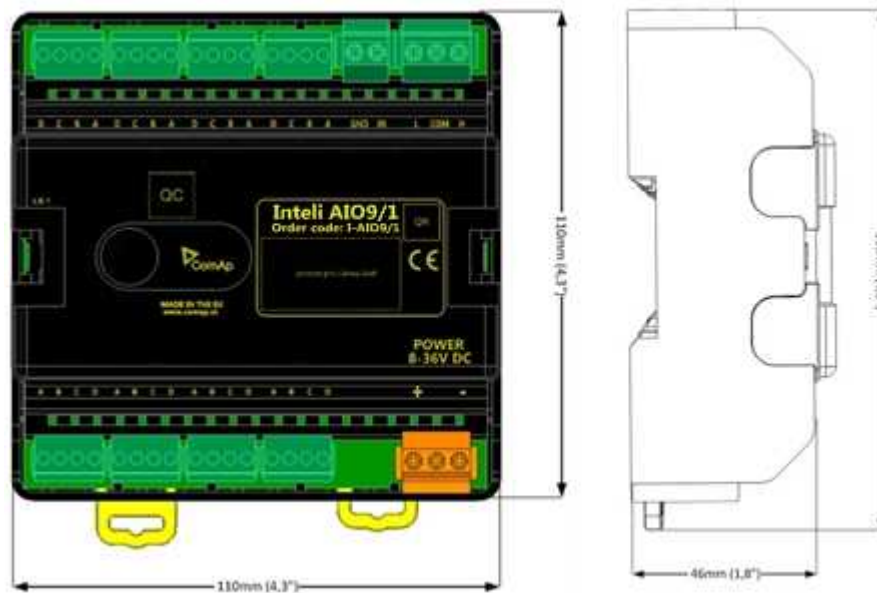
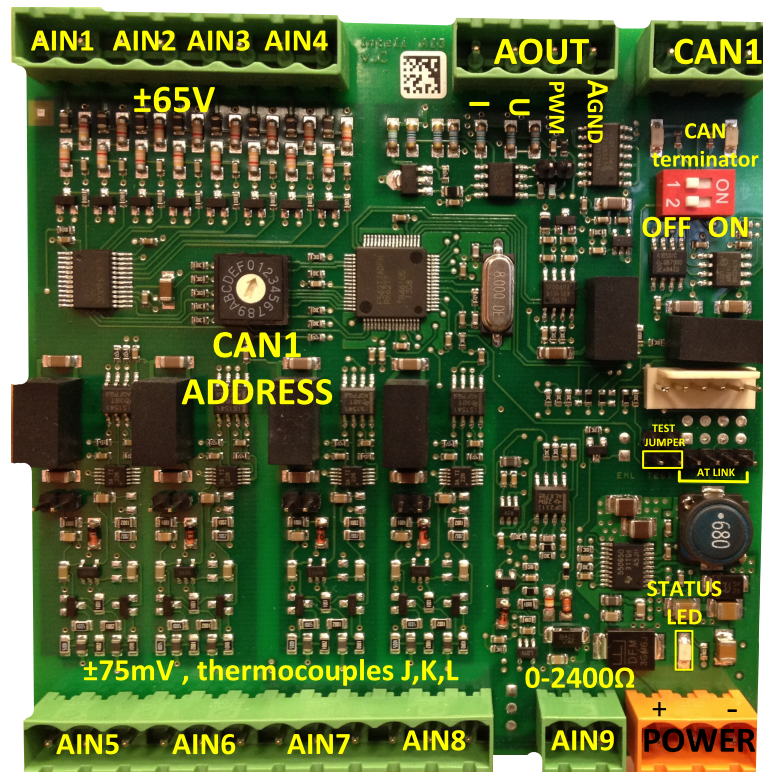


Image 9.33 Intel AIO9/1 dimensions



## 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  $\pm 65V$  (it is determined for measurement of battery voltage)
- ▶ 4 channels AIN5 – AIN8 can be configured as:
  - Thermocouples – type J, K or L (in  $^{\circ}C$  or  $^{\circ}F$ )
  - Sensor  $\pm 75mV$  DC – (for connecting current shunts)
- ▶ 1 channel AIN9 can be configured as:
  - RTD (Pt1000, Ni1000)
  - Common resistance 0-2400 $\Omega$



## Analog outputs

- ▶ 1 channel AOUT1. Type of output:
  - 0-10V DC
  - 0-20mA
  - PWM (5V, freq 2,4Hz ÷2,4kHz)
- ▶ 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)
0-2400Ω (fix linear)
± 65 V DC (fix linear)
+ -75mV (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 via AT-link (TTL). For programming it is necessary to close jumper TEST and switch OFF and switch ON the power supply.

For programming use FlashProg PC tool version 4.4 or higher.

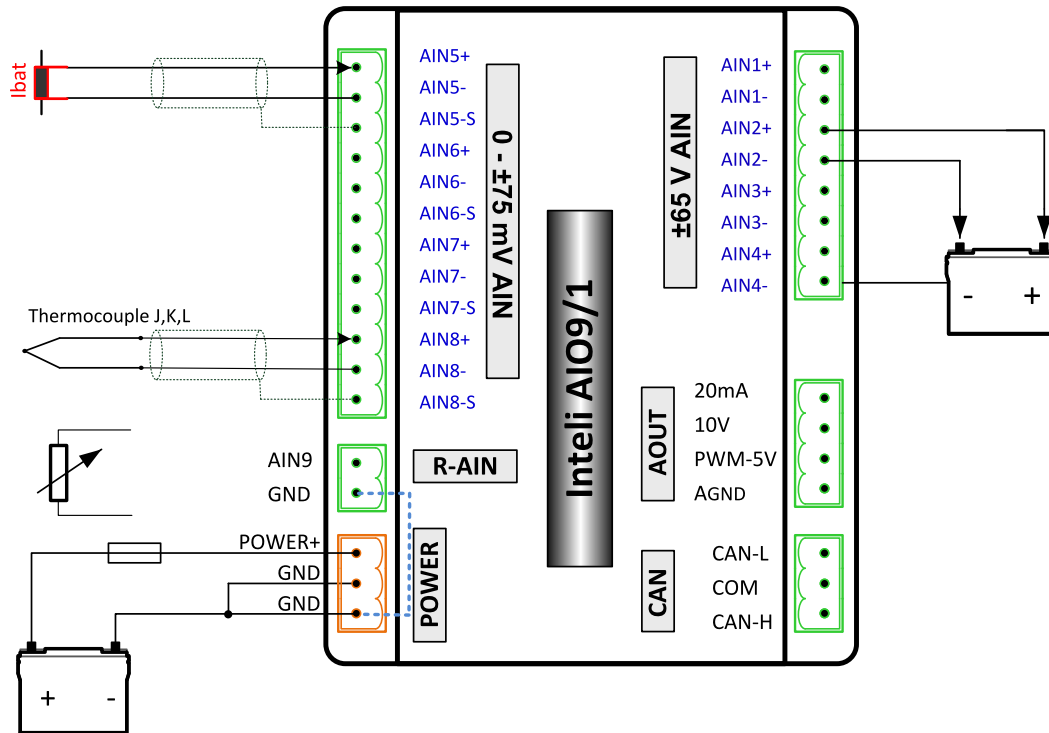
## LED indication

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 Intelilite 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)

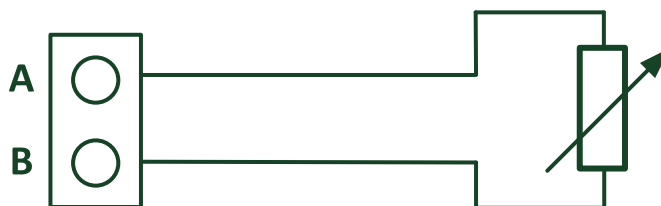
## Wiring

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

<b>Dimension (W × H × D)</b>	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
<b>Weight</b>	248 grams
<b>Interface to controller</b>	CAN1 – galvanic separated from power supply and measurement,

<b>Analog inputs (not electric separated)</b>		9 channels
<b>AIN1-AIN4 – Voltage inputs</b>	<b>Range</b>	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.
	<b>Accuracy of measurement</b>	± 0,1 % of actual value + ± 100 µV (± 3 °C)
<b>AIN5-AIN8 – Voltage inputs</b>	<b>Range</b>	± 75 mV (nominal) (measurement up to ±80 mV)
	<b>Accuracy of measurement</b>	± 0.1 % of actual value + ± 75 µV Galvanic separated from power supply
<b>AIN9 resistance input</b>	<b>Range</b>	0- 2400 Ω
	<b>Accuracy of measurement</b>	± 0.5 % of actual value + ± 4 Ω Pt1000, Ni1000 ± 2,5 °C It is not galvanic separated from power supply.

<b>Analog output</b>
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

<b>Galvanic separation</b>	CAN bus is galvanic separated from the measurement and power supply
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<b>Power supply</b>	8 to 36 V DC
<b>Protection</b>	IP20
<b>Current consumption</b>	150 mA at 24 V ÷ 400 mA at 8 V
<b>Storage temperature</b>	- 40 °C to + 80 °C
<b>Operating temperature</b>	- 30 °C to + 80 °C

*The product is fully supported in fw IGS-NT 3.1.1 or higher.*

*Information about support this module in IGS-NT fw branches and ID-DCU – please read New Feature Lists.*