InteliNano AMF 5

Controller for single gen-set applications

SW version 1.1.0

Global Guide

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1 Document information

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1.1 Clarification of Notation

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

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

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

> **CAUTION: 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 InteliNano AMF 5 family controllers which must be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate InteliNano AMF 5 controllers.

This manual is dedicated for:

> Operators of Gen-sets

> Gen-set control panel builders

> Anyone who is involved with the installation, operation and maintenance of the Gen-set

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

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

1.3.1 General security recommendations and set of measures

1. Production mode
   > Disable production mode BEFORE the controller is put into regular operation.

2. User accounts
   > Change password for the existing default administrator account or replace that account with a completely new one BEFORE the controller is put into regular operation mode.
   > Do not leave PC tools (e.g. InteliConfig) unattended while a user, especially administrator, is logged in.

3. AirGate Key

> Change the AirGate Key BEFORE the device is connected to the network.

> Use a secure AirGate Key – preferably a random string of 8 characters containing lowercase, uppercase letters and digits.

> Use a different AirGate Key for each device.

1.3.2 Used open source software

Name of software	License name	License condition web address
Mbed TLS	Apache 2.0	license
Aladin MD5	Zlib	license
EmbOS	Segger License Agreement v. 150515	license
emFile	Segger License Agreement	license
emUSB Device	Segger License Agreement	license
emUSB-Host	Segger License Agreement	license
Tiny Mersenne Twister (tinymt32)	BSD 3	license

1.4 General warnings

1.4.1 Remote control and programming

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

Make sure:

> Disconnect remote control

> Disconnect binary outputs

1.4.2 SW and HW versions compatibility

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

1.4.3 Dangerous voltage

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

Always connect grounding terminals!

Under no circumstances should you disconnect controller CT terminals!
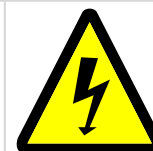
1.4.4 Adjusting the setpoints

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

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

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

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

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

1.5 Functions and protections

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

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

1.6 Certifications and standards

› EN 61000-6-2 › EN 61000-6-4 › EN 61010-1 › EN 61326-1:2021 › EN 60068-2-1 (-20 °C/16 h) › EN 60068-2-2 (70 °C/16 h)	› EN 60068-2-6 (2÷25 Hz / ±1,6 mm; 25÷100 Hz / 40 m/s^2) › EN 60068-2-27 (a=500 m/s^2; T=6 ms) › EN 60068-2-30:2005 25/55°C, RH 95%, 48hours › EN 60529 (front panel IP50, front panel IP65 with gasket, back side IP20) › UL 6200	c (UL) us LISTED CE UKCA

Supplier's Declaration of Conformity **47 CFR § 2.1077 Compliance Information**
Unique identifier: IN2AMF5XBAANP

Responsible Party:
Kevin Counts
10 N Martingale Rd #400
60173 - Schaumburg, IL
USA
Tel: +1 815 636 2541
E-mail: info.us@comap-control.com
FCC Compliance Statement This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.7 Document history

Revision number	Related sw. version	Date	Author
2	1.1.0	27.11.2024	Michal Slavata
1	1.0.0	1.12.2023	Michal Slavata

1.8 Symbols in this manual

Symbol	Name	Symbol	Name	Symbol	Name	Symbol	Name
	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		Wi-fi / WAN / LAN
	Breaker		Fuse		Pick - up		Transil
	Capacitor		Fuse switch		Relay coil		USB-C
	Coil		Generator		Relay coil of slow-operating		
	Connector - female		Generator schematic		Resistor		

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2 System overview

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2.1 General description

InteliNano AMF 5 family controller are a comprehensive Gen-set controllers for single Gen-set operating in prime power source MRS) applications. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications.

2.1.1 The key features of InteliNano AMF 5

> Easy-to-use operation and installation. The factory default configuration covers most applications.

> Various customizations are possible thanks to its configurability

> Excellent remote communication capabilities

> High level of support for EFI engines (most world producers)

> High reliability

2.2 True RMS measurement

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

2.3 Configurability and monitoring

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

2.3.1 Supported configuration and monitoring tools

> InteliConfig – complete configuration and single or multiple Gen-sets monitoring

> WebSupervisor – web-based system for monitoring and controlling

>> WebSupervisor mobile – supporting application for smart-phones

> WinScope 1000 – special graphical monitoring software

> InteliSCADA – monitoring and management of ComAp devices

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

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

2.3.2 Configuration parts

> Mapping of logical binary inputs (functions) or assigning alarms to physical binary input terminals

> Mapping of logical binary outputs (functions) to physical binary output terminals

> Assigning sensor characteristics (curves) and alarms to analog inputs

> Selection of peripheral modules, which are connected to the controller, and performing the same functions (as mentioned above) for them

> Selection of ECU type, if an ECU is connected

> Changing the language of the controller interface
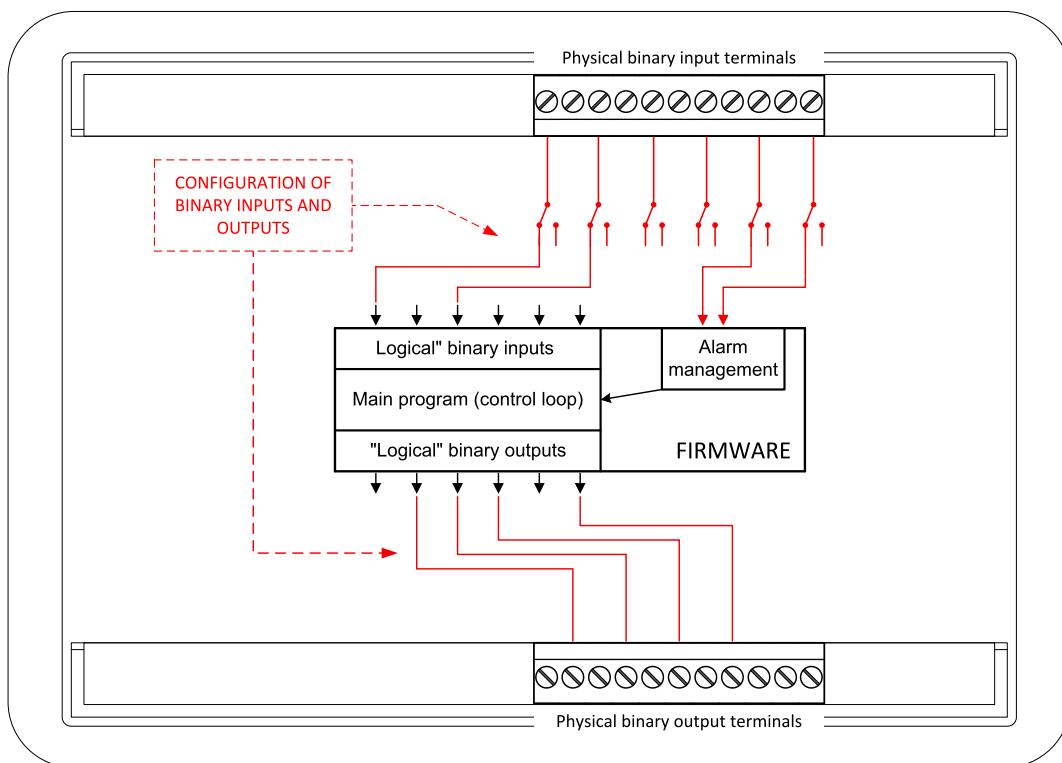
Image 2.1 Principle of binary inputs and outputs configuration

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

Once the configuration is modified, it can be saved to a file for later usage with another controller or for backup purposes. The file is called archive and has the file extension .ail4. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

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

2.4 PC Tools

2.4.1 InteliConfig

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

This tool provides the following functions:

> Direct or internet communication with the controller

> Offline or online controller configuration

> Controller firmware upgrade

> Reading/writing/adjustment of setpoints

> Reading of measured values

> Browsing of controller history records

> Exporting data into an XLS file

> Controller language translation
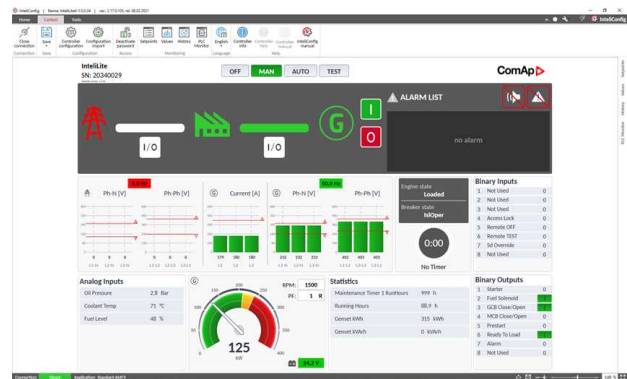
2.4.2 WebSupervisor

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

This tool provides the following functions:

> Site and fleet monitoring

> Reading of measured values

> Browsing of controller history records

> On-line notification of alarms

> Email notification

> Also available as a smart-phone application
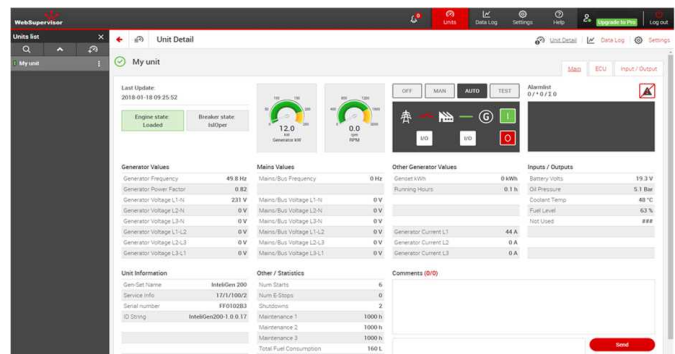
WebSupervisor available at: www.websupervisor.net

Demo account:

> Login: comaptest

> Password: ComAp123

2.4.3 WinScope 1000

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

This tool provides the following functions:

> Monitoring and archiving of ComAp controller's parameters and values

> View of actual / historical trends in controller

> On-line change of controller's parameters for easy regulator setup
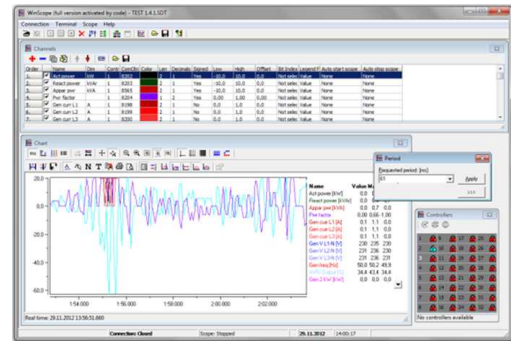
2.4.4 InteliSCADA

InteliSCADA is a Windows based softwaresoftware for remote or local site monitoring. See more in the InteliSCADA Global guide.

This tool provides the following functions:

> Basic SCADA in a few minutes (auto-generated SCADA)

> Broad range of instruments with easy and fast configuration

> Fully customizable SCADA diagram

> Browsing of all measured and computed values

> More than 200 images available

> Browsing of controllers' history records

> Multimedia support (IP cam, video, animated images, map, …)

> Industrial security level – sites are protected against stealing of controllers' credentials

Note: Only AMF template supported

2.5 Plug-in Modules

2.5.1 CM3-Ethernet

Internet/Ethernet module.

> 10/100 Mbit interface over RJ45 socket
> Remote control and monitoring of the controller via InteliConfig, WebSupervisor
> Active e-mail sending
> AirGate 2.0 technology support for easy connection – no need of public and static IP address
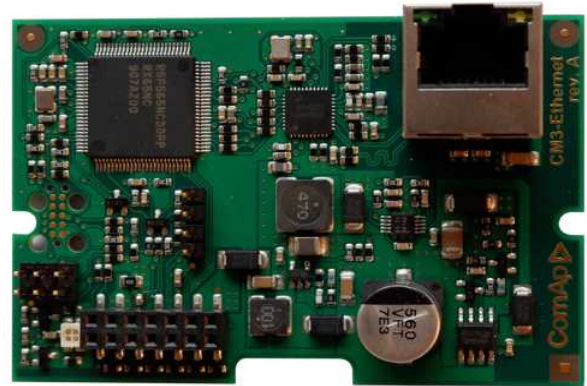
2.5.2 CM2-4G-GPS

GSM/4G module

> GSM/4G Internet module and GPS locator
> Global 4G (LTE) module with 3G/2G backup
> Remote control and monitoring of the controller via InteliConfig, WebSupervisor
> AirGate 2 technology support for easy connection – no need of public and static IP address
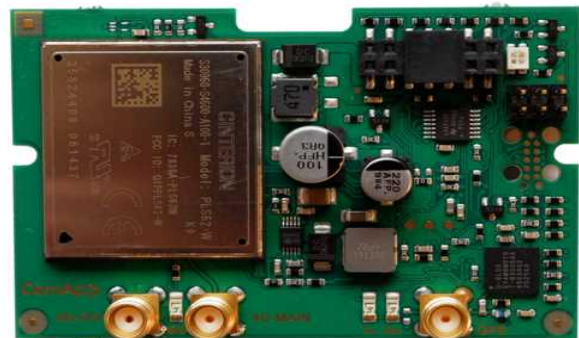
2.5.3 CM-RS232-485

Communication module with two communication ports.

> RS232 and RS485 interface
> Modbus RTU support
> Serial connection to InteliConfig
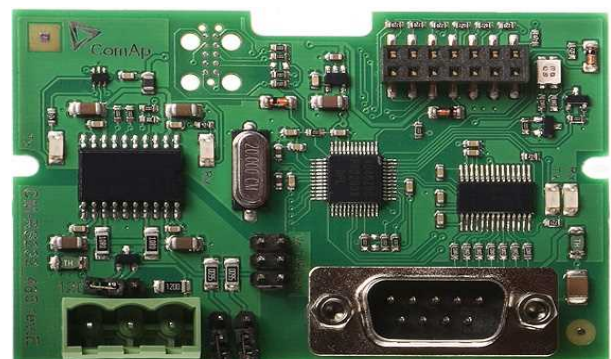
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3 Applications overview

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3.1 AMF – Automatic Mains Failure Start

The typical schematic of Automatic Mains Failure Start application is shown below. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is not necessary. InteliNano AMF 5 controllers can also work without breaker feedback.
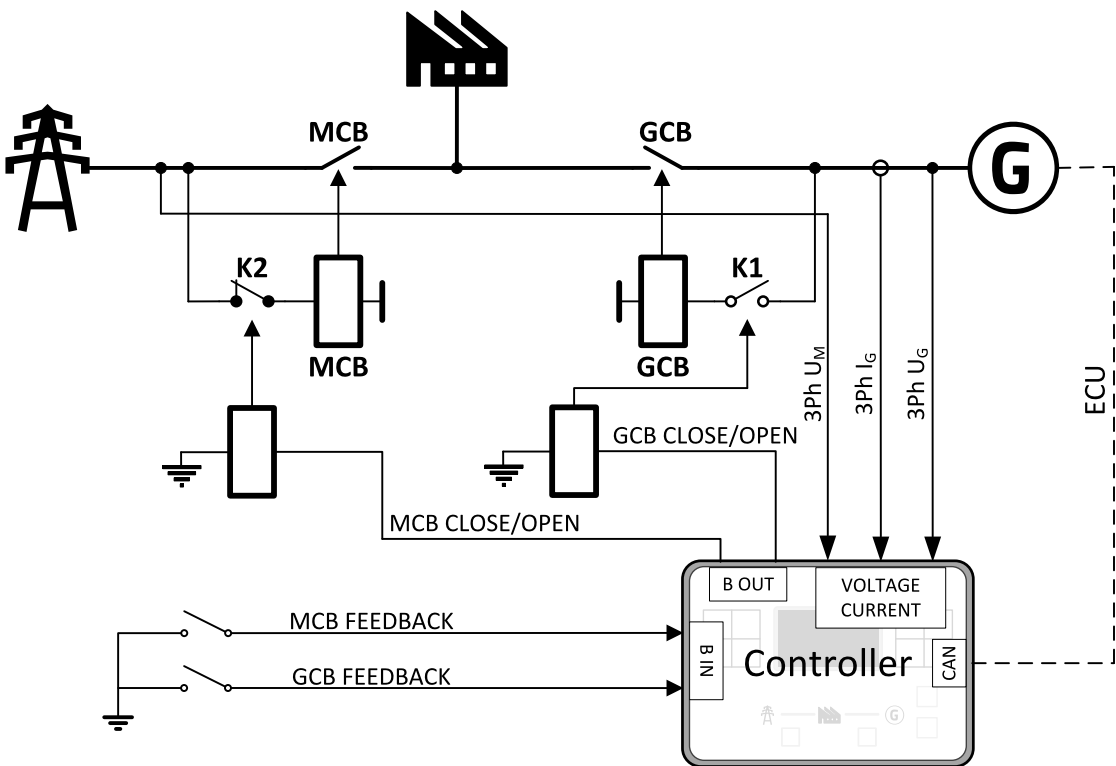
Image 3.1 AMF application overview

3.2 MRS – Manual Remote Start

The typical schematic of Manual Remote Start application is shown below. The controller controls one breaker – a generator breaker. Feedback from the breaker is not necessary. InteliNano AMF 5 controllers can also work without breaker feedback.
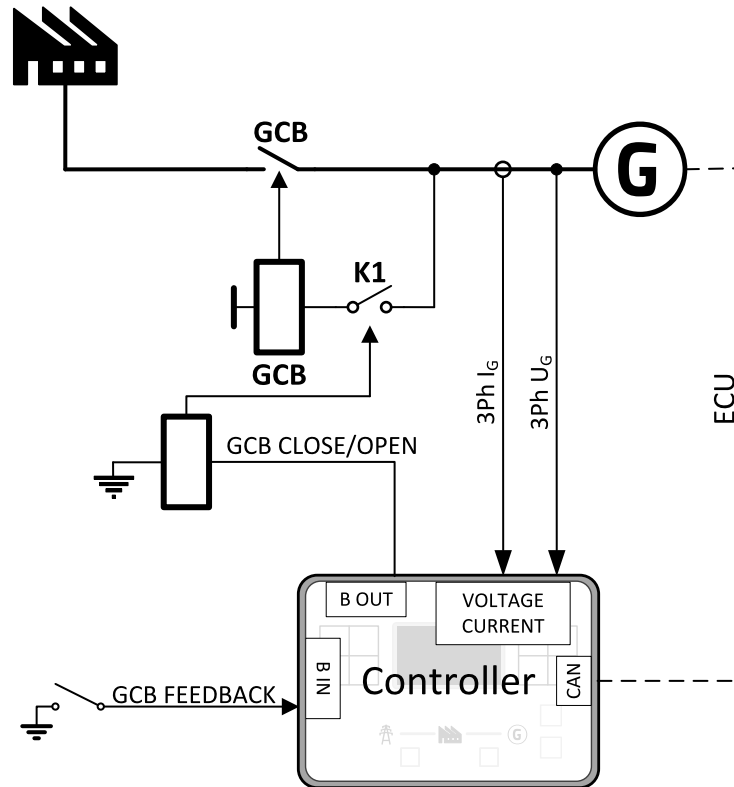
Image 3.2 MRS application overview

3.3 Engine

Dedicated application for engine control only. All electrical parameters are hidden, all electrical protections are blocked. All front facia LEDs are disabled. Only Gen LED is available - Green when RPMs are higher than starting RPM and Red when there is 2nd level alarm.

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4 Installation and wiring

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4.1 Package content

The package contains:

> Controller

> Mounting holders

> Terminal blocks

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

4.2 Controller installation

4.2.1 Dimensions
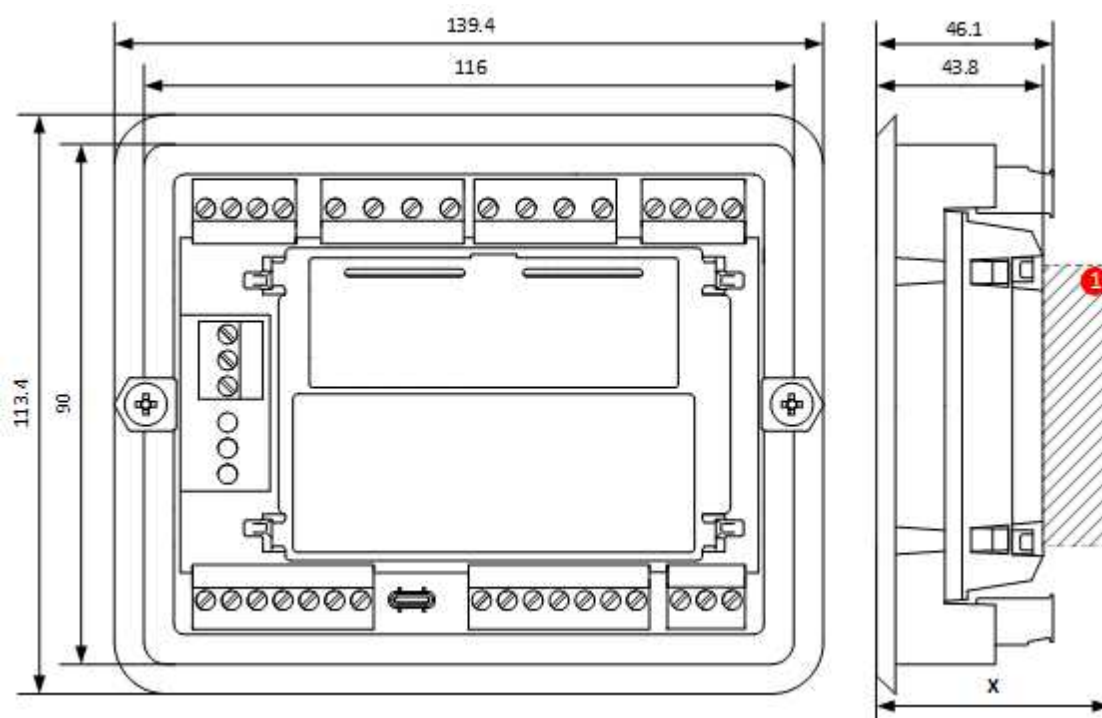
① Plug-in module

Note: Dimension x depends on plug-in module

Note: Dimensions are in millimetres.

Note: Cut-out for the controller is 118 × 92 mm.

4.2.2 Mounting

The controller should be mounted onto the switchboard door. Requested cutout size is 118 × 92 mm. Use the screw holders delivered with the controller to fix the controller into the door as described in pictures below. Recommended torque for holders is 0.1 to 0.15 N·m.

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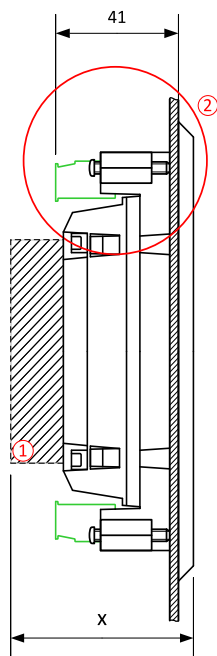
Note: Enclosure Type rating with mounting instruction – For use on a Flat surface of a type 1 enclosure.

4.3 Terminal Diagram

❶ GENERATOR CURRENT MEASUREMENT		❷ GENERATOR VOLTAGE MEASUREMENT		❸ MAINS VOLTAGE MEASUREMENT		❹ BINARY INPUTS	
T25	COM	T29	N	T33	N	T37	BIN1
T26	L1	T30	L1	T34	L1	T38	BIN2
T27	L2	T31	L2	T35	L2	T39	BIN3
T28	L3	T32	L3	T36	L3	T40	BIN4
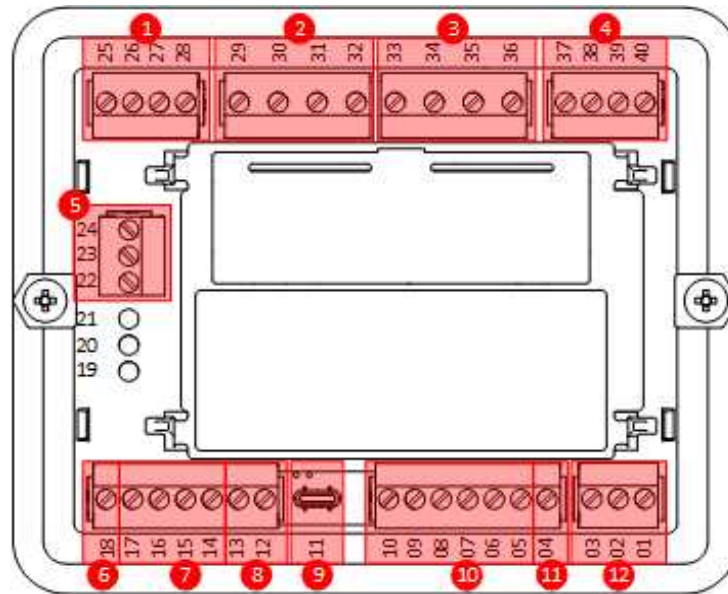
Image 4.1 Terminal diagram for InteliNano AMF 5

❺ CAN		❼ ANALOG INPUTS		❾ USB-C		⓫ E-STOP	
T22	L	T17	A03	T11	USB-C	T04	E-STOP
T23	COM	T16	A02	❿ BINARY OUPUTS		⓬ POWER SUPPLY, D+	
T24	H	T15	A01	T10	BOUT6	T01	BATT -
		T14	A COM	T09	BOUT5	T02	D+
❻ +5 V		❽ RPM		T08	BOUT4	T03	BATT +
T18	+5 V	T13	RPM IN	T07	BOUT3		
		T12	RPM GND	T06	BOUT2		
				T05	BOUT1		

4.4 Recommended wiring

Note: *Wiring terminal markings to included tightening torque: 0.5 N-m (4.5 lb-in)., and wire size: 2 mm^2 (12-26 AWG).*
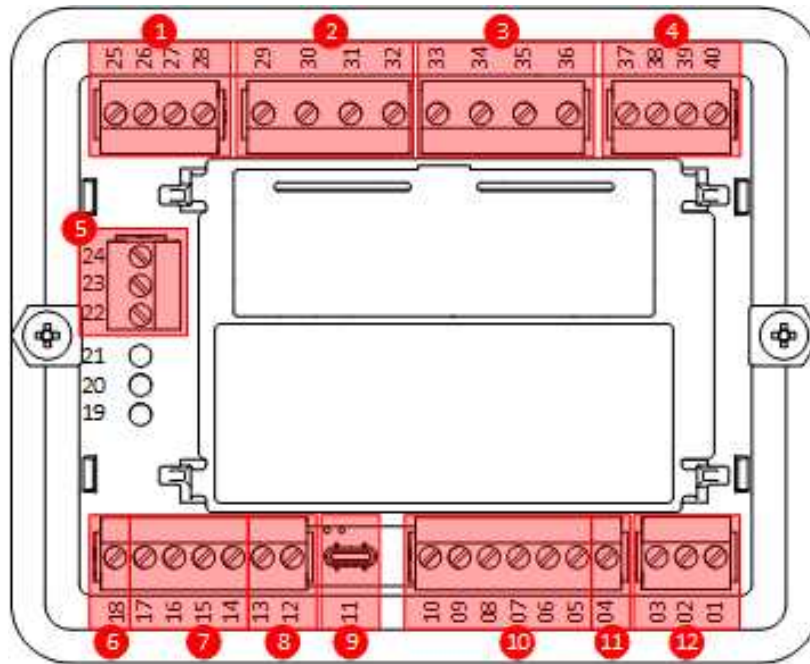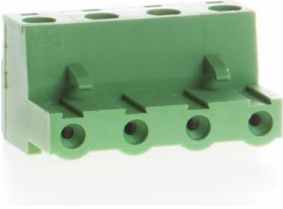
1	Current inputs	25-28	**Current measurement wiring (page 24)**
2	Generator voltage inputs	29-32	**Voltage measurement wiring (page 28)**
3	Mains voltage inputs	33-36	**Voltage measurement wiring (page 28)**
4	Binary inputs	37-40	**Binary inputs (page 37)**
5	CAN bus	H, COM, L	**CAN bus wiring (page 42)**
6	+5 V	18	
7	Analog inputs	14-17	**Analog inputs (page 39)**
8	RPM	12, 13	**Magnetic pick-up (page 36)**
9	USB-C	11	
10	Binary outputs	05-10	**Binary Outputs (page 38)**
11	E-Stop	04	**E-Stop (page 39)**
12	Power supply	"+", D, "-"	**Power supply (page 22)**

4.4.1 General

To ensure proper function:

> Use grounding terminals.

> Wiring for binary inputs and analog inputs must not be run with power cables.

> Analog and binary inputs should be wired with shielded cables, especially when the length is more than 3 m.

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

4.4.2 Example of AMF Wiring
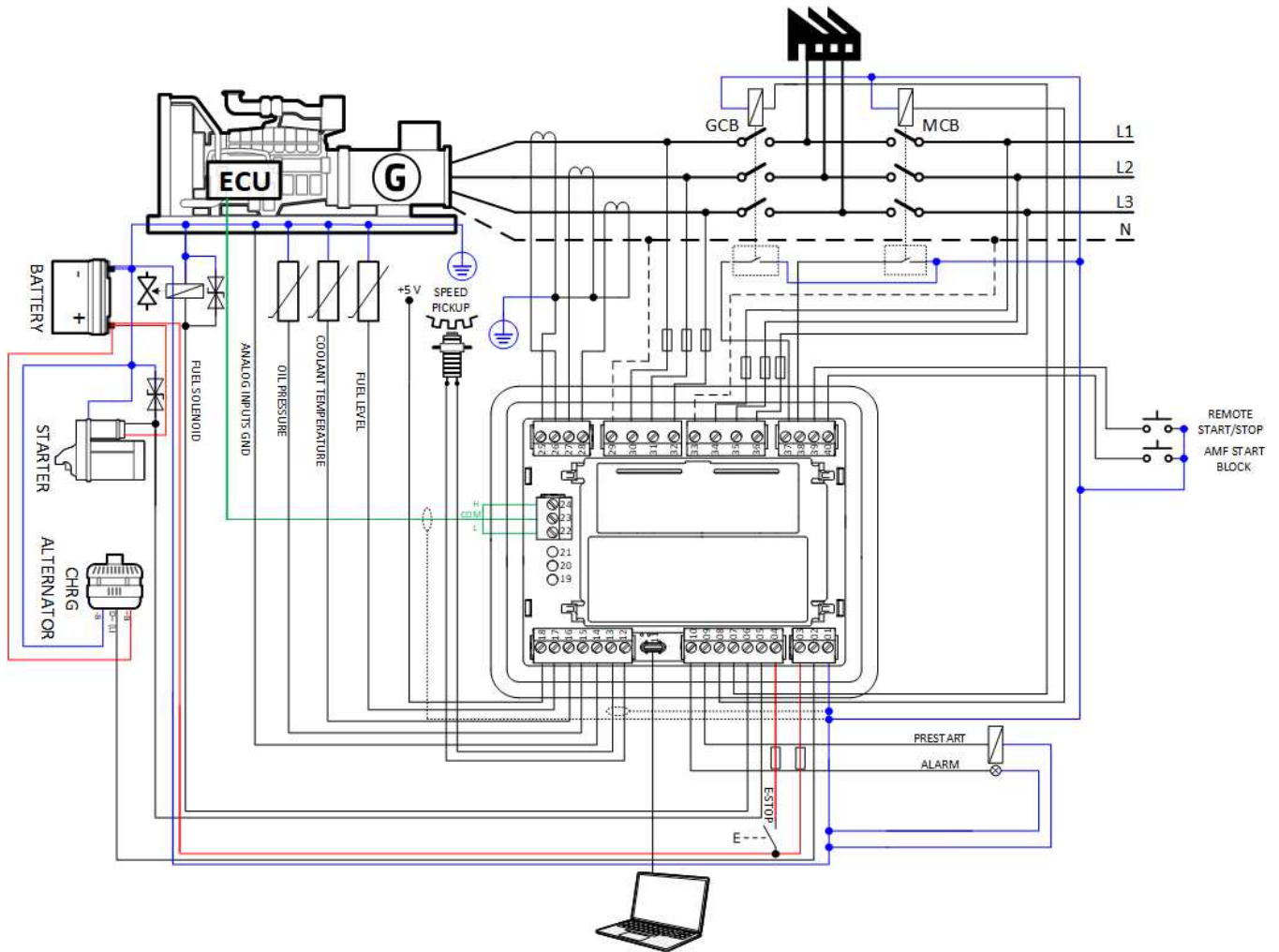
Image 4.2 Example of AMF Wiring

4.4.3 Grounding

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

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

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

4.4.4 Power supply

To ensure proper function:

> Use power supply cable min. 1.5 mm^2

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

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

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

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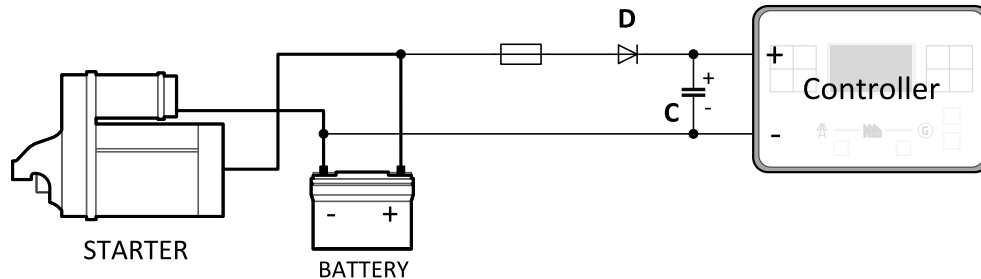
Note: Recommended fusing is 4 A fuse.

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

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

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

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

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

Power supply fusing

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

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

4.4.5 Measurement wiring

Use 1.5 mm^2 cables for voltage connection and 2.5 mm^2 for current transformers connection. Adjust **Connection type (page 146)**, **Nominal Voltage Ph-N (page 148)**, **Nominal Voltage Ph-Ph (page 148)**, **Nominal Current (page 144)** and **Gen CT Ratio Prim (page 145)** to appropriate setpoints in the Basic Settings group.

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

Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type (page 146)** [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph].

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

To ensure proper function:

> Use cables of 2.5 mm^2

> Use transformers to 5 A

> Connect CT according to following drawings:

3 phase application
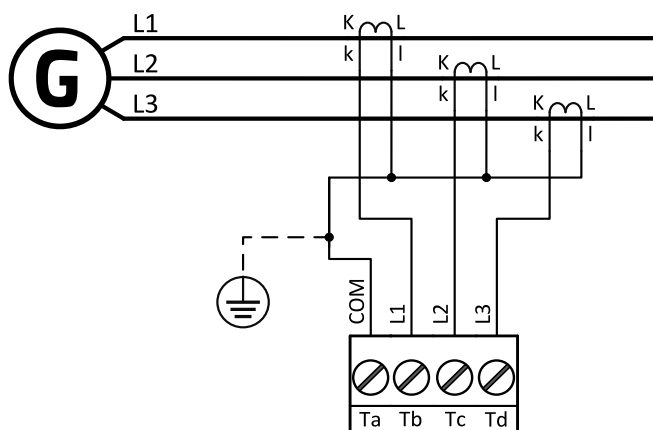
T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	L2	T27
Td	L3	T28

Image 4.3 3 phase application

> **IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so ground properly both terminals.**
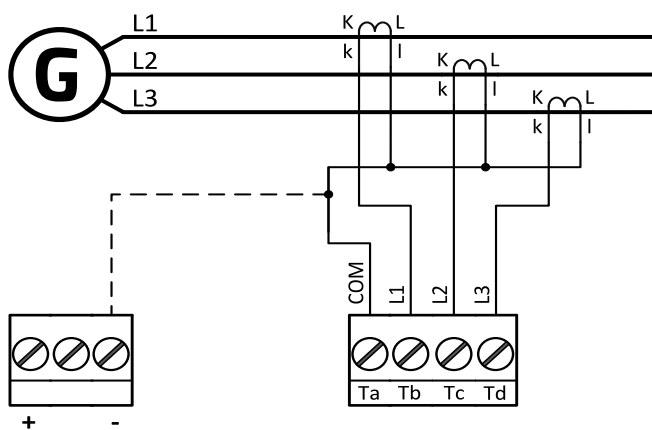
T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	L2	T27
Td	L3	T28

Image 4.4 3 phase application

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

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

SplPhL1L2 application
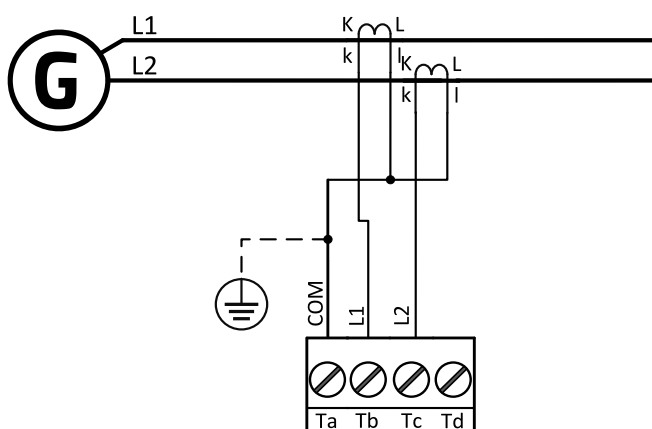
T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	L2	T27
Td	N/A	T28

Image 4.5 SplPhL1L2 application

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "−" terminal is maximally ±2 V. To do so ground properly both terminals.
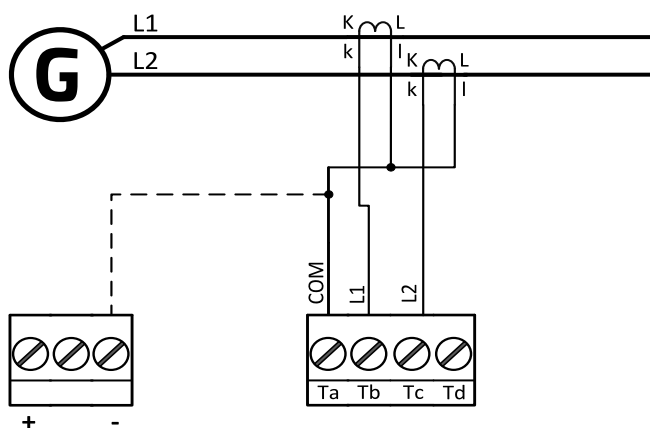
T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	L2	T27
Td	N/A	T28

Image 4.6 SplPhL1L2 application

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

Note: This wiring is recommended for Indian market.

SplPhL1L3 application

T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	N/A	T27
Td	L3	T28

Image 4.7 SplPhL1L3 application

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

Image 4.8 SplPhL1L3 application

T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	N/A	T27
Td	L3	T28

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

Note: This wiring is recommended for Indian market.

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

Mono phase application

Connect CT according to following drawings. Terminals phase 2 and phase 3 are opened.
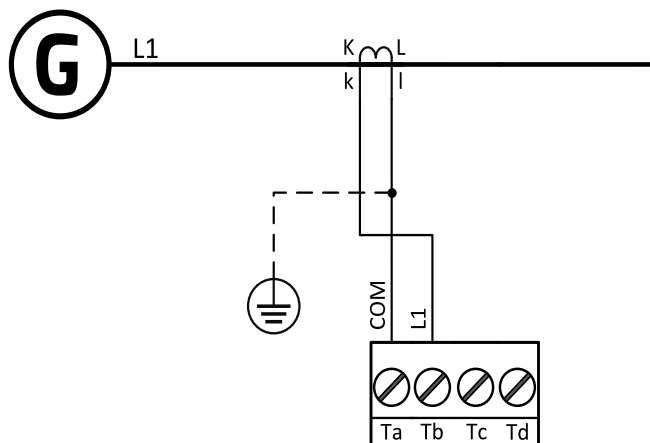
T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	N/A	T27
Td	N/A	T28

Image 4.9 Mono phase application

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so ground properly both terminals.
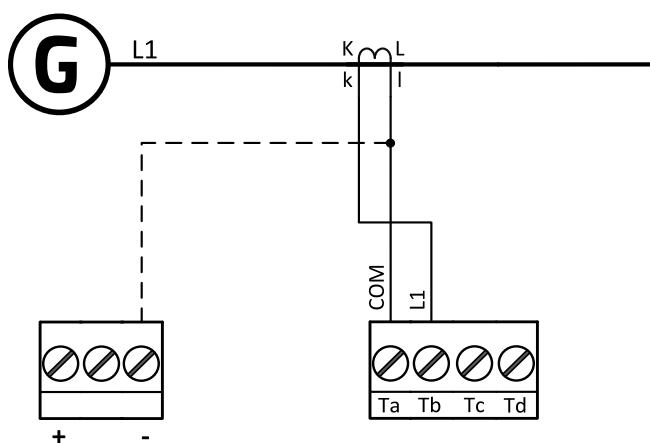
Image 4.10 Mono phase application

T	Phase	Terminal
Ta	COM	T25
Tb	L1	T26
Tc	N/A	T27
Td	N/A	T28

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

Note: This wiring is recommended for Indian market.

Voltage measurement wiring

There are 6 voltage measurement Connection Type (setpoint **Connection type (page 146)** [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph] options, each type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages based on **Connection type (page 146)** setting:

> 3Ph 4W – Ph-Ph voltage, Ph-N voltage

> High Leg D – Ph-Ph voltage, Ph-N voltage

> 3Ph 3W – Ph-Ph voltage

> SplPhL1L2 – Ph-N voltage

> SplPhL1L3 – Ph-N voltage

> Mono Ph – Ph-N voltage

Connection Type: 3 Phase 4 Wires

T	Phase	Terminal
Ta	COM	T29
Tb	L1	T30
Tc	L2	T31
Td	L3	T32
Te	COM	T33
Tf	L1	T34
Tg	L2	T35
Th	L3	T36
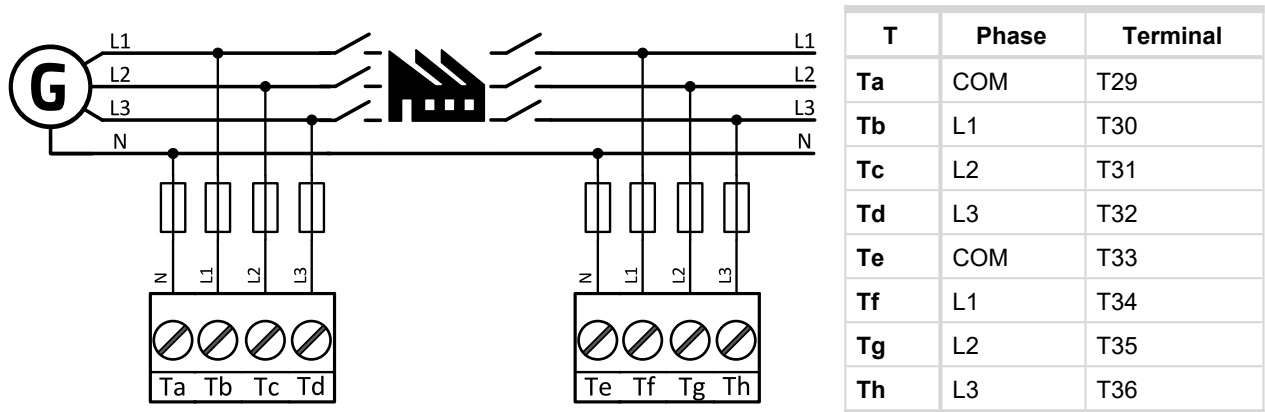
Image 4.11 3 phase application with neutral

Note: *Fuse on "N" wire is not obligatory but recommended.*
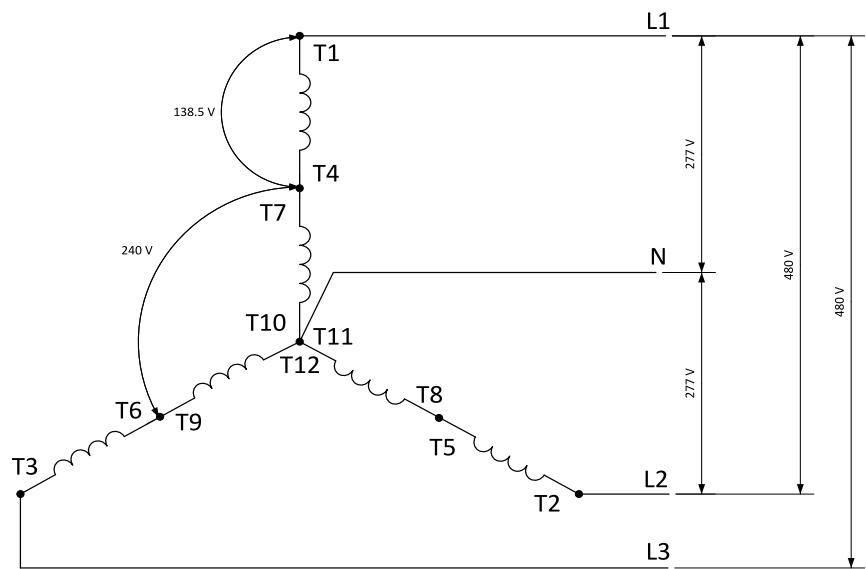
Image 4.12 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

Note: *Connection type 277/480V 3-PHASE, **Nominal Voltage 3Ph High Y (page 149)**.*
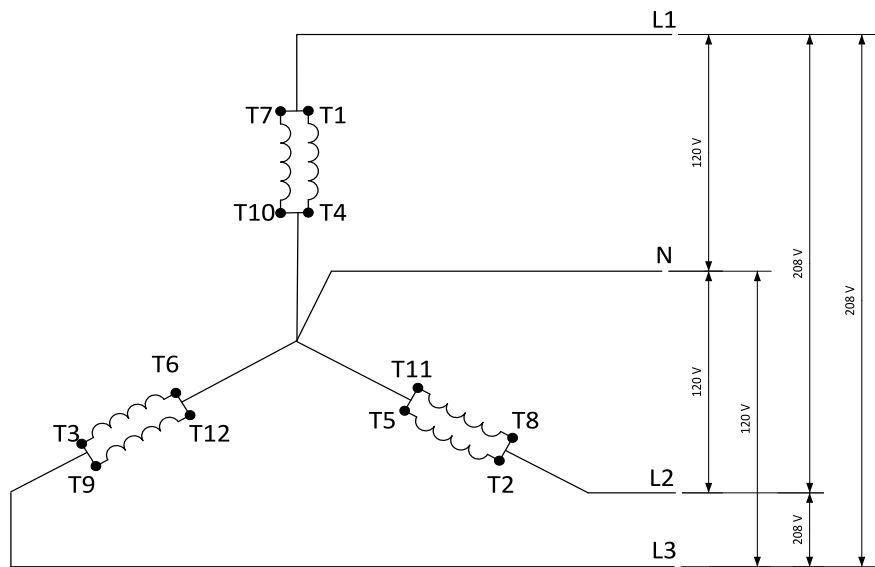
Image 4.13 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

Note: *Connection type 120/208V 3-PHASE,* ***Nominal Voltage 3Ph Low Y (page 149)****.*

Connection Type: High Leg D

T	Phase	Terminal
Ta	COM	T29
Tb	L1	T30
Tc	L2	T31
Td	L3	T32
Te	COM	T33
Tf	L1	T34
Tg	L2	T35
Th	L3	T36
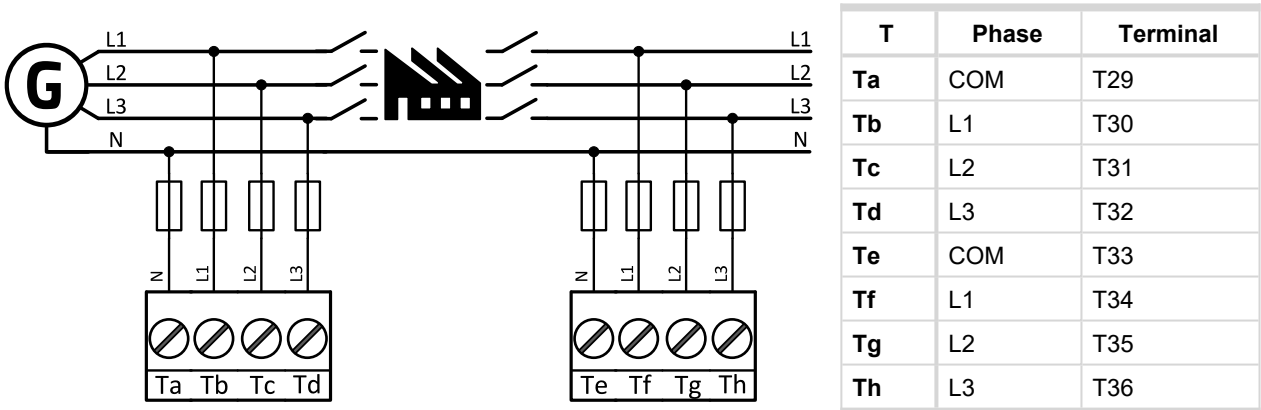
Image 4.14 High Leg Delta application

Note: *Fuse on "N" wire is not obligatory but recommended.*
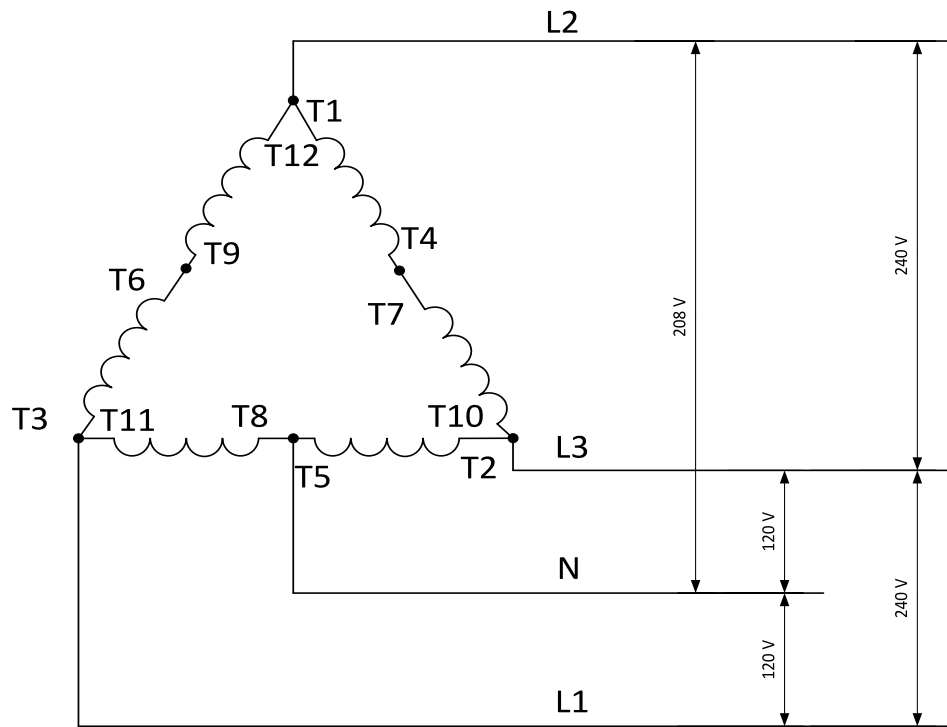
Image 4.15 Typical High Leg D generator wiring

Note: Connection type 120/240V 3-PHASE, **Nominal Voltage High Leg D (page 150)**.

Connection Type: 3 Phase 3 Wires

T	Phase	Terminal
Ta	N/A	T29
Tb	L1	T30
Tc	L2	T31
Td	L3	T32
Te	N/A	T33
Tf	L1	T34
Tg	L2	T35
Th	L3	T36
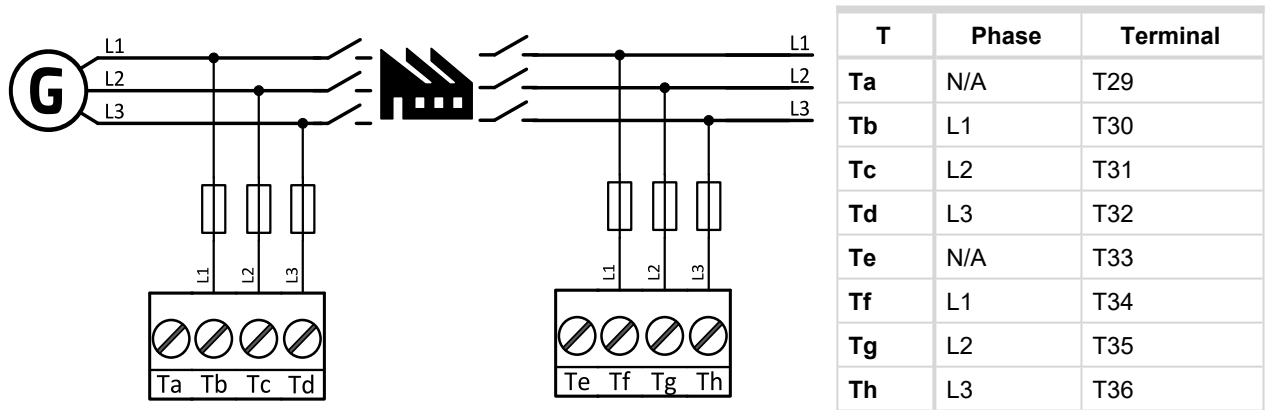
Image 4.16 3 phase application without neutral
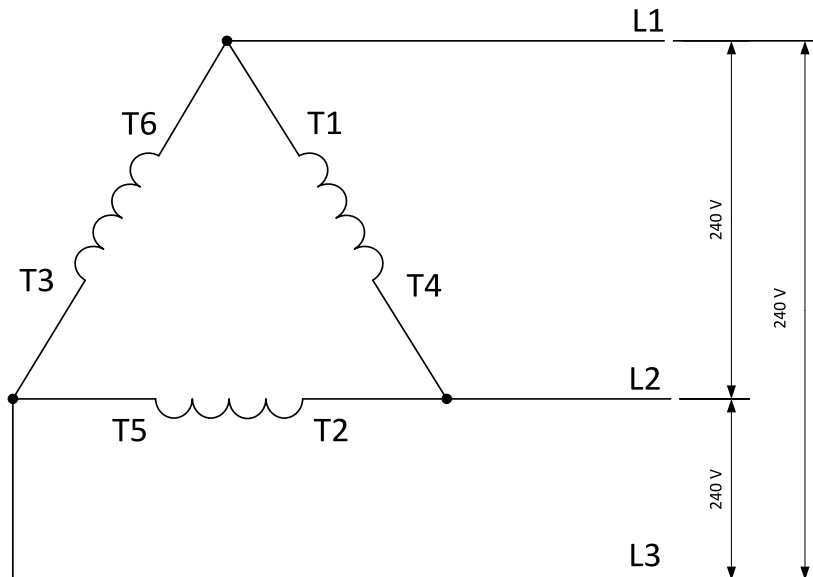
Image 4.17 Typical 3 Phase 3 Wires generator wiring

Connection Type: SplPhL1L2

T	Phase	Terminal
Ta	COM	T29
Tb	L1	T30
Tc	L2	T31
Td	N/A	T32
Te	COM	T33
Tf	L1	T34
Tg	L2	T35
Th	N/A	T36
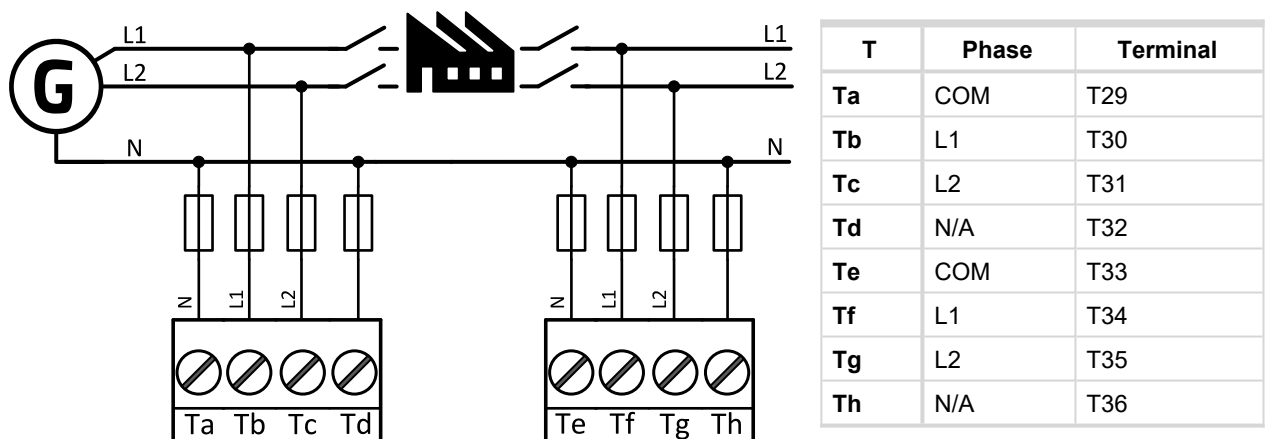
Image 4.18 Split phase L1L2 application

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

DOUBLE DELTA Connection
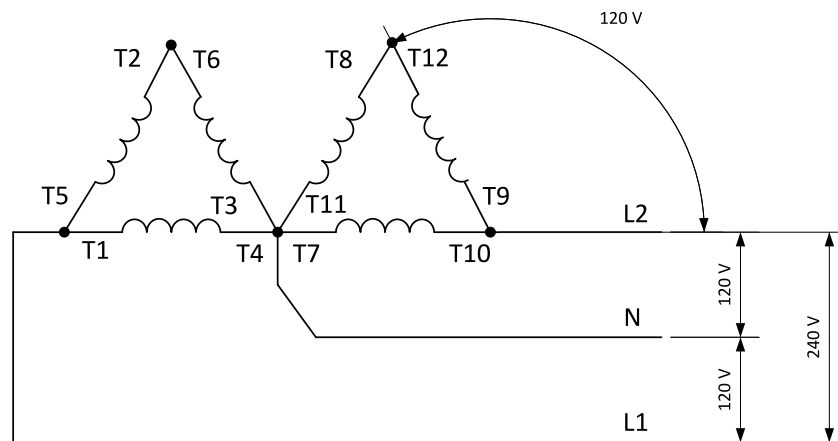
Image 4.19 Typical Split Phase generator wiring

ZIG ZAG (DOG LEG) Connection
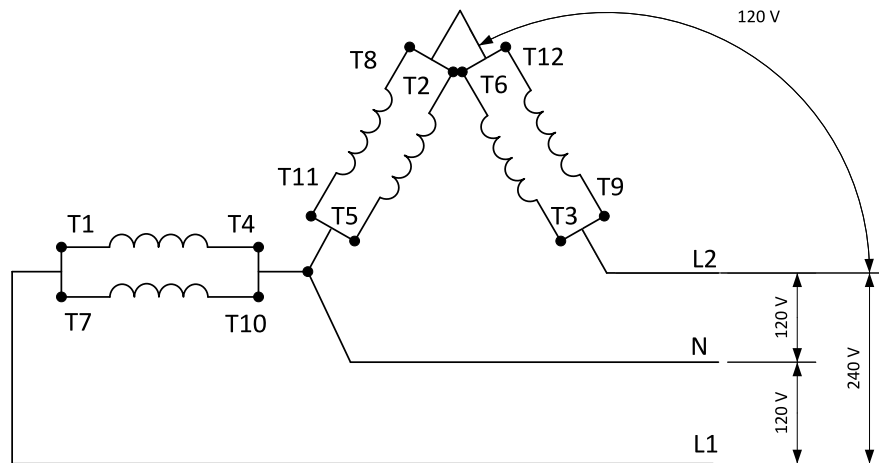
Image 4.20 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* **Nominal Voltage SplitPhase (page 150)**.

Connection Type: SplPhL1L3

T	Phase	Terminal
Ta	COM	T29
Tb	L1	T30
Tc	N/A	T31
Td	L3	T32
Te	COM	T33
Tf	L1	T34
Tg	N/A	T35
Th	L3	T36
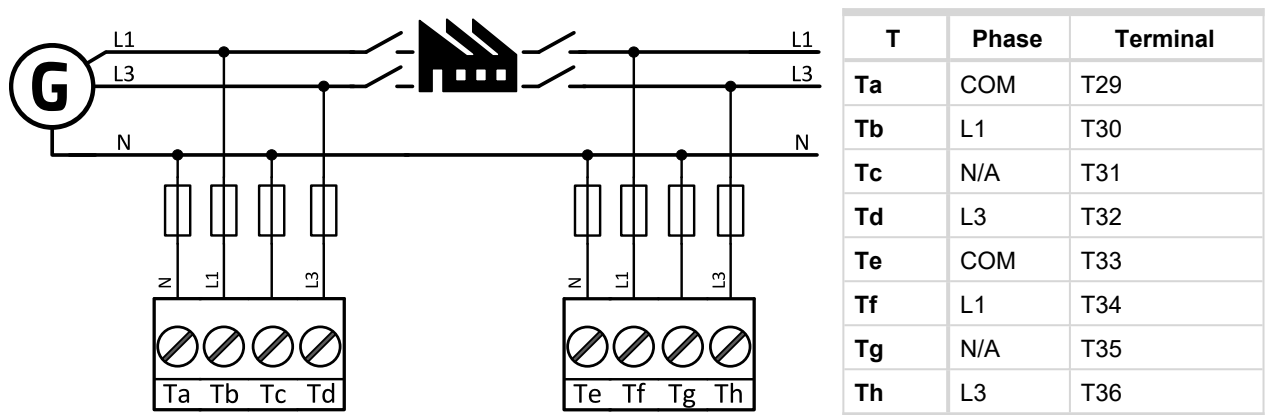
Image 4.21 Split phase L1L3 application

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

DOUBLE DELTA Connection
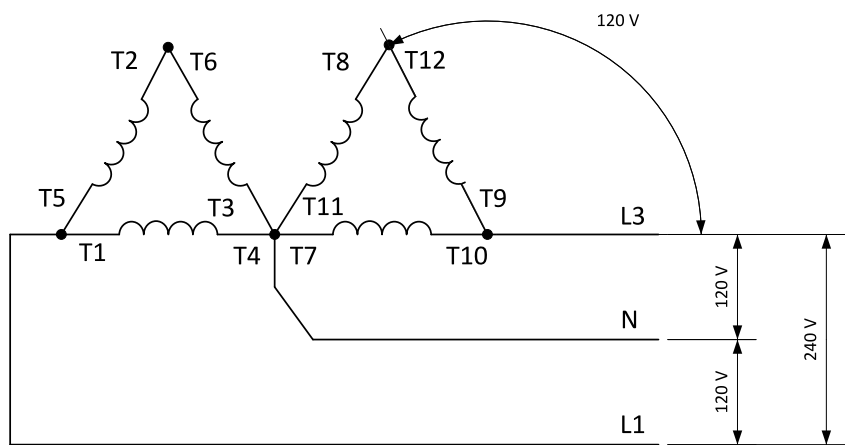
Image 4.22 Typical Split Phase generator wiring

ZIG ZAG (DOG LEG) Connection
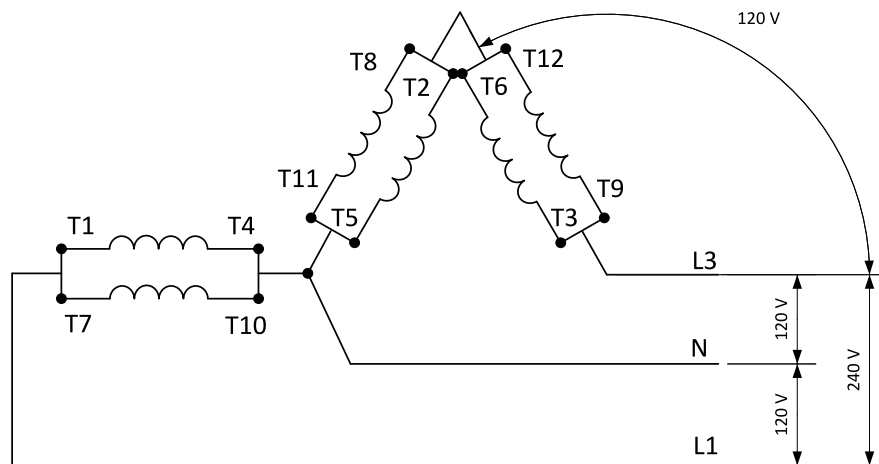
Image 4.23 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE, **Nominal Voltage SplitPhase (page 150)**.*

Connection Type: Mono Phase

T	Phase	Terminal
Ta	COM	T29
Tb	L1	T30
Tc	N/A	T31
Td	N/A	T32
Te	COM	T33
Tf	L1	T34
Tg	N/A	T35
Th	N/A	T36
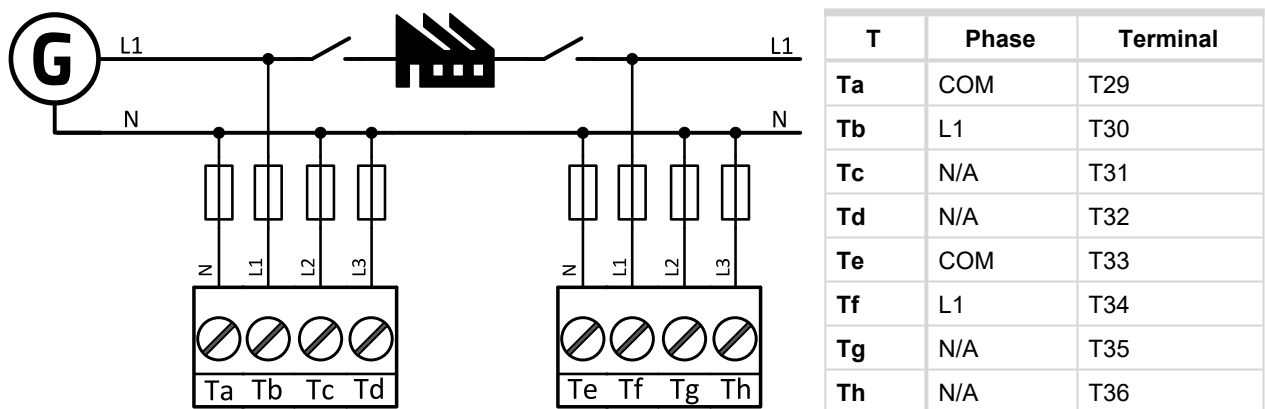
Image 4.24 Mono phase application

Note: *Fuse on "N" wire is not obligatory but recommended.*
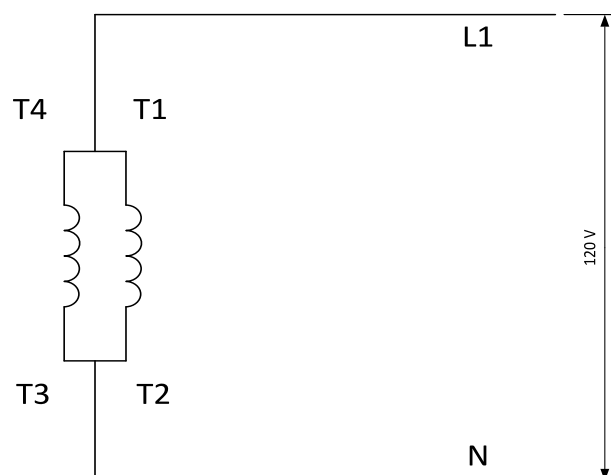
Image 4.25 Typical Mono Phase generator wiring

4.4.6 Magnetic pick-up

A magnetic speed sensor (pickup) is the most common method of engine speed measurement. To use this method, mount the pickup opposite the engine flywheel, connect the cable to the controller as shown on the picture below and adjust the setpoint **Gear Teeth (page 152)** according to the number of teeth on the flywheel.

For the details about the pick-up input parameters **see Technical data on page 136**.

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

T	Line	Terminal
Ta	GND	T13
Tb	IN	T12
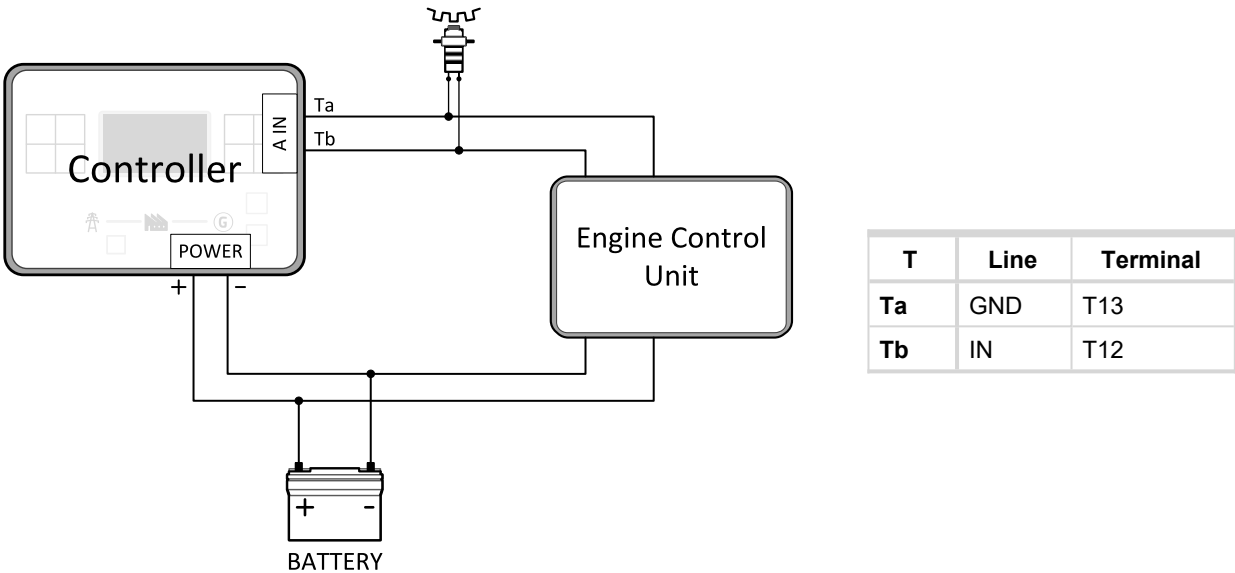
*Note: For more information about Magnetic pick-up terminals **see Recommended wiring on page 20**.*

If engine will not start:

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

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

4.4.7 Binary inputs

Use minimally 1 mm^2 cables for wiring of Binary inputs.
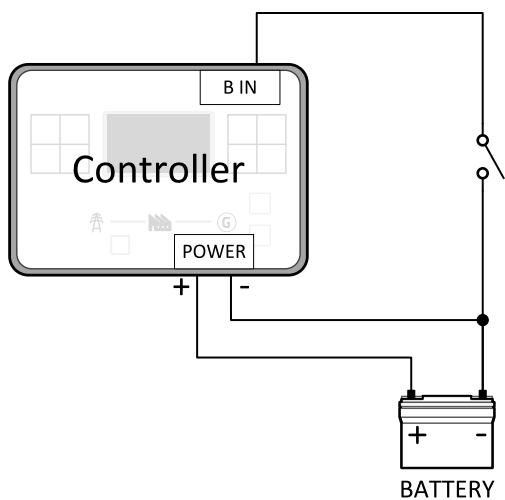
Image 4.26 Wiring binary inputs

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

4.4.8 Binary Outputs

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

> **IMPORTANT: Use suppression diodes on all relays and other inductive loads!**
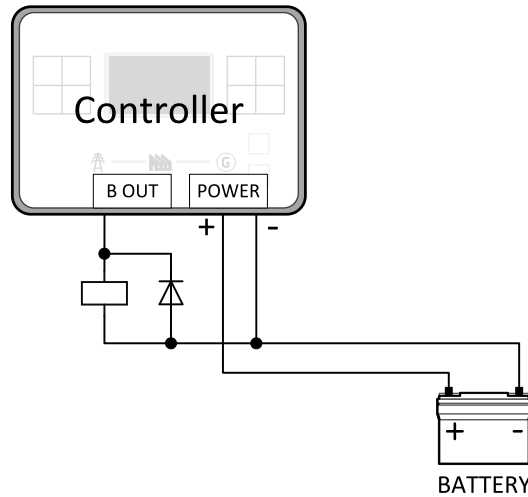
Image 4.27 Binary outputs wiring

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

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

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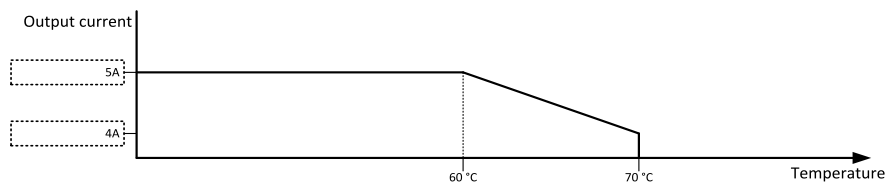
4.4.9 E-Stop

E-Stop has dedicated terminal T04. Power supply of binary output 1 and binary output 2 is internally connected (in controller) to E-Stop terminal. It means higher security and faster disconnection of these outputs. More information about E-Stop functions **see E-Stop on page 74**.

Note: This function has the same behavior as binary input EMERGENCY STOP (PAGE 326).
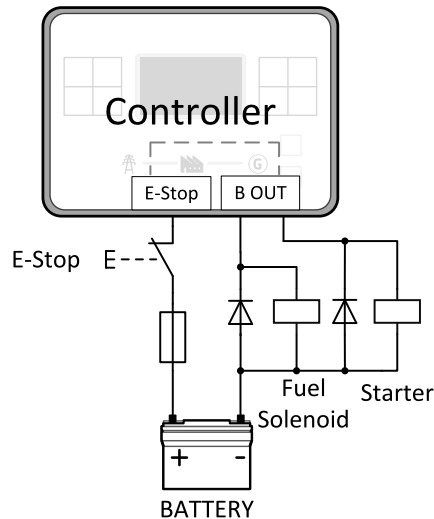
Image 4.28 E-Stop wiring

Note: Recommended fusing is 10 A fuse.

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

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

IMPORTANT: Suppression diodes are not indicated, but required.

4.4.10 Analog inputs

On AIN1 and AIN2, there is the possibility to connect only resistive sensor, whereas on AIN3 voltage, current or a resistive sensor.

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

> 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.
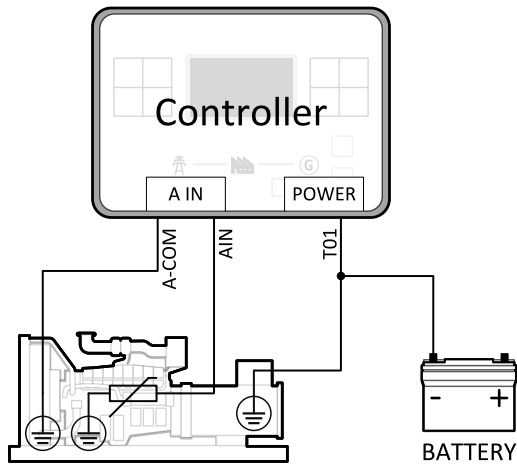
Image 4.29 Grounded sensors
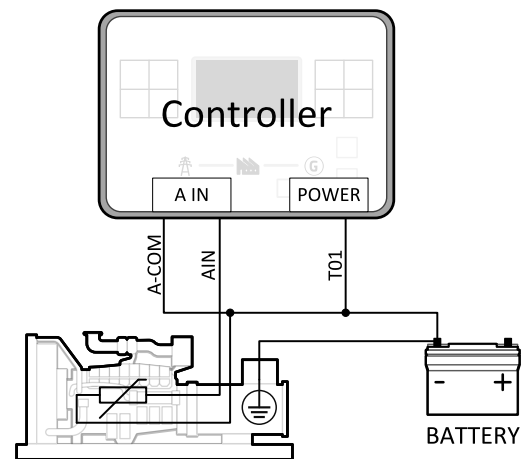
Image 4.30 Isolated sensors

Note: For more information about analog inputs terminals **see Recommended wiring on page 20**.

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

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

Analog as binary or tristate inputs

Analog inputs can be used also as binary or tri-state, i.e. for contact sensors without or with circuit check. The threshold level is 750 Ω. In the case of tri-state, values lower than 10 Ω and values over 2400 Ω are evaluated as sensor failure (short or open circuit). This can be used for example to prevent running the engine with failed temperature sensor, so it wont be overheated.
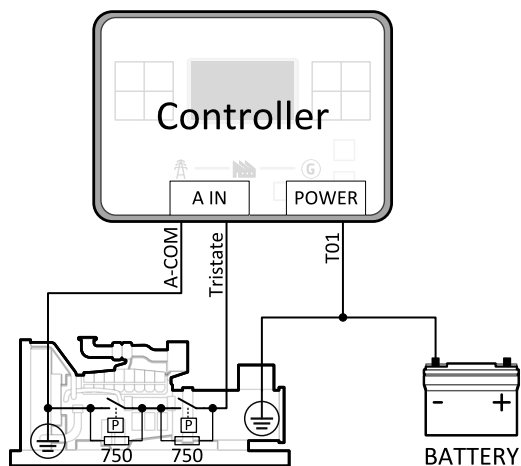
Image 4.31 Analog inputs as tristate
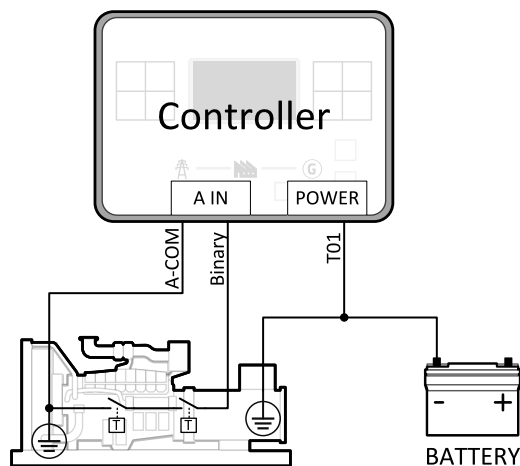
Image 4.32 Analog inputs as binary

*Note: For more information about A-COM terminal **see Recommended wiring on page 20**.*

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

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

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

Tristate sensor has 3 states:

> Fls – fail of sensor

> 1 – value is in logical 1

> 0 – value is in logical 0

Curve of sensor:

> < 10 Ω – fail of sensor

> 10 .. 750 Ω – logical 1

> 750 .. 2500 Ω – logical 0

> > 2500 – fail of sensor

Analog Voltage sensor

Controller is equipped with +5 V terminal which can be used as power supply for a voltage analog sensor.
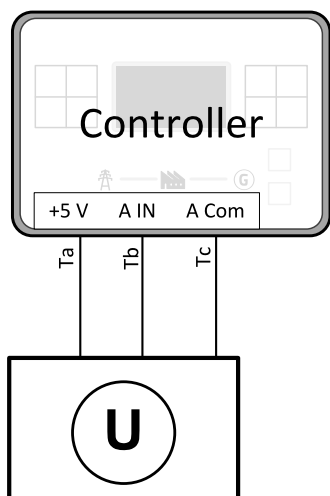
T	Line	Terminal
Ta	+5V	T18
Tb	AIN	T16
Tc	COM	T17

Image 4.33 Analog Voltage sensor

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

4.4.11 CAN bus wiring

CAN bus wiring

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

› The maximum length of the CAN bus depends on the communication speed. For a speed of 250 kbps, which is used on the CAN1 bus (extension modules, ECU), the maximum length is 200 m.

› The bus must be wired in linear form with termination resistors at both ends. No nodes are allowed except on the controller terminals.

› Shielded cable[1] must be used, and shielding must be connected to the terminal T01 (Grounding).

› External units can be connected on the CAN bus line in any order, but keeping line arrangement (no tails, no star) is necessary.

› The CAN bus must be terminated by 120Ω resistors at both ends using a cable with following parameters:

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

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

---

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

Note: A termination resistor at the CAN (120 Ω) is already implemented on the PCB.
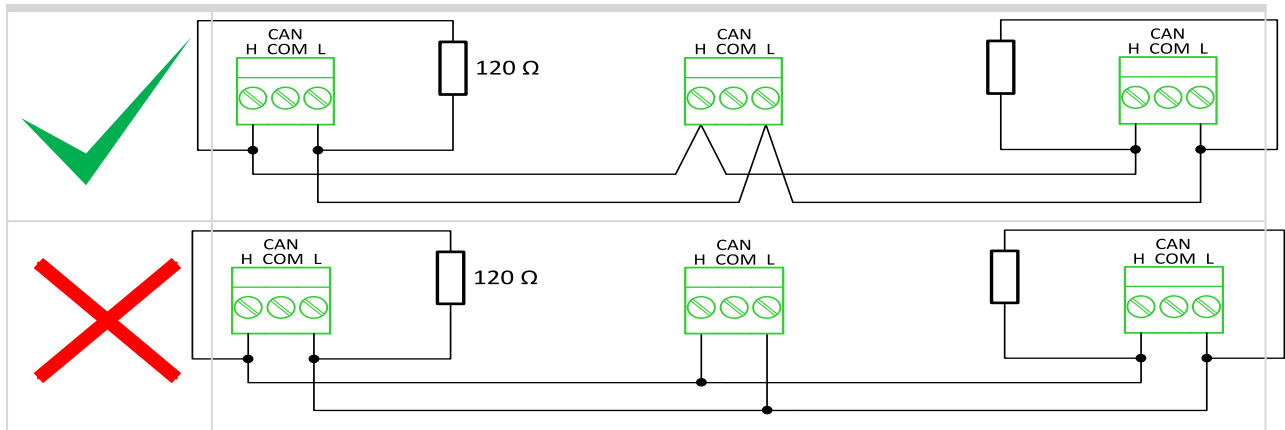
Image 4.34 CAN bus topology

❯ For shorter distances (connection within one building)
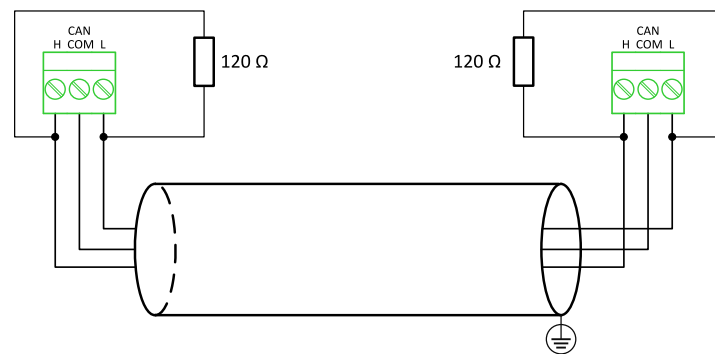
Image 4.35 CAN bus wiring for shorter distances

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.)
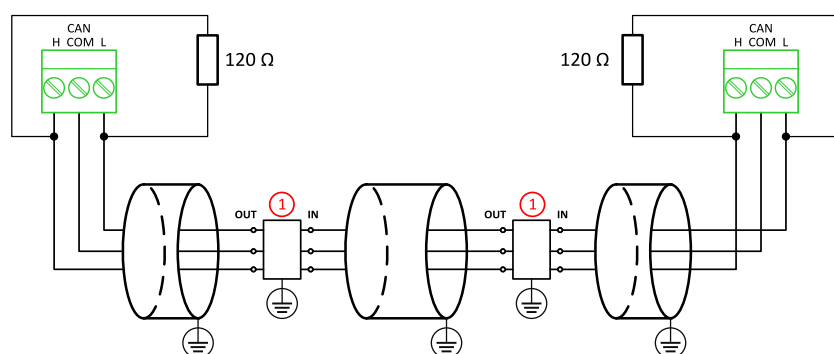
Image 4.36 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST[1]

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[1]Protections recommended: Phoenix Contact (http://www.phoenixcontact.com): PT 5-HF-12DC-ST with PT2x2-BE (base element) or Saltek (http://www.saltek.cz): DM-012/2 R DJ

4.4.12 USB

This is required for computer connection. Use the shielded USB-C cable.
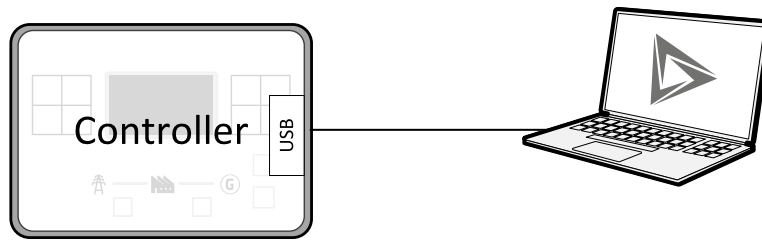
Image 4.37 USB connection

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

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

⏏ **back to Recommended wiring**

4.5 Plug-in module installation

4.5.1 Installation

> **IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply and USB from the controller!**

⏏ **back to Installation and wiring**

5 Controller setup

🔺 **back to Table of contents**

5.1 Default configuration

5.1.1 Binary inputs

Number	Description	Configured function
BIN1	Generator circuit breaker feedback	**GCB FEEDBACK (PAGE 327)**
BIN2	Mains circuit breaker feedback	**MCB FEEDBACK (PAGE 329)**
BIN3	Remote Start/Stop	**REMOTE START/STOP (PAGE 330)**
BIN4	AMF Start Block	**AMF START BLOCK (PAGE 323)**

5.1.2 Binary outputs

Number	Description	Function
BOUT1	Starter motor control	**STARTER (PAGE 356)**
BOUT2	Fuel solenoid valve	**FUEL SOLENOID (PAGE 342)**
BOUT3	Indication of breaker state	**GCB CLOSE/OPEN (PAGE 343)**
BOUT4	Indication of breaker state	**MCB CLOSE/OPEN (PAGE 350)**
BOUT5	Activation of any devices before start	**PRESTART (PAGE 353)**
BOUT6	Alarm	**ALARM (PAGE 336)**

5.1.3 Analog inputs

Number	Configured sensor	Function
AIN1	VDO 10 Bar	**OIL PRESSURE (PAGE 363)**
AIN2	VDO40-120°C	**COOLANT TEMP (PAGE 362)**
AIN3	VDOLevel %	**FUEL LEVEL (PAGE 362)**

5.2 Controller configuration and PC tools connection

⬥ **back to Controller setup**

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

5.2.1 USB

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

Connection using InteliConfig
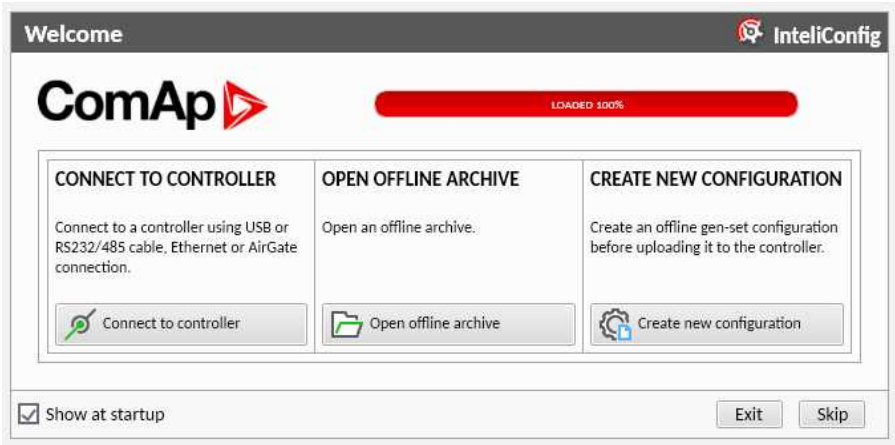
Image 5.1 First screen of InteliConfig – select connect to controller
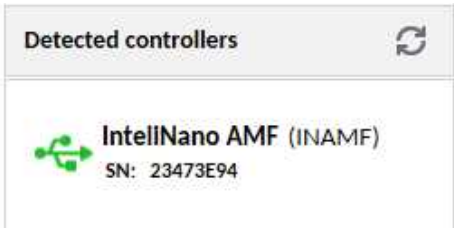
Image 5.2 Second screen of InteliConfig – select detected controllers

Connection using WinScope 1000
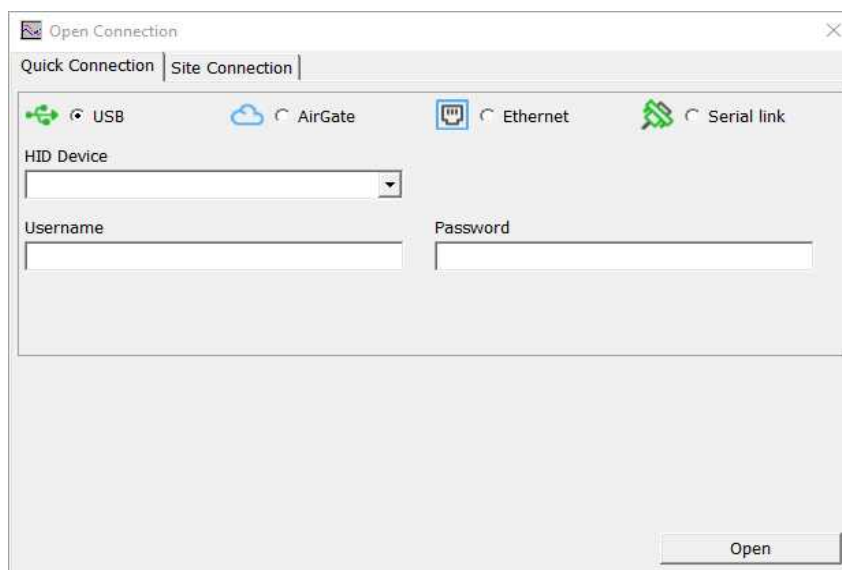
Image 5.3 WinScope 1000 screen – select USB connection

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

Note: Username and password are not mandatory.

5.2.2 RS232/RS485

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

> **COM1 Mode (page 229)** = Direct
> **Controller Address (page 162)** must be set

Connection using InteliConfig
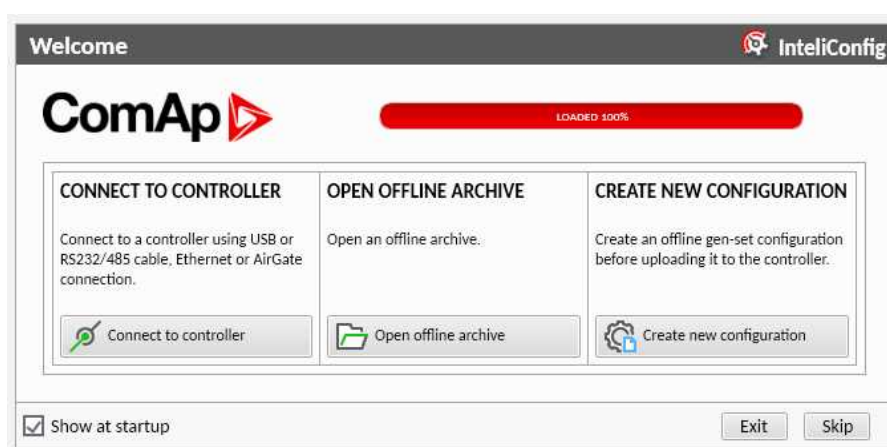
Image 5.4 First screen of InteliConfig – select connect to controller
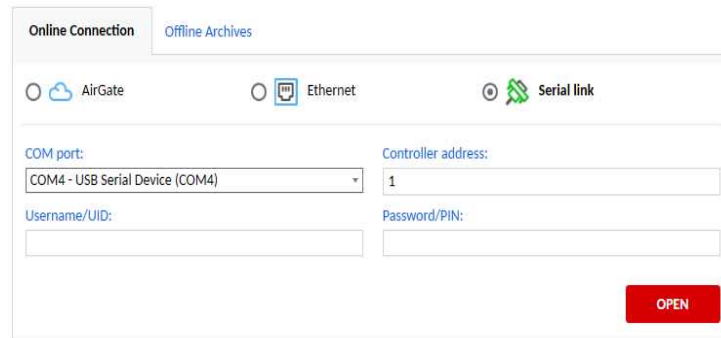
Image 5.5 Second screen of InteliConfig – select Serial link

Connection using WinScope 1000
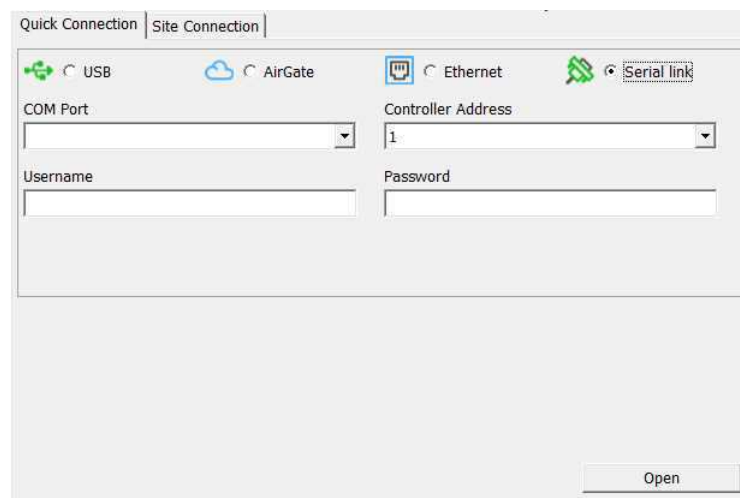
Image 5.6 WinScope 1000 screen – select serial link

Note: Username and password are not mandatory.

5.2.3 Ethernet

It is possible to connect to the controller using ComAp's AirGate service.

AirGate connection

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

> **Controller Address (page 162)** has to be set to the same value as in the PC tool

> **IP Address Mode (page 247)** must set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED

> **IP Address (page 248)** is either set automatically or it can be adjusted to a specific requested value

> **Subnet Mask (page 248)** is either set automatically or it can be adjusted to a specific requested value

> **Gateway IP (page 249)** can be set here when it is used

> **AirGate Connection (page 250)** must be set to Enabled

> **AirGate Address (page 251)** currently there is one AirGate server running at URL global.airgate.link (enter this URL into the setpoint)

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

> **IMPORTANT: Controller has to be connected to the Internet.**

Getting started with AirGate

1. Make sure controller has link to Internet
   a. CM3-Ethernet is connected to LAN infrastructure, has an IP address and access to Internet
   b. CM2-4G-GPS is connected to a mobile operator (preferably to 3G/4G network) and has an IP address
2. Connect with InteliConfig e.g. via USB and check setpoints as follows:
   a. *AirGate connection* = ENABLED
   b. *AirGate port* = 54440
   c. *AirGate address* = global.airgate.link
3. Adjust *AirGate key* in InteliConfig – this is your "secret key" that you have to provide always when you want to connect to the controller via AirGate.
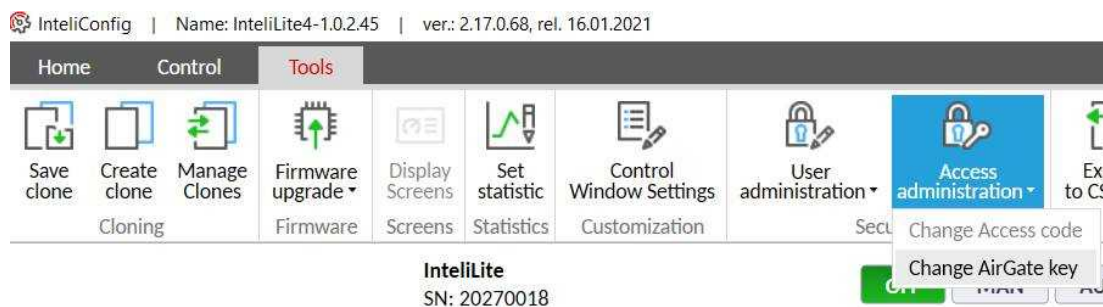
Image 5.7 Changing AirGate key

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

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

Connecting from InteliConfig via AirGate 2.0

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

AirGate operational and diagnostic information

Object	Description
Not defined	Indicated while the controller is actually not trying to connect to AirGate. This is initial value of the status.
Wait to connect	Indicated while the controller is waiting the "repetition period" before next attempt to connect to a node is performed.
Resolving	Indicated while the controller is resolving domain name of the node to which it is attempting to connect.
Connecting	Indicated while the controller is attempting to establish TCP link to the node.
Creat sec chan	Indicated while CCS encrypted channel is being negotiated.
Registering	Indicated when the CCS channel has been established until AirGate sends message "setRuntimeParams" (with any registration status).
Conn inoperable	Indicated when AirGate sent registration status other than "Authorized" until the status changed to "Authorized".
Conn operable	Indicated when AirGate sent registration status "Authorized" until the status changed to any other one.
Susp AGkeyEmpty	Indicated when the service is enabled but suspended due to empty AirGate key. *Note: If you see this status message you have to adjust AirGate Key as per instructions above.*

Connection using InteliConfig

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

- **AirGate ID (page 312)**
- AirGate Server → **AirGate Address (page 251)**
- **Controller Address (page 162)**
- User name and Password
- AirGate Key

> **IMPORTANT: AirGate Key has to be configured. User with administrator rights has a possibility to set up or change AirGate Key via InteliConfig using Tools -> Access Administration -> Change AirGate Key.**
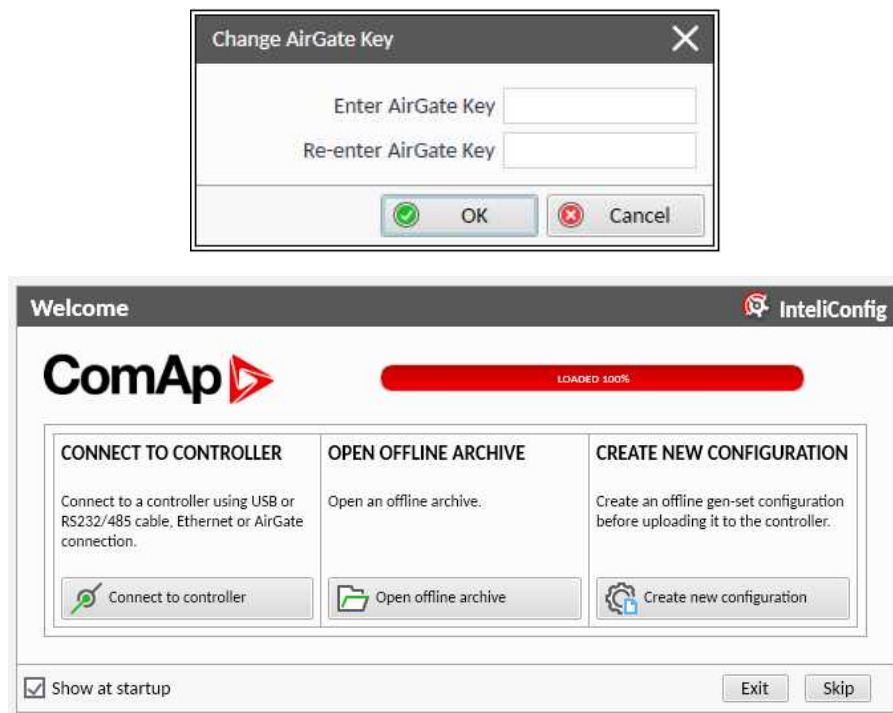
Image 5.8 First screen of InteliConfig – select connect to controller
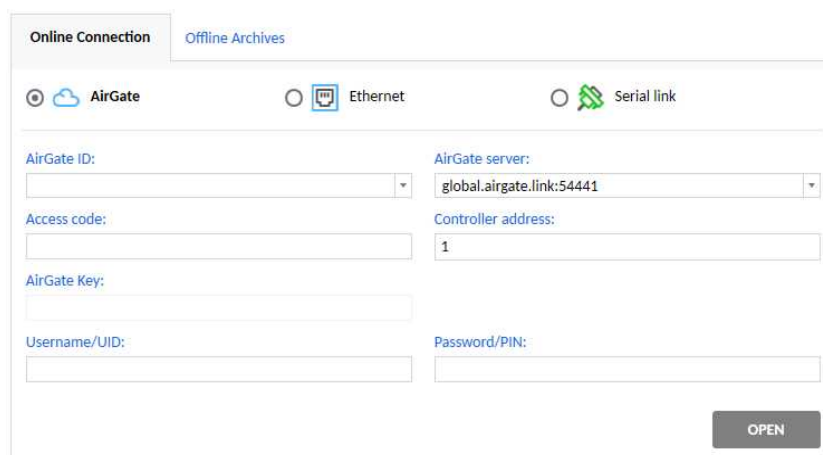
Image 5.9 Second screen of InteliConfig – AirGate

Connection using WinScope 1000

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

> **AirGate ID (page 312)**

> AirGate Server → **AirGate Address (page 251)**

> **Controller Address (page 162)**

> User name and Password

> Device Access Key →AirGate Key

> Access code is required

IMPORTANT: AirGate Key has to be configured. User with administrator rights has a possibility to set up or change AirGate Key via InteliConfig using Tools -> Access Administration -> Change AirGate Key.
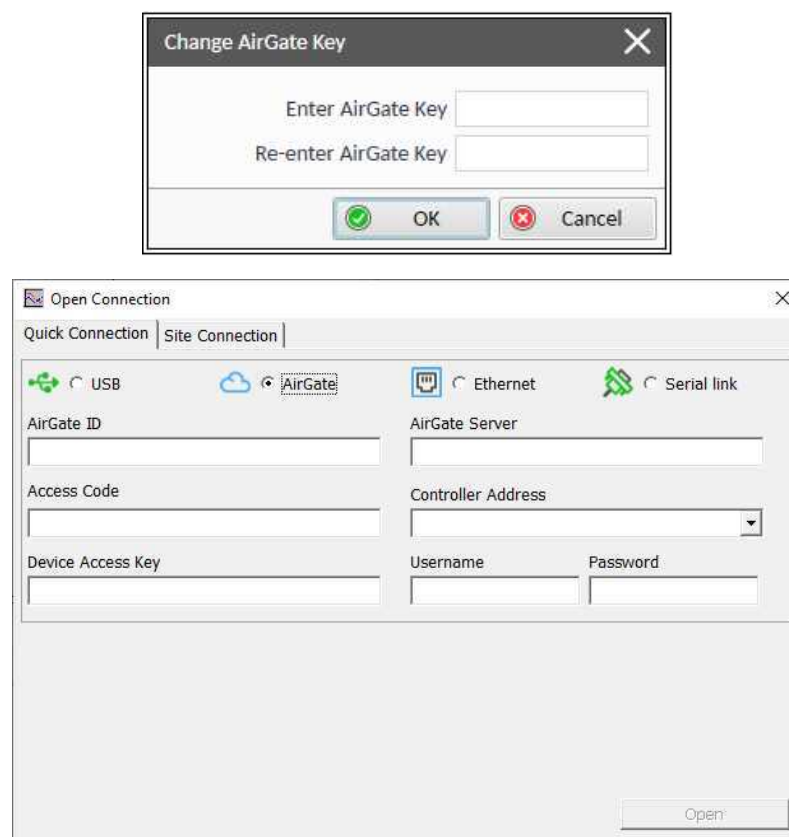
Image 5.10 WinScope 1000 screen – select AirGate

5.3 Operator Guide

5.3.1 Front panel elements
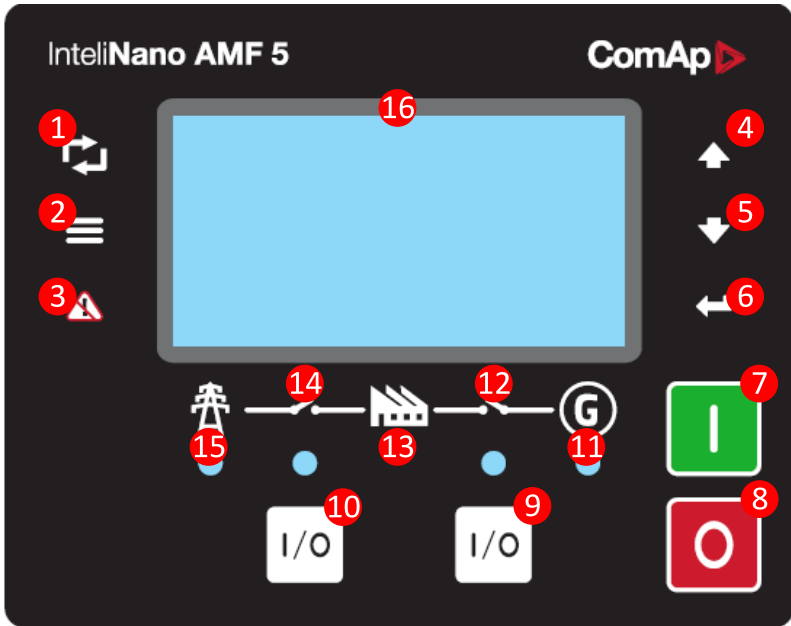
Image 5.11 Operator interface of InteliNano AMF 5

Control buttons		
Position	**Picture**	**Description**
1		**MODE** button. Use this button to cycle modes and to navigate in the interface. The Mode button is used as the Right button in most cases.
2		**PAGE** button. Use this button to switch over display pages.
3		**FAULT RESET** button. Use this button to acknowledge alarms. 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.
4		**UP** button. Use this button to move up or increase value.

⑤	⬇	**DOWN** button. Use this button to move down or decrease value.
⑥	⬅	**ENTER** button. Use this button to finish editing a setpoint or moving right in the history page.
⑦	I	**START** button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.
⑧	O	**STOP** button. Works in MAN mode only. Press this button to initiate the stop sequence of the Gen-set. Repeated pressing of button will cancel current phase of stop sequence (like cooling) and next phase will continue.
⑨	I/O	**GCB** button. Works in MAN mode only. Press this button to open or close the GCB.
⑩	I/O	**MCB** button. Works in MAN mode only. Press this button to open or close the MCB.
⑪	Ⓖ	**GENERATOR** status indicator. There are two states – Gen-set OK (indicator is green) and Gen-set failure (indicator is red). Green LED is on if the generator voltage and frequency is present and within limits. Red LED starts flashing when Gen-set failure occurs. After FAULT RESET button is pressed, Red LED goes to steady light (if an alarm is still active) or is off (if no alarm is active).
⑬	🏭	**LOAD**. Green LED is ON if load is supplied by power source. It means, that Gen-set or mains is healthy and proper circuit breaker is closed.
⑮	🗼	**MAINS** status indicator. There are two states – Mains OK (indicator is green) and Mains failure (indicator is red). Green LED is on, if mains is present and within limits. Red LED starts blinking when the mains failure is detected and after the Gen-set has started and connected to the load it lights permanently until the mains failure disappears.

Indicators and others

Position	Description
⑫	**GCB Status**. Green LED is on if GCB is closed. It is driven by GCB CLOSE/OPEN output or by GCB feedback signal.
⑭	**MCB Status**. Green LED is on if MCB is closed. It is driven by MCB CLOSE/OPEN output or by MCB feedback signal.
⑯	Graphic B/W display, 132 × 64 px.

5.3.2 Display screens and pages structure

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

> The page Measurement consists of screens which display measured values such as voltages, current, oil pressure etc.; computed values such as Gen-set power, statistic data and the alarm list on the last screen.

> The page setpoints contains all setpoints organized to groups and also a special group for entering a password.

> The page History log shows the history log with the most recent record displayed first.

Main Screen
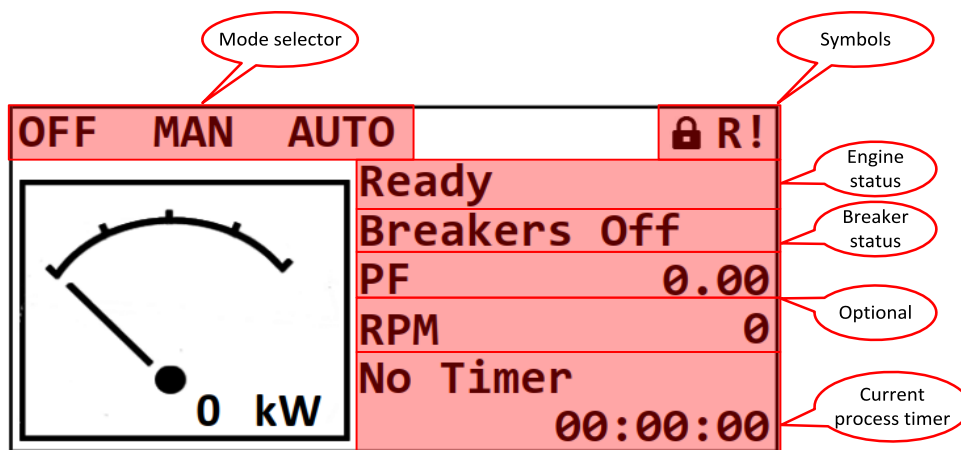
Symbols

> Padlock – active when LBI ACCESS LOCK is active

> R – active when there is active remote connection to controller

> Exclamation mark – active when there is any alarm in alarm list

Personalization of main screen

Main screen can be personalized by following setpoints:

> Main Screen Line 1

> Main Screen Line 2

> Main Screen Gauge

Measurement Screens

```
OFF  MAN  AUTO           🔒R!
┌─────────────┐ Ready
│   ╱‾‾‾‾╲    │ Breakers Off
│  ╱      ╲   │ PF        0.00
│ ╱        ╲  │ RPM          0
│    ●        │ No Timer
│      0  kW  │       00:00:00
└─────────────┘
```

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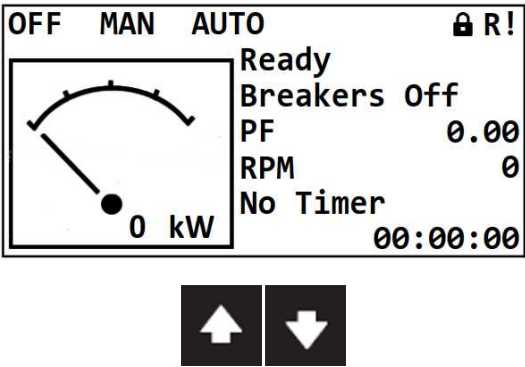
Note: *Use the Up and Down buttons to move between measurement pages.*

```
┌──────────────────────────────┐
│          Generator           │
├──────────────────────────────┤
│ L1N    230V   L1L2     400V   │
│ L2N    230V   L2L3     400V   │
│ L3N    230V   L3L1     400V   │
│ Generator Freq        50.0Hz  │
└──────────────────────────────┘
```

⬆ ⬇

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

```
┌──────────────────────────────┐
│      Analog Inputs     1/2    │
│ AIN1              #########   │
│                               │
│ AIN2              #########   │
│                               │
│ AIN3              #########   │
│                               │
└──────────────────────────────┘
```

⬆ ⬇

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

Note: *There are additional screens. Screen's visibility depends on actual configuration (usage of extension or communication modules, ECU, controller model, etc.).*

```
        Alarmlist      3
 * Wrn Alarm 1
 * BOC Alarm 2
   Sd  Alarm 3



```

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

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

Setpoint Screens
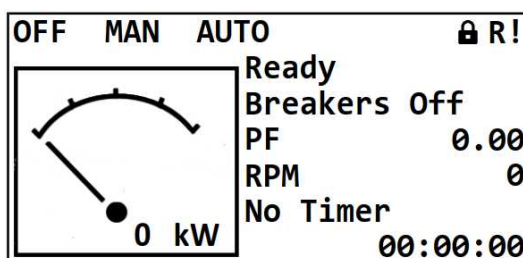
```
OFF  MAN  AUTO          🔒R!
 ┌──────────┐ Ready
 │          │ Breakers Off
 │    ╱     │ PF           0.00
 │   ●      │ RPM             0
 │   0 kW   │ No Timer
 └──────────┘       00:00:00
```

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

```
           Login
      Setpoint Group 1
      Setpoint Group 2
      Setpoint Group 3
      Setpoint Group 4
      Setpoint Group 5
      Setpoint Group 6
```

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

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

```
         Nominal Power
   Default          Current
   value            value
    200              120
 Range 1÷5000              kW
 ◄■□□□□□□□□□□□□□□□□□□□□►
```

⬆ ⬇

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

🔁

Note: Use the Mode button to select required setpoint.

↵

Note: Use the Enter button to enter selected setpoint.

```
         Nominal Power
   Default            New
   value            value
    200             [120]
 Range 1÷5000
 ◄■□□□□□□□□□□□□□□□□□□□□►
```

⬆ ⬇

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

↵

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

☰

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

History Log

```
 OFF   MAN   AUTO        🔒R!
                   Ready
                   Breakers Off
                   PF        0.00
                   RPM          0
                   No Timer
       0  kW           00:00:00
```

☰

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

```
                    Login
            Setpoint Group 1
            Setpoint Group 2
            Setpoint Group 3
            Setpoint Group 4
            Setpoint Group 5
            Setpoint Group 6
```

≡

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

```
No. Reason
 000 GCB Closed
-001 GCB Opened
-002 GCB Opened


11:05:45           2021-12-03
```

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

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

5.3.3 Browsing alarms

```
OFF   MAN   AUTO          🔒R!
                   Ready
                   Breakers Off
                   PF        0.00
                   RPM          0
                   No Timer
      0  kW            00:00:00
```

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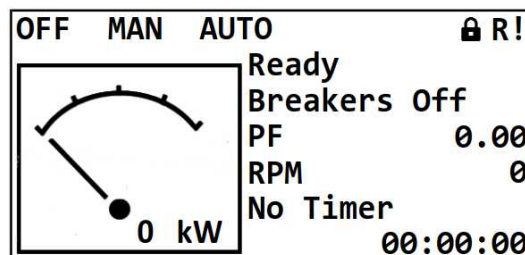
Note: Use the Up button to move to alarm list from main measurement screen.

```
            Alarmlist        3
*  Wrn Alarm 1
*  BOC Alarm 2
   Sd  Alarm 3


```

> Active alarms are displayed as white text on black background. It means the alarm is still active, i.e. the appropriate alarm conditions are still present.

> Inactive alarms are displayed as black text on white background. It means the alarm is not active, i.e. the appropriate alarm conditions are gone.

> Unconfirmed alarms are displayed with an asterisk. This means the alarm is still not acknowledged (confirmed).

> ECU alarms: SPN/FMI/OC/SC

>> SPN – Suspect parameter number

>> FMI – type of protection

>> OC – number of errors

>> SC – source of error

User access management alarms

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

> **Wrn Production Mode** is present in the alarm list any time the production mode is turned on. To turn off the Production mode go to User management and uncheck the checkbox Production mode or go to Production Mode display screen and select disable.

> **Wrn Default Password** appears in alarm list when the default administrator password is set and communication module is plugged in the controller. The purpose of alarm is to inform that the controller might be or is connected to an untrusted interface and cybersecurity rules are not fulfilled because there is default administrator password.

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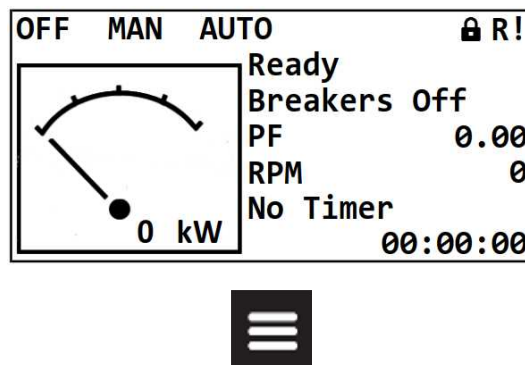
Note: From all measurement pages you can easily go to the setpoint group page by pressing the Page button.

```
              Login
       Setpoint Group 1
       Setpoint Group 2
       Setpoint Group 3
       Setpoint Group 4
       Setpoint Group 5
       Setpoint Group 6
```

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

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

```


              Login
         Production Mode


```

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

Note: Use the Enter button to enter Login.

```
              Login


       UserID  0 0 0 0
          PIN  0 0 0 0

```

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

Note: Use the Mode button to move between digits.

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

```
              Login

             STOP

         Wrong Credentials

```

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

5.3.5 Production mode

```
OFF  MAN  AUTO        🔒R!
┌─────────────┐Ready
│   ╱‾╲       │Breakers Off
│  ╱   ╲      │PF        0.00
│ │     │     │RPM          0
│  ●          │No Timer
│   0 kW      │      00:00:00
└─────────────┘
```

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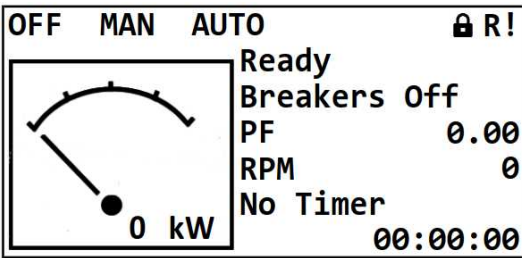
Note: From all measurement pages you can fluently go to the setpoint group page by pressing the Page button.

```
        Login
   Setpoint Group 1
   Setpoint Group 2
   Setpoint Group 3
   Setpoint Group 4
   Setpoint Group 5
   Setpoint Group 6
```

↵

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

```

        Login
     Production Mode


```

⬆

⬇

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

↵

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

```
        Production Mode

           Disabled
           Enabled



        Production Mode


           Disabled
           Enabled
```

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

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

```
        Production Mode


           Disabled

```

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

5.3.6 Information screen

```
OFF  MAN  AUTO        🔒R!
                  Ready
                  Breakers Off
                  PF        0.00
                  RPM          0
                  No Timer
        0 kW          00:00:00
```

↵ + ☰

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

```
         InteliNano

           ComAp

    www.comap-control.com
```

≡

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

```
 About Controller    1/2
        InteliNano
          ComAp
      Controller Name

 Application          ABC
 Branch          Standard
```

≡

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

```
 About Controller    2/2
 SW Version      1.0.0.00
 HW Version           1.0
 Serial          12345678
 UserID              1234
 Access level           3
```

⬆

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

```
 Languages

        Language1
        Language2
```

⬆ ⬇

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

↵

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

≡

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

```
┌─────────────────────────────┐
│     Configuration Level     │
│                             │
│                             │
│         Standard            │
│         Advanced            │
│                             │
└─────────────────────────────┘
```

Note: Use the Up and the Down button to select required configuration level.

Note: Use the Enter button to confirm selected configuration level.

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

5.3.7 Language selection

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

```
┌─────────────────────────────┐
│                             │
│         InteliLite          │
│                             │
│           ComAp             │
│                             │
│     www.comap-control.com   │
│                             │
└─────────────────────────────┘
```

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

```
┌─────────────────────────────┐
│  About Controller      1/2  │
│         InteliLite          │
│           ComAp             │
│       Controller Name       │
│                             │
│  Application            ABC │
│  Branch           Standard  │
└─────────────────────────────┘
```

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

```
  About Controller      2/2
SW Version        1.0.0.00
HW Version             1.0
Serial            12345678
UserID                1234
Access level             3
```

☰

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

```
         Languages

        Language1
        Language2
        Language3
```

⬆

⬇

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

↵

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

5.3.8 Display contrast adjustment
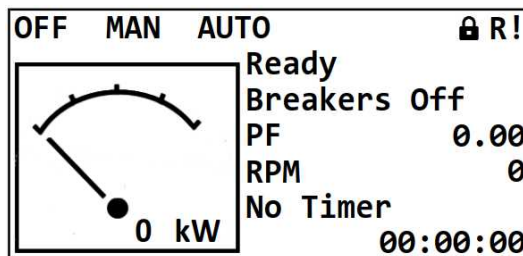
```
OFF   MAN   AUTO        🔒R!
                Ready
                Breakers Off
                PF        0.00
                RPM          0
                No Timer
        0  kW        00:00:00
```

↵ + ☰

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

↵ + ⬆

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

↵ + ⬇

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

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

5.4 Functions

5.4.1 Additional running engine indications

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

The following conditions are evaluated as additional running engine indication:

> Voltage on the D+ input is higher than the **D+ Threshold (page 177)** of battery voltage. Connect this input to the D+ (L) terminal of the charging alternator and enable the D+ function by the setpoint **D+ Threshold (page 177)**. 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 165)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.

> Binary input **OIL PRESSURE (PAGE 330)** is in logical 0.

> At least one phase of generator voltage is >25 % of nominal voltage.

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

5.4.2 After-treatment Support

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

> Providing After-Treatment status information by

>> Displaying universal lamps (icons)

>> Displaying analog and binary values

> Control of After-Treatment regeneration function by

>> Transmitting commands to the ECU

Providing After-treatment status information

After-Treatment screen

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

Image 5.12 Example of active After-treatment screen
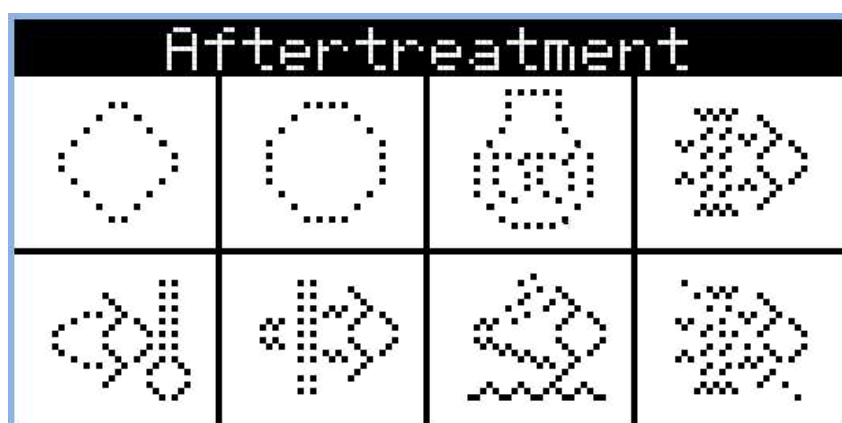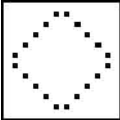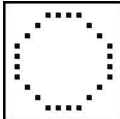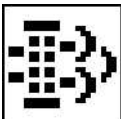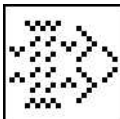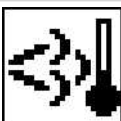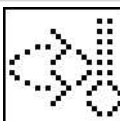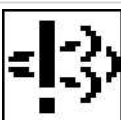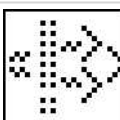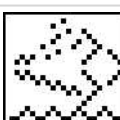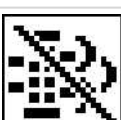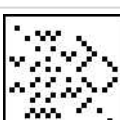
Image 5.13 Example of inactive After-treatment screen

Universal lamps (icons)

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

> shown

> hidden

> blinking slow (1 Hz)

> blinking fast (2 Hz)

Lamp name	Active icon	Inactive icon	Alarm	LBO
ECU Yellow Lamp			**Wrn ECU Yellow Lamp (page 369)**	**ECU YELLOW LAMP (PAGE 341)**
ECU Red Lamp			**Wrn ECU Red Lamp (page 369)**	**ECU RED LAMP (PAGE 341)**
ATT DPF Lamp			**Wrn ATT DPF Lamp (page 370)**	**ATT DPF LAMP (PAGE 336)**
ATT HEST Lamp			**Wrn ATT HEST Lamp (page 370)**	**ATT HEST LAMP (PAGE 337)**
ATT SCR Error Lamp			**Wrn ATT SCR Error Lamp (page 370)**	**ATT SCR ERROR LAMP (PAGE 337)**
ATT DEF Level Lamp			**Wrn ATT DEF Level Lamp (page 370)**	**ATT DEF LEVEL LAMP (PAGE 336)**
ATT Inhibited Lamp			**Wrn ATT Inhibited Lamp (page 371)**	**ATT INHIBITED LAMP (PAGE 337)**

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

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

Control of After-Treatment regeneration function

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

> Controller is in MAN mode

> State Running

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

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

> **ATT FORCE REGEN (PAGE 323)**

> **ATT FORCE REGEN ALT (PAGE 323)**

> **ATT INHIBIT REGEN (PAGE 324)**

Force regeneration by the user

User activates**ATT FORCE REGEN (PAGE 323)** by pressing the push-button (generate pulse) to force start of the automatic regeneration process. Controller immediately change (and holds for 5 seconds) the data part of the message transmitted to the ECU (SPN 3696) This will generate signal like 5sec pulse command for the ECU. If input signal is held more than 5 seconds, the output will continue to generate signal as well.

Force regeneration by the user (alternative)

User activates**ATT FORCE REGEN ALT (PAGE 323)** by by pressing the push-button (generate pulse) to force start of the automatic regeneration process. Controller immediately change (and holds for 5 seconds) the data part of the message transmitted to the ECU (SPN 3696) This will generate signal like 5sec pulse command for the ECU. If input signal is held more than 5 seconds, the output will continue to generate signal as well.

During this type of regeneration, protections for overvoltage and overfrequency are deactivated. Overspeed protection level is increased according to setpoint **DPF Regeneration RPM (page 174)**. GCB is prohibited to close and alarm DPF Regen with protections off is active.

User can also inhibit regeneration process by:

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

5.4.3 Alternate configuration

There are 3 sets of alternate configurations in a controller:

Configuration set 1	Configuration set 2
Nominal Power Split Phase 1 (page 266)	Nominal Power Split Phase 2 (page 271)
Nominal Power 1 (page 266)	Nominal Power 2 (page 271)
Nominal RPM 1 (page 262)	Nominal RPM 2 (page 267)
Nominal Frequency 1 (page 262)	Nominal Frequency 2 (page 267)
Nominal Voltage Ph-N 1 (page 263)	Nominal Voltage Ph-N 2 (page 268)
Nominal Voltage Ph-Ph 1 (page 263)	Nominal Voltage Ph-Ph 2 (page 268)
Nominal Current 1 (page 264)	Nominal Current 2 (page 269)
Connection Type 1 (page 264)	Connection type 2 (page 269)

Configuration sets can be changed via logical binary inputs ALTERNATE CONFIG 2 (PAGE 323). Configuration set 1 is active when there is no input activated.

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

> **IMPORTANT: When frequency is changed from 50 to 60Hz, ECU Power Relay is activated to send this change to ECU.**

5.4.4 Breaker control

The following power switches are controlled by the controller:

> The generator circuit breaker or contactor – GCB

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

> The control outputs must be configured and wiring of the power switches must be provided in such a way, that the controller has full control over the breakers – i.e. the controller can open and close the breaker at any time.

> The breaker must respond within max. 5 seconds to a close and open command. Special attention should be paid to opening of motorized circuit breakers, as it could take more than 5 seconds on some types. In such cases it is necessary to use an undervoltage coil for fast opening.

> After opening the breaker, there is an internal delay before closing the breaker. Delay is 6 seconds – 5 seconds for OFF coil and 1 second for UV coil. After these 6 seconds, breaker can be closed again. There is no delay when opening a breaker.

Breaker control outputs

Close/Open	An output for control of a contactor. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.
ON coil	An output giving a 5 second pulse in the moment the breaker has to be closed. The output is intended for control of close coils of circuit breakers.
OFF coil	An output giving a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds. The output is intended for control of open coils of circuit breakers.
UV coil	The GCB UV coil output is active the whole time the Gen-set is running (not in idle or cooling). The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off. The output is intended for control of undervoltage coils of circuit breakers.
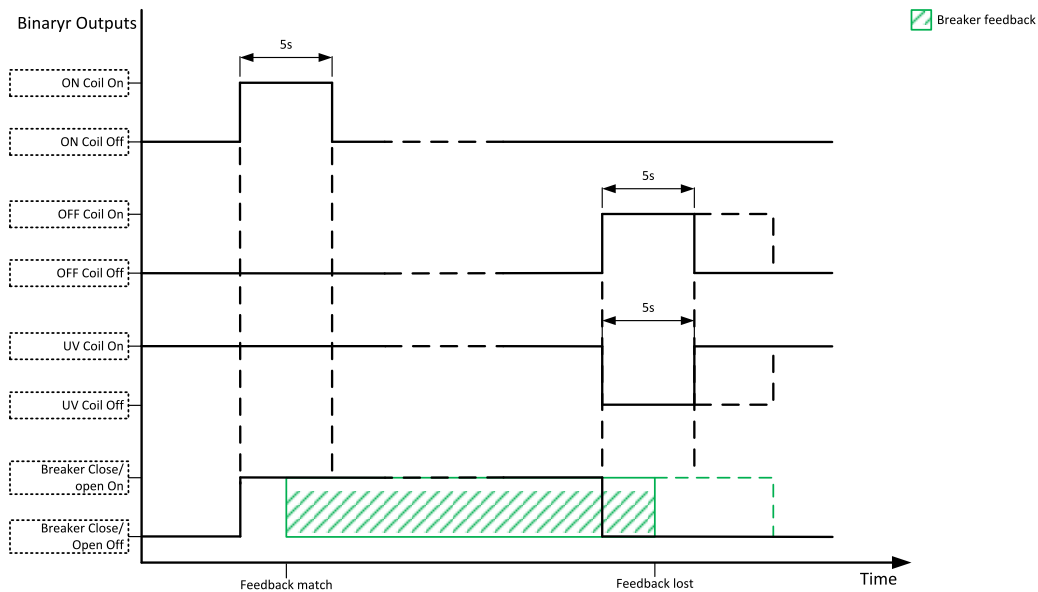
Image 5.14 Breaker control outputs

Breaker failure detection

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

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

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

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

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

When binary output breaker close/open is in steady state and breaker feedback is changed the breaker failure is detected immediately (no delay).
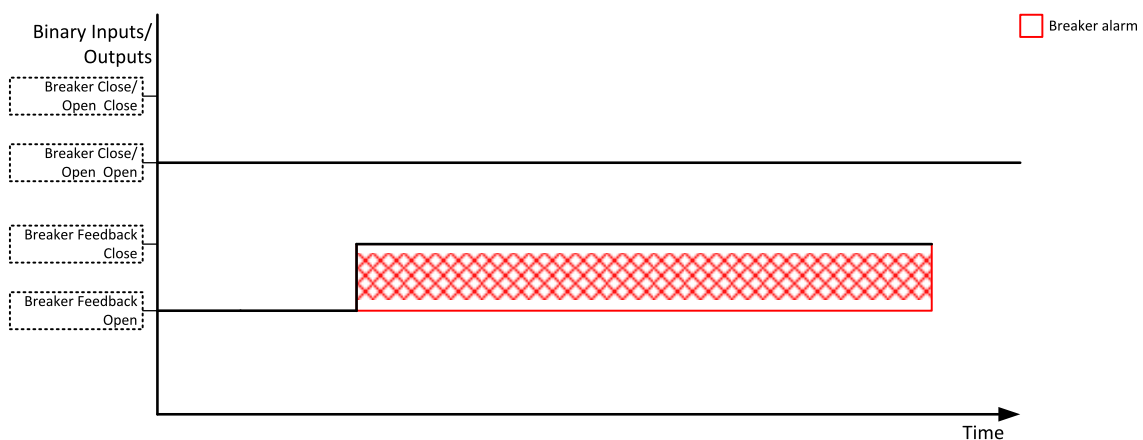
Image 5.15 Breaker failure – breaker close/open in steady position – open
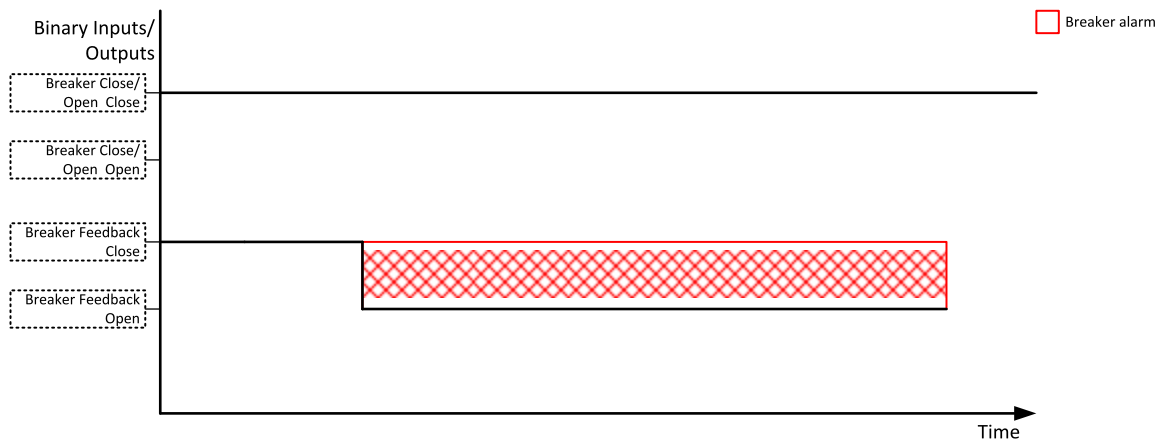
Image 5.16 Breaker failure – breaker close/open in steady position – close

When binary output breaker close/open opens there is 5 sec delay for breaker failure detection.
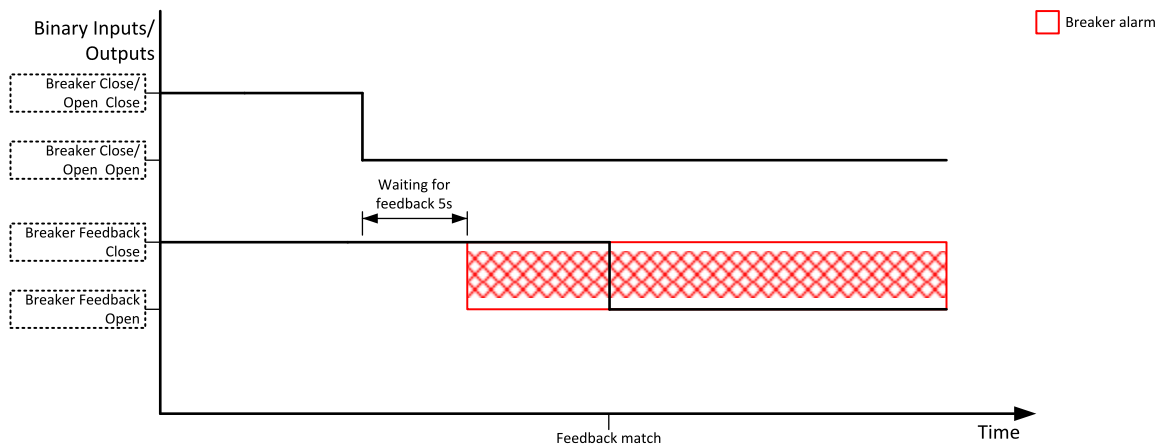
Image 5.17 Breaker failure – breaker close/open opens

When binary output breaker close/open closes there is 5 sec delay for breaker failure detection.
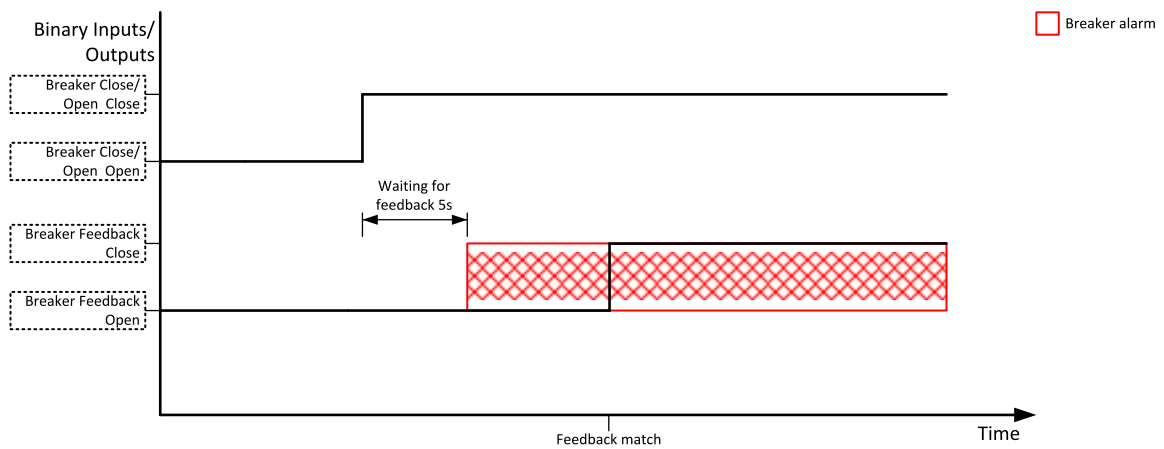
Image 5.18 Breaker failure – breaker close/open closes

5.4.5 Connecting to load

When the **Stabilization (page 103)** 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 mode) or manually by pressing the GCB button. The following conditions must be valid:

> The Gen-set is running and the **Minimal Stabilization Time (page 173)** timer has elapsed.

> The Gen-set voltage and frequency are within limits.

5.4.6 E-Stop

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

> The emergency stop circuit must be secured.

> The power supply of the associated binary outputs (BOUT1 and BOUT2) is supplied by the E-STOP input, not by the + battery voltage.

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

There is a measurement of E-STOP input voltage analogically and setting the binary value (representing emergency stop input level) based on comparison of the measured voltage to two analog levels, which are derived from the controller supply voltage (battery voltage) perceptually.
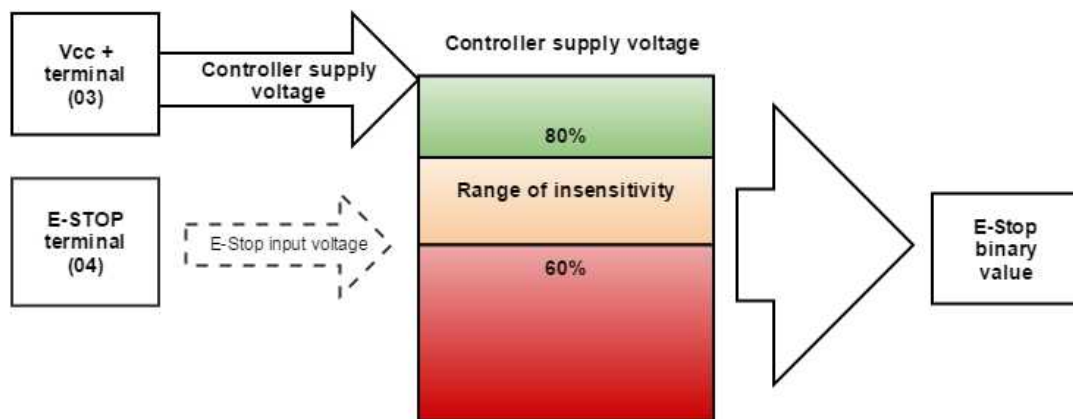
Image 5.19 SW principle of E-STOP

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

> If the input voltage of E-stop is lower than low comparison level (ex. lower than 60% of the supply voltage), then E-stop is activated.

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

Visualization on CU screen

> 1 – E-STOP has voltage – state is OK

> 0 – E-STOP has no voltage – protection is active

For more information about connection **see E-Stop on page 39**.

5.4.7 ECU Frequency selection

Value Ecu freq select is calculated from **Nominal Frequency (page 151)** setpoint. The sequence for frequency change is executed automatically (engine must be in still condition) in the following steps:

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

5.4.8 Engine cool down and stop

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

> Duration of the cool down phase is determined by the setpoint **Cooling Time (page 175)**.
> 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 174)**.
> The cool down can be finished manually in MAN mode by pressing the STOP button.
> If a new start request comes, the cool down will be interrupted and the Gen-set will go back to the stabilization phase. If the cooling was at nominal speed, the stabilization timers will not count down again so the GCB is ready to be closed (after 2s delay).

When the cool down is finished, the output FUEL SOLENOID (PAGE 342) is de-energized and STOP SOLENOID (PAGE 357) is energized. The engine will stop within the time period determined by the setpoint **Stop Time (page 175)**. If the engine does not stop within this time, the alarm Wrn Stop Fail (page 372) will be issued.

The output STOP SOLENOID (PAGE 357) is energized until the engine is stopped, but at least for the duration of **Stop Time (page 175)**. If the **Stop Time (page 175)** has elapsed and the engine has still not stopped, the STOP SOLENOID (PAGE 357) is de-energized for 5 s and then energized again for **Stop Time (page 175)**.This is repeated until the engine is stopped.

Stopped Gen-set evaluation

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

> The engine speed is lower than 2 RPM.
> The generator voltage in all phases is lower than 10 V.
> None of the **Additional running engine indications (page 67)** signals is active.

5.4.9 Engine start

Diesel engine

> After the command for start is issued (pressing the Start button in MAN mode, auto start condition is fulfilled in AUTO mode), PRESTART (PAGE 353) and GLOW PLUGS (PAGE 347) outputs are energized for a time period established by the setpoints **Prestart Time (page 164)** and **Glow Plugs Time (page 165)**.

> After **Prestart Time (page 164)** and **Glow Plugs Time (page 165)**, the output FUEL SOLENOID (PAGE 342) is energized after **Fuel Solenoid Lead (page 171)** the motor starter is activated by energizing the output STARTER (PAGE 356).

> When one or more of following conditions is met, the starter output is de-energized:

>> The engine speed exceeds the value of **Starting RPM (page 164)**, or

>> One of the **Additional running engine indications (page 67)** signals is active.

> The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 164)**, after which it is considered started and the Idle period will follow.

> The maximum duration that the output STARTER (PAGE 356) is energized is determined by the setpoint **Maximum Cranking Time (page 163)**. If the engine does not start within this period, the output STARTER (PAGE 356) is de-energized. PRESTART (PAGE 353) and GLOW PLUGS (PAGE 347) 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 163)**.

> Once the engine is started, the Idle period follows. The binary output IDLE/NOMINAL (PAGE 349) remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 171)**.

> After the idle period has finished, the output IDLE/NOMINAL (PAGE 349) is activated and the start-up sequence is finished. The **Stabilization (page 103)** phase follows.
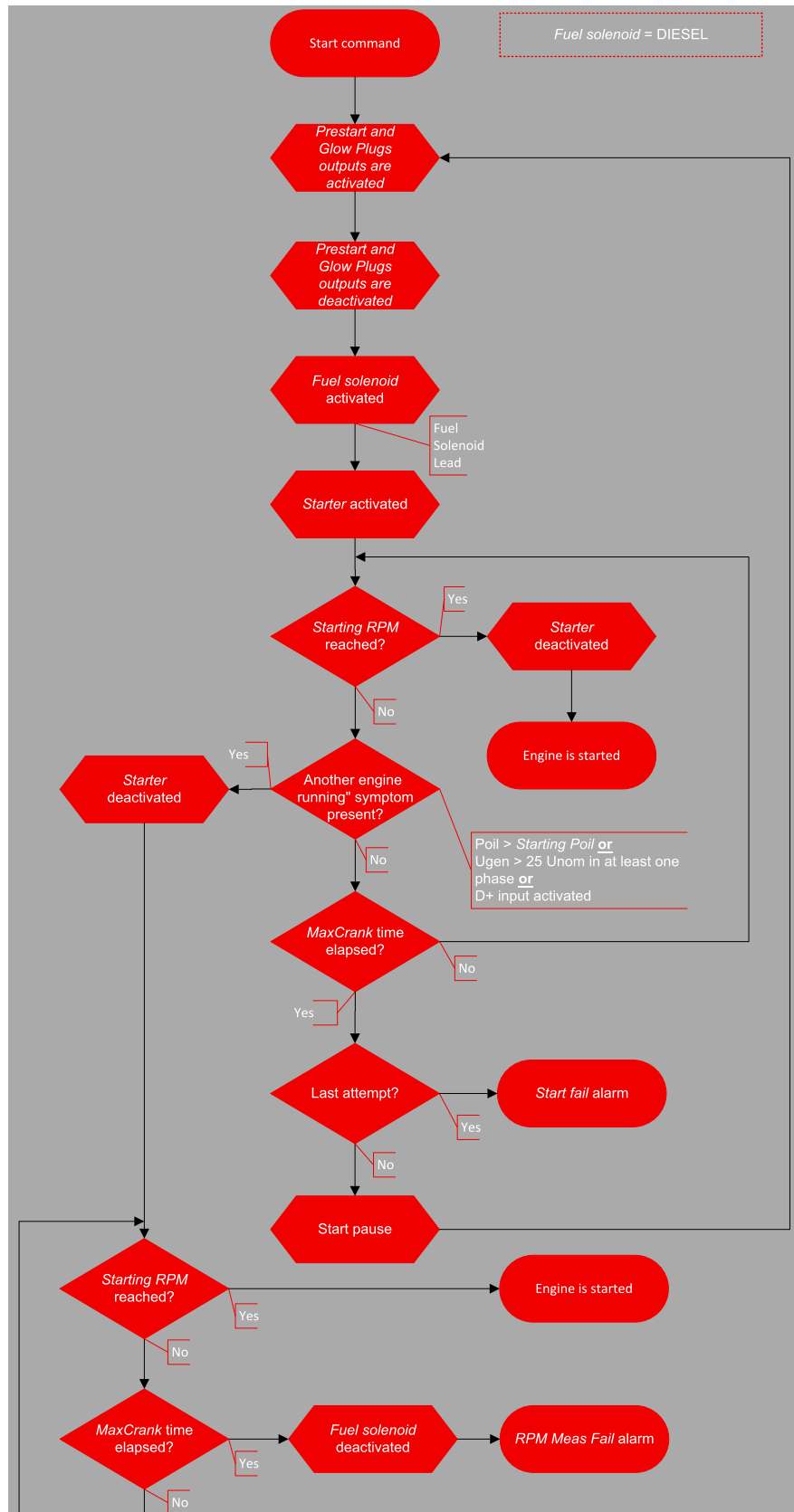
Image 5.20 Flowchart of start of diesel engine

5.4.10 Exercise timers

The exercise (general-purpose) timers in controller are intended for scheduling of any operations such as periodic tests of the Gen-set.

Related setpoints for timer 1 are:

- Timer 1 Function (page 215)
- Timer 1 Repetition (page 217)
- Timer 1 First Occur. Date (page 216)
- Timer 1 First Occur. Time (page 217)
- Timer 1 Duration (page 217)
- Timer 1 Repeated (page 218)
- Timer 1 Repeat Day (page 218)

- Timer 1 Day (page 219)
- Timer 1 Repeated Day In Week (page 219)
- Timer 1 Repeat Day In Month (page 219)
- Timer 1 Repeat Week In Month (page 220)
- Timer 1 Refresh Period (page 221)
- Timer 1 Weekends (page 222)
- Timer 1 Setup (page 216)

There are up to 2 Timers available in the InteliNano AMF 5. For more information **see Group: Scheduler on page 210**.

Available modes of each timer:

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

Once mode

Set-up via InteliConfig

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

Note: First, the timer functions must be adjusted via setpoint Timer 1 Function (page 215).
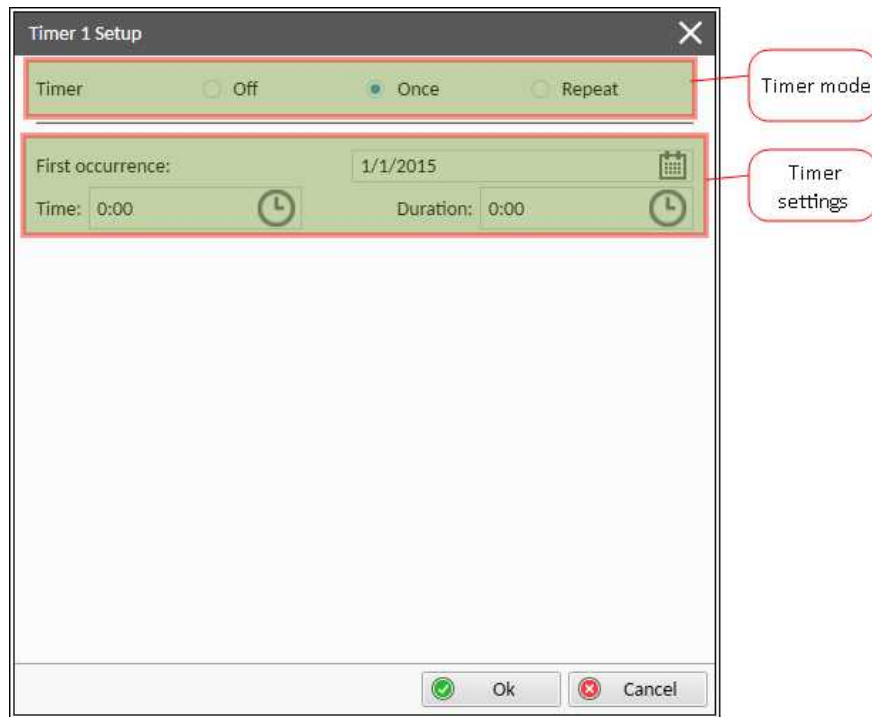
Image 5.21 Once mode – InteliConfig

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 215)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 217)** setpoint select Once mode. Then adjust **Timer 1 First Occur. Date (page 216)**, **Timer 1 First Occur. Time (page 217)** and **Timer 1 Duration (page 217)**.

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

Daily mode

Set-up via InteliConfig

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

Note: First, the timer functions must be adjusted via setpoint Timer 1 Function (page 215).
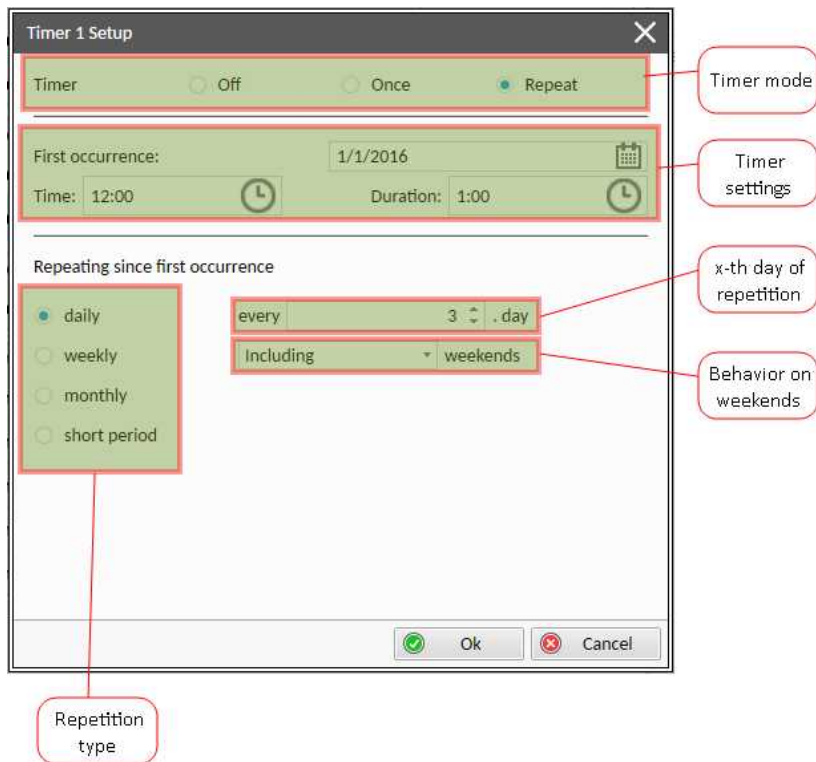
Image 5.22 Daily mode – InteliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the xth day of repetition (**Timer 1 Refresh Period (page 221)**) and behavior of timer on weekends (**Timer 1 Weekends (page 222)**).

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 215)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 217)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 216)**, **Timer 1 First Occur. Time (page 217)** and **Timer 1 Duration (page 217)**. In setpoint **Timer 1 Repeated (page 218)** select Daily and adjust **Timer 1 Refresh Period (page 221)** (xth day of repetition) and **Timer 1 Weekends (page 222)** (behavior of timer on weekends).

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

Weekly mode

Set-up via InteliConfig

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

Note: First, the timer functions must be adjusted via setpoint Timer 1 Function (page 215).
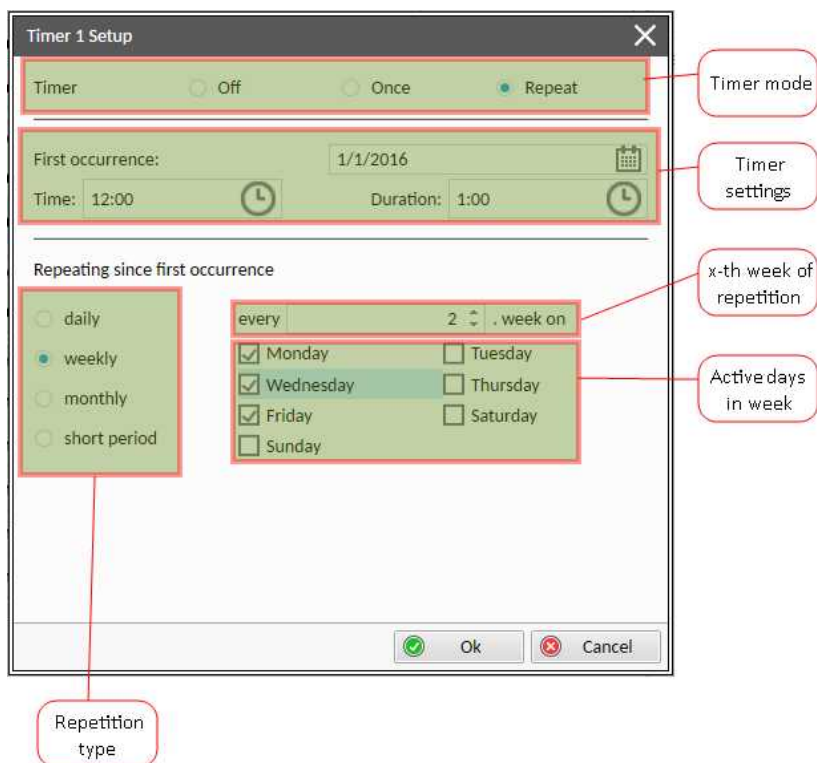
Image 5.23 Weekly mode – InteliConfig

In timer mode select Repeat. In repetition type select Weekly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the xth week of repetition (**Timer 1 Refresh Period (page 221)**) and days when timer should be active (**Timer 1 Day (page 219)**).

> **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 215)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 217)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 216)**, **Timer 1 First Occur. Time (page 217)** and **Timer 1 Duration (page 217)**. In setpoint **Timer 1 Repeated (page 218)** select Weekly and adjust **Timer 1 Day (page 219)** (days when timer should be active) and **Timer 1 Refresh Period (page 221)** (xth week of repetition).

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

Monthly mode

Set-up via InteliConfig

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

> **Note:** First, the timer functions must be adjusted via setpoint **Timer 1 Function (page 215)**.

There are two types of monthly repetition. The first is based on repeating one day in month.
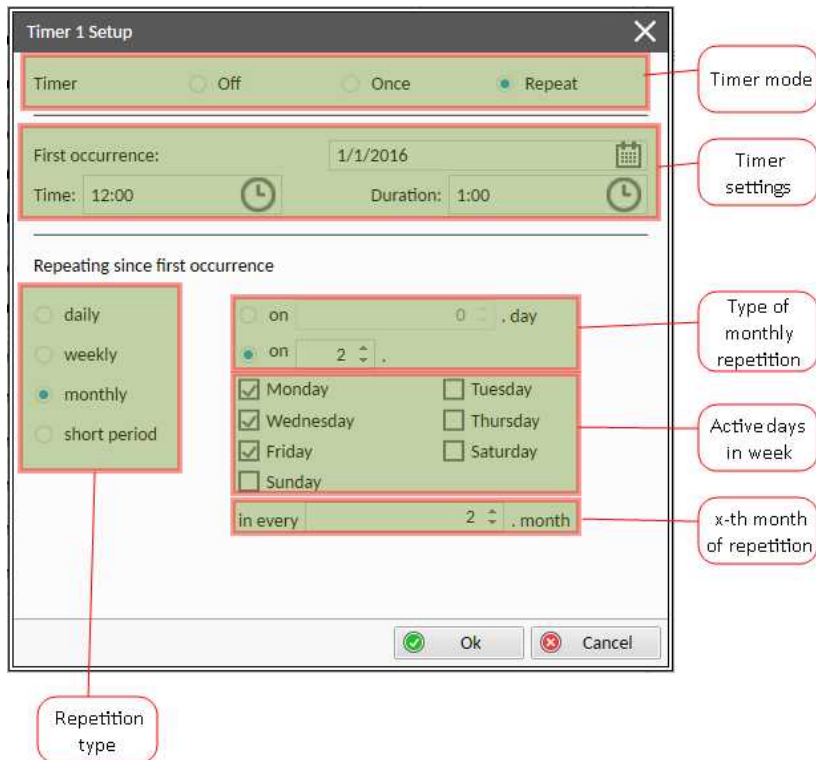
Image 5.24 Monthly mode – InteliConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the type of monthly repetition and the xth day of repetition (**Timer 1 Repeat Day In Month (page 219)**). Than select the xth month of repetition.

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

Second type of monthly repetition is based on repeating days in week in month.
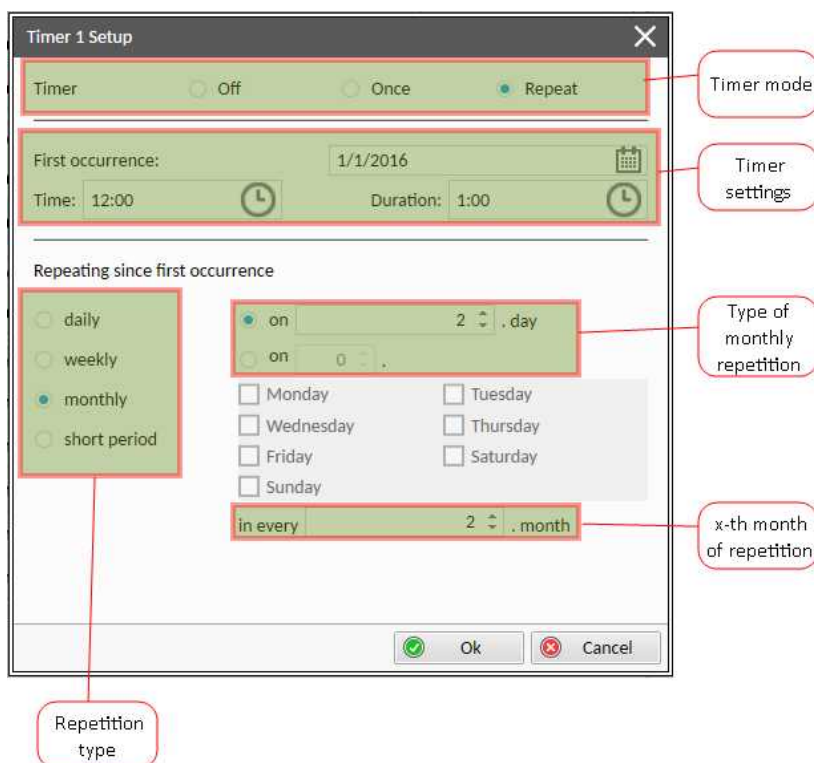
Image 5.25 Monthly mode – InteliConfig

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

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

Set-up via controller interface

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 215)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 217)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 216)**, **Timer 1 First Occur. Time (page 217)** and **Timer 1 Duration (page 217)**. In setpoint **Timer 1 Repeated (page 218)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 218)**, **Timer 1 Refresh Period (page 221)** (xth month of repetition) and **Timer 1 Repeat Day In Month (page 219)** (concrete day in repeated months).

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 215)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 217)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 216)**, **Timer 1 First Occur. Time (page 217)** and **Timer 1 Duration (page 217)**. In setpoint **Timer 1 Repeated (page 218)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 218)**, **Timer 1 Refresh Period (page 221)** (xth month of repetition), **Timer 1 Repeated Day In Week (page 219)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 220)** (concrete week in repeated months).

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

Short period mode

Set-up via InteliConfig

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

Note: First, the timer functions must be adjusted via setpoint Timer 1 Function (page 215).
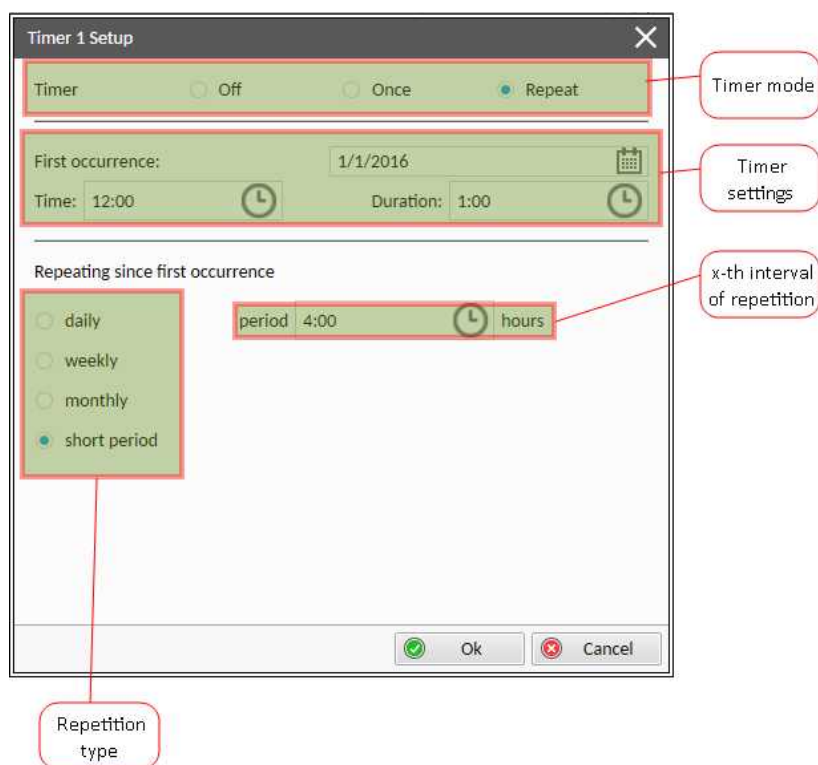
Image 5.26 Short period mode – InteliConfig

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

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 215)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 217)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 216)**, **Timer 1 First Occur. Time (page 217)** and **Timer 1 Duration (page 217)**. In setpoint **Timer 1 Repeated (page 218)**, select Short Period and adjust **Timer 1 Refresh Period (page 221)** (interval of repetition).

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

5.4.11 Firewall

The firewall function allows to restrict the access to the controller application services or to the specific computers or networks. Firewall can be activated on Ethernet port.

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

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

5.4.12 Gen-set operation states

Engine state machine

Init	Autotest during controller power on. *Note: Sometimes controller stays in Init mode after FW upgrade. It means that there are new parameters which should be checked by user. It is possible to disable this control via InteliConfig.*
Not ready	Gen-set is not ready to start. > **Example:** When shutdown alarm is active or unit is in OFF mode.
Ready	Gen-set is ready to run.
Prestart	Prestart sequence in process, PRESTART (PAGE 353) output is active. > **Example:** Usually used for preheating or processes executed prior Gen-set start.
Cranking	Engine is cranking, STARTER (PAGE 356) output is active.
Pause	Pause between start attempts.
Starting	Starting speed is reached and the Idle timer is running.
Running	Gen-set is running at nominal speed.
Loaded	Gen-set is running at nominal speed and GCB CLOSE/OPEN (PAGE 343) is active.
Cooling	Gen-set is cooling before stop.
Stop	Stop. > **Example:** Automatic or manual stop command was issued, engine is stopping.
Shutdown	Shut-down alarm activated.
EmergMan	EMERGENCY MAN (PAGE 325) Gen-set operation. > **Example:** Used for bypass the controller and engine manual start. Controller mode, where the LBI EMERGENCY MAN (PAGE 325) is activated. All control functions are stopped

Engine started conditions

> Engine speed (RPM) > **Starting RPM (page 164)** or
> Oil pressure > **Starting Oil Pressure (page 165)** or
> Binary input OIL PRESSURE (PAGE 330) is in logical 0 or
> D+ terminal active (reached **D+ Threshold (page 177)** of supply voltage) for minimum 1 s or

> Generator voltage > 25 % of **Nominal Voltage Ph-N (page 148)** or **Nominal Voltage Ph-Ph (page 148)** (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 164).

Engine running conditions

> Engine speed (RPM) > **Starting RPM (page 164)** or
> Oil pressure > **Starting Oil Pressure (page 165)** or
> Binary input OIL PRESSURE (PAGE 330) is in logical 0 or
> Generator voltage > 25 % of **Nominal Voltage Ph-N (page 148)**

Still engine conditions

> Engine speed (RPM) < **Starting RPM (page 164)** and
> Oil pressure < **Starting Oil Pressure (page 165)** and
> Binary input OIL PRESSURE (PAGE 330) is in logical 1 and
> Generator voltage < 50 V (all phases)

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

When any engine running conditions are observed in still engine, then the **Wrn Stop Fail (page 372)** is activated with the following delays:

> For generator voltage from 10 V to < 50 % of nominal voltage, Wrn Stop Fail has delay 1 s
> For generator voltage > 50 % of nominal voltage, Wrn Stop Fail has delay 200 ms
> Oil pressure > **Starting Oil Pressure (page 165)**, Wrn Stop Fail has delay 1 s
> Binary input OIL PRESSURE (PAGE 330) is in logical 0, Wrn Stop Fail has delay 1 s
> For detected RPM, there is no delay.

Stop engine conditions

If no engine running conditions are validated, then the controller will wait extra 12 s before leaving the Machine Stop state and releasing the STOP SOLENOID (PAGE 357) output.
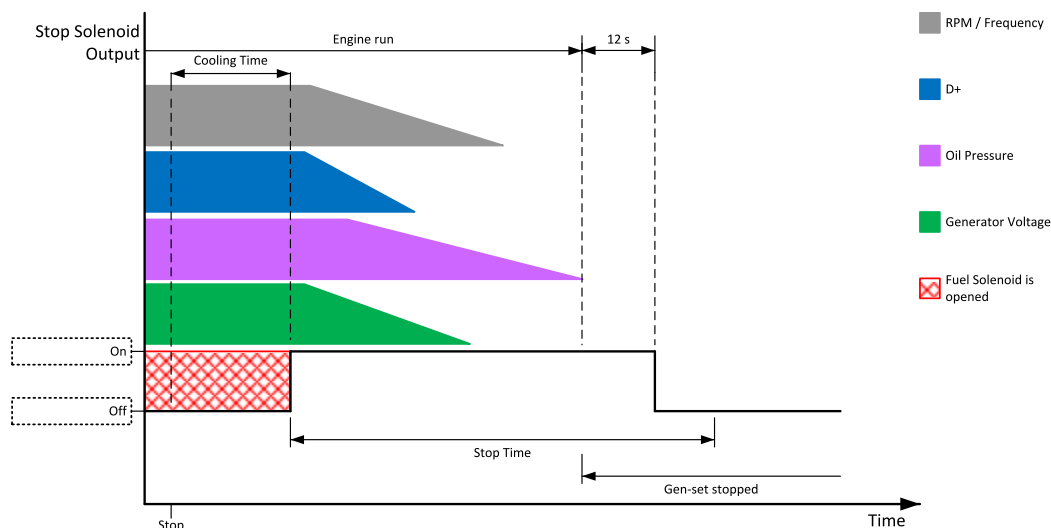
If the total stopping time will exceed setpoint **Stop Time (page 175)** then the **Wrn Stop Fail (page 372)** and binary outputs for stopping are activated. The controller will continuously try to stop the engine.
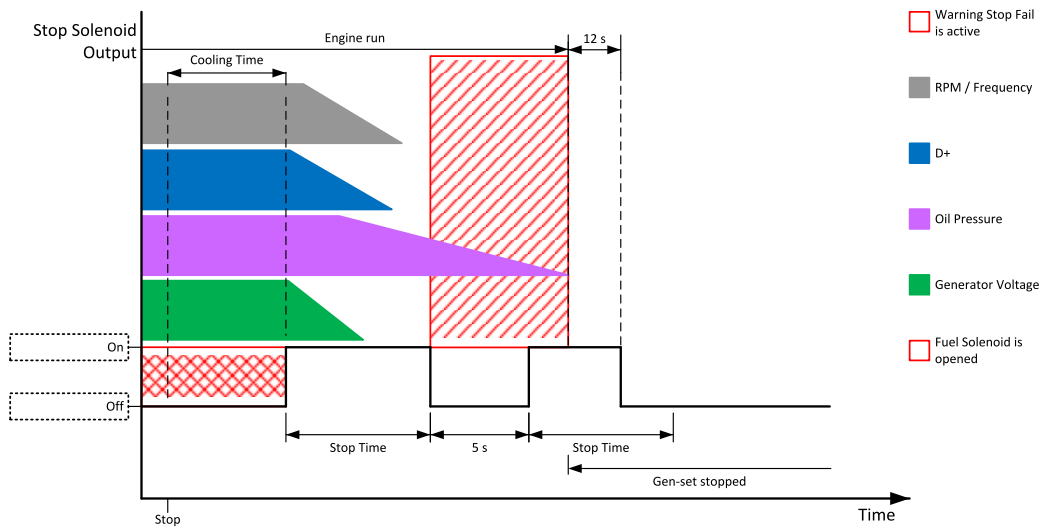
Image 5.28 Engine stops after first **Stop Time (page 175)**

Electric state machine

MainsOper	Mains is present and all its values are within limits.
IslOper	Island operation
BrksOff	GCB opened

5.4.13 History log

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

Each record has the same structure and contains:

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

> The date and time when it was recorded

> All important data values such as RPM, kW, voltages, etc. from the moment that the event occurred.

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

Record structure

Name	Abbreviation	Description
Number	No.	Row number (0 corresponds to the last record, -1 to the previous one, etc.)
Reason	Reason	Reason for history record (any event or alarm related to the gen-set

Time	Time	Time
Date	Date	Date
RPM	RPM	Engine rotations per minute
Power	Pwr	Generator active power
Reactive power	Q	Generator reactive power
Power Factor	PF	Generator power factor
Load Character	LChr	Generator load character
Generator Frequency	Gfrq	Generator Frequency
Generator Voltage	Vg1	Generator voltage Ph1
Generator Voltage	Vg2	Generator voltage Ph2
Generator Voltage	Vg3	Generator voltage Ph3
Generator Voltage	Vg12	Generator voltage Ph12
Generator Voltage	Vg23	Generator voltage Ph23
Generator Voltage	Vg31	Generator voltage Ph31
Generator Current	Ig1	Generator current Ph1
Generator Current	Ig2	Generator current Ph2
Generator Current	Ig3	Generator current Ph3
Voltage Battery	VBat	Voltage of battery
Analog Input 1	Ain1	Analog input 1
Analog Input 2	Ain2	Analog input 2
Analog Input 3	Ain3	Analog input 3
Binary Inputs	BIN	Controller binary inputs
E-Stop	E-Stop	State of dedicated E-Stop input
Binary Outputs	BOUT	Controller binary outputs
Controller Mode	Mode	Controller mode

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

5.4.14 Maintenance Timers

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

> **Maintenance Timer RunHours** is based on engine running hours and it only counts down when engine is running. When engine runs value **Maintenance Timer RunHours** counts down, but setpoint **Maintenance Timer RunHours** will not change.

> **Maintenance Timer Interval** is set in months. Specific date is calculated as the setpoint is set. E.g. when the timer is set to 6 months on June 10th, corresponding **Maintenance Timer Interval** value is set to the number of days remaining to December 10th, the timer count down is done in days and alarm is issued on December 10th. The setpoint value does not change, as the remaining days count down is done.

> Timers can be reset by changing the corresponding setpoint value.

> When either of the timers elapse, appropriate LBO **Maintenance** will be activated and stays active until the timer is reset.

5.4.15 MRS operation

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

The MRS procedure

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

> The Gen-set is started.

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

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

> GCB is opened and the Gen-set stops supplying the load.

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

5.4.16 Operating Modes

Selecting the operating mode is done with the Mode 🔁 button on the front panel or by changing the **Controller Mode (page 153)** 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.

AMF Operating Modes

OFF mode – AMF

No starting of the Gen-set is possible .Controller stays in Not ready status and cannot be started in any way. The MCB is closed permanently (**MCB Opens On (page 205)** = GENRUN) or is open / closed depending on whether the mains is present or not (**MCB Opens On (page 205)** = MAINSFAIL). No AMF function will be performed. The buttons MCB ᴵ/ᴼ, GCB ᴵ/ᴼ, Start 🟩 and Stop 🟥 including the appropriate binary inputs for external buttons are not active.

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

MAN mode – AMF

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

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

AUTO mode – AMF

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

MRS Operating Modes

OFF mode – MRS

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

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

MAN mode – MRS

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

AUTO mode – MRS

The controller does not respond to the buttons Start `I`, Stop `O` and GCB ON/OFF `I/O`. Engine start/stop request is given by binary input **Remote Start/Stop (page 330)**.

5.4.17 Power formats and units

InteliNano AMF 5 allows users to choose from several Power Formats that affect dimensions in which values and some setpoints are interpreted or adjusted. Power formats and units can be changed with InteliConfig in the following way. Control tab → Controller configuration → Others tab → Units/Power format

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

Units

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

Power Format

Identification/Name	Power	Voltage	Current
Small	0.1 kW / kVA / kVAr	1 V	1 A
Standard	1 kW / kVA / kVAr	1 V	1 A

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

5.4.18 Protections

Fixed Protections

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

Fixed Protection types

Name	Level	Abbreviation	Alarm List	History	Fault Reset needed	LBO Alarm activation	Action: CB open	Action: Gen-set stop	SD Override blocking	Common LBO
History Record Only	1	Hst	-	✓	-	-	-	-	-	-
Alarm List Indication	1	ALI	✓	-	-	-	-	-	-	-
Alarmlist indication + history record	1	AHI	✓	✓	-	-	-	-	-	-
Warning	1	Wrn	✓	✓	✓	✓	-	-	-	AL COMMON WRN (PAGE 335)
Shutdown	2	Sd	✓	✓	✓	✓	✓	✓	✓	AL COMMON SD (PAGE 335)
Breaker Open & Cool Down	2	BOC	✓	✓	✓	✓	✓	✓	✓	AL COMMON BOC (PAGE 335)
Shutdown Override	2	Sd	✓	✓	✓	✓	✓	✓	-	

Protection blocking

Engine and generator fixed protections are blocked during starting phases or Ready and Stop states. They become unblocked once **Maximal Stabilization Time (page 272)** has elapsed or GCB is closed whichever happens first.

Exceptions are:

> Overspeed protection which has two limits defined via setpoints **Overspeed Sd (page 178)** and **Starting Overspeed Sd (page 179)**. Starting Overspeed limit is considered in the starting phase till Starting Overspeed Time elapses. This time starts to count once the RPM exceeds the value of **Starting RPM (page 164)**.

> E-Stop and Emergency stop

Generator and engine protections lists

Generator protections

	Alarms / Protection name
Current	**BOC Short Circuit (page 399)**
Frequency	**BOC Generator Overfrequency (page 394)**
	BOC Generator Underfrequency (page 394)
Others	**ALI Gen Ph L1 Inverted (page 379)**
	ALI Gen Ph L2 Inverted (page 379)
	ALI Gen Ph L3 Inverted (page 379)
	ALI Gen Ph Rotation Opposite (page 379)
Power	**BOC Overload (page 398)**
Voltage	**Sd Generator L1 Overvoltage (page 388)**
	Sd Generator L2 Overvoltage (page 388)
	Sd Generator L3 Overvoltage (page 389)
	Sd Generator L1L2 Overvoltage (page 389)
	Sd Generator L2L3 Overvoltage (page 389)
	Sd Generator L3L1 Overvoltage (page 389)
	BOC Generator L1 Undervoltage (page 390)
	BOC Generator L2 Undervoltage (page 390)
	BOC Generator L3 Undervoltage (page 390)
	BOC Generator L1L2 Undervoltage (page 390)
	BOC Generator L2L3 Undervoltage (page 391)
	BOC Generator L3L1 Undervoltage (page 391)

Engine protections

	Alarms / Protection name
Speed	**Sd Overspeed (page 386)**
	Sd Underspeed (page 386)

User Protections

InteliNano AMF 5 allows users to configure their own protections to any analog input or binary input/output. Only one protection of 1st level and/or one protection of 2nd level can be configured on logical binary input/output. More than one protection can be configured on analog input. Max simultaneous number of configured user protections is 32.

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

Source

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

Protection activation

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

User Protection types

Name	Level	Abbreviation	Alarm List	History	Fault Reset needed	LBO Alarm activation	Action: CB open	Action: Gen-set stop	SD Override blocking	Common LBO
Warning	1	Wrn	✓	✓	✓	✓	-	-	-	**AL COMMON WRN** (PAGE 335)
Shutdown	2	Sd	✓	✓	✓	✓	✓	✓	✓	**AL COMMON SD** (PAGE 335)
Breaker Open & Cool Down	2	BOC	✓	✓	✓	✓	✓	✓	✓	**AL COMMON BOC** (PAGE 335)

Protection blocking

It is possible to configure one Protection Blocking to any **User Protections (page 93)**. This function is used to block certain protections when their function is unwanted or meaningless. Each user protection has an option to set the blocking condition.

Protection blocking

Block Type	Description
All the time	The protection is not blocked.
Run Only Block Delay	The protection is blocked depending on the engine state and time 5 seconds (fixed delay value).
Electrical Protection	The protection is blocked depending on engine state. It is unblocked once **Maximal Stabilization Time (page 272)** is elapsed or GCB is closed.
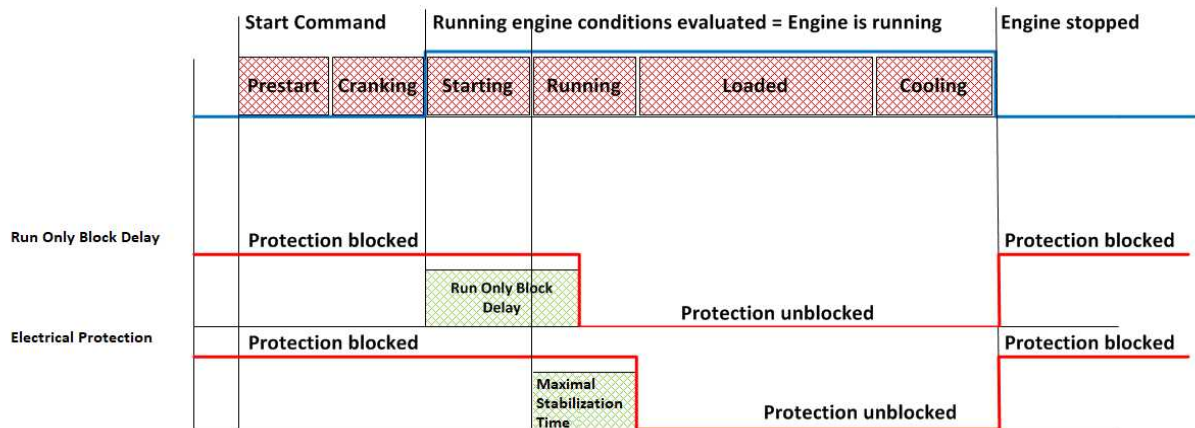
Image 5.29 Run only block delay and electrical protection blocking

History record

❯ Always – History is recorded all the time.

❯ Once – History is recorded only once after fault reset.

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

Configuration of protections in InteliConfig

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

❶	Select the desired protections to be configured (Analog protections / Binary protections).
❷	Add protection by clicking on the icon ⊞ . Delete selected protection by clicking on the icon ✕ . Edit selected protection by clicking on the icon ✎ .

Protection states

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

Fixed protection states

Important **Fixed Protections (page 90)** have a protection state. The protection state is (usually) named the same as the alarm. Fixed protection states are in a group of 32 values.

Protection states groups:

> **FIXED PROTECTIONS STATES 1 (PAGE 300)**
> **FIXED PROTECTIONS STATES 2 (PAGE 300)**
> **FIXED PROTECTIONS STATES 3 (PAGE 300)**
> **FIXED PROTECTIONS STATES 4 (PAGE 300)**

User protections states

During the **Configuration of protections in InteliConfig (page 96)**, you can decide whether you want to add user protection state for the protection. The name is the same as the alarm's message.

User protection states are in a group of 32 values.

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

Protection states group:

> **USER PROTECTIONS STATES 1 (PAGE 301)**

Alarm management

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

Analog input alarm evaluation principle
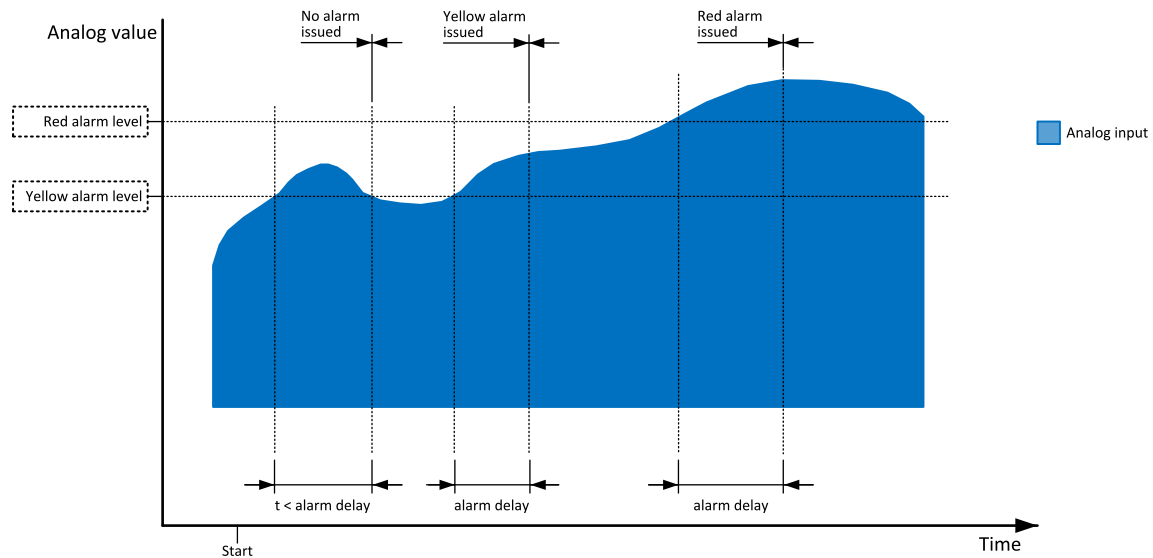
Image 5.30 Analog input alarm evaluation principle

Alarm handling

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

> The alarm is evaluated all the time the controller is switched on.

> The alarm is evaluated only when the generator is excited. These alarms begin to be evaluated after the engine has been started and **Maximal Stabilization Time (page 272)** has elapsed or the GCB has been closed. They remain evaluated until cooling has finished. Only Generator under/overvoltage, Generator voltage unbalance and Generator under/overfrequency belong to this category. This category is not configurable to binary and analog input alarms.

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

After pressing the Fault reset button, all active alarms change to confirmed state. Confirmed alarms will disappear from the Alarm list as soon as the respective condition dismisses. If the condition is dismissed before acknowledging the alarm, the alarm will remain in the Alarm list as Inactive.

Alarm states

An alarm can have the following states:

> Active alarm: the alarm condition persists, alarm delay has elapsed.

> Inactive alarm: the alarm condition has disappeared, but the alarm has not been confirmed.

> Confirmed alarm: the alarm condition persists, but the alarm has already been confirmed.

Image 5.31 Alarm List

Alarm types – Level 1

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

Warning (Wrn)

The alarm appears in the Alarm list and is recorded into the history log. Activates the output **AL COMMON WRN (PAGE 335)** as well as the standard alarm output **ALARM (PAGE 336)**).

Alarm types – Level 2

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

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

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

Breaker open and cool down (BOC)

The event appears in the Alarm list and is recorded into the history log. It causes immediate opening of the GCB and then the standard stop sequence with cooling follows. The Gen-set cannot be started again while there is a BOC alarm in the Alarm list. Activates the output **AL COMMON BOC (PAGE 335)** as well as the standard alarm output **ALARM (PAGE 336)**).

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

Shutdown (Sd)

The alarm appears in the Alarm list and is recorded into the history log. It causes immediate stop of the Gen-set without cooling phase. Also GCB breaker will open. The Gen-set cannot be started again while there is a shutdown alarm in the Alarm list. Activates the output **AL COMMON SD (PAGE 335)** as well as the standard alarm output **ALARM (PAGE 336)**).

Sensor failure detection (FLS)

If the measured resistance on an analog input exceeds the valid range, a sensor failure will be detected and a sensor failure message will appear in the **Alarm list (page 99)**. The valid range is defined by the far left (RL) and far right (RH) points of the sensor characteristic ±12.5 % from RH-RL.

Note: Sometimes there can be problem with lower limit of valid range which can be counted as negative number. In this case the lower limit is set as one half of the RL point of the sensor curve characteristic.
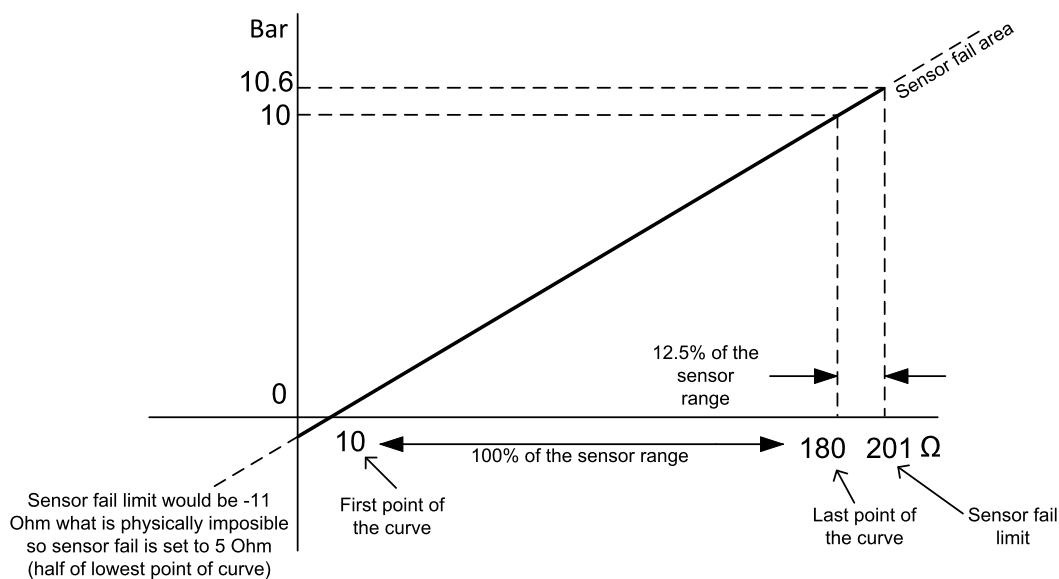
Image 5.32 Sensor failure detection principle

Remote alarm messaging

If the communication plug-in module is connected to the controller, the controller can send SMS messagesor emails at the moment when a new alarm appears in the **Alarm list (page 99)** or new event is written in the **History log (page 87)**. The message will contain a copy of the **Alarm list (page 99)** or reasons from the **History log (page 87)**. To enable this function first to check the controller internet connection. Also enter a valid GSM phone number or email address to the setpoints.

The list of all supported terminals shows the table below:

*Note: * Only with enabled **Internet Connection (page 233)**.*

Alarm list

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

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

Alarm list contains three types of alarms:

> Controller built-in alarms

> User configured alarms on binary or analog inputs

> ECU alarms

Controller built-in alarms

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

User configured alarms

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

ECU alarms

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

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

Built-in alarms

Events specification	Protection type	Description
Wrn Battery Overvoltage	WRN	Battery voltage is out of limits given by **Battery Overvoltage (page 187)** setpoint.
Wrn Battery Undervoltage	WRN	Battery voltage is out of limits given by **Battery Undervoltage (page 186)** setpoint.
Sd Battery Flat	SD	If the controller switches off during starting sequence (STARTER (PAGE 356) output is active) it doesn't try to start again and activates this protection (controller assumes bad battery condition).
Sd Start Fail	SD	Gen-set start failed. All crank attempts were tried without success.
BOC Gen Lx Undervoltage Sd Gen Lx Overvoltage (where x=1,2,3)	SD BOC	The generator voltage is out of limits given by **Generator Undervoltage BOC (page 195)** and **Generator Overvoltage Sd (page 194)** setpoints.
BOC Gen >, <Frequency	BOC	The generator frequency is out of limits given by **Generator Overfrequency BOC (page 196)** and **Generator Underfrequency BOC (page 197)** setpoints.
BOC Overload	BOC	The load is greater than the value given by **Overload BOC (page 191)** setpoint.
Sd Overspeed	SD	The protection comes active if the speed is greater than **Overspeed Sd (page 178)** setpoint.
Sd Underspeed	SD	During starting of the engine when the RPM reach the value of **Starting RPM (page 164)** setpoint the starter is switched off and the speed of the engine can drop under **Starting RPM (page 164)** again. Then the Underspeed protection is active. Protection evaluation starts 5 seconds after reaching **Starting RPM (page 164)**.
Emergency Stop	SD	If the input Emergency Stop is active shutdown is immediately activated.
E-Stop	SD	If the input E-Stop is active shutdown is immediately activated.
GCB Fail	SD	Failure of generator circuit breaker.
Sd RPM Measurement	SD	Failure of magnetic pick-up sensor for speed measurement.

Events specification	Protection type	Description
Fail		This alarm appears, if starter was disengaged for other reason than over-crossing **Starting RPM (page 164)** (like oil pressure or D+) and at the end of timer **Maximum Cranking Time (page 163)** there are no RPMs > **Starting RPM (page 164)** detected.
Wrn Stop Fail	WRN	Gen-set stop failed. See description at Gen-set Operation States chapter.
Charge Alternator Fail	WRN	Failure of alternator for charging the battery.
Wrn Override All Sd	WRN	The protection is active if the output Sd Override is active.
ALI Gen Ph-Rotation Opposite	ALI	Gen-set voltage phases are not wired correctly. GCB closing is prohibited by controller.

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

5.4.19 RPM Measurement

InteliNano AMF 5 offers multiple methods to measure the RPM of the engine. Please pay close attention during configuration to ensure that you will use correct method.

Measuring using dedicated RPM input

Connect magnetic pick-up sensor to dedicated input **Magnetic pick-up (page 36)**. Received data are converted using setpoint **Gear Teeth (page 152)**.

Measuring from generator frequency

RPM is calculated from generator frequency which is received from **Generator Voltage L1-N (page 280)**. To enable this measurement method adjust setpoint **Gear Teeth (page 152)** to Fgen->RPM. The calculation is based on expectation of 4 pole alternator. Following formula is used:

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

5.4.20 Sensor curves

Background of the sensor calibration

To correct measuring error of each analog input (pressure, temperature, level, etc.), calibrating constants should be set. To correct an offset of each analog input, select an option Offset in InteliConfig and set the appropriate value.

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

Sensor curve HW configuration

On AIN1 and AIN2, there is the possibility to connect only resistive sensor, whereas on AIN3 voltage, current or a resistive sensor.

InteliNano AMF 5 analog inputs allows you to select Input HW type. Three HW configuration options are available:

> 0-15 kΩ

> 0-10 V

> 0-20 mA passive

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

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

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

Default sensor curves

There are 5 default resistive curves available. The following table provides information on minimum/maximum values of respective sensors. Actual values especially of temperature curves may differ. The purpose is to prolong curve to the lower temperature values, so the cold engine will not raise alarm failure sensor.

Curve	Min [Ω]	Max [Ω]	Units
VDO 10 Bar	10	180	Bar
VDO40-120°C	22	3200	°C
VDOLevel%	0	180	%
General line 1	0	1000	Ω
General line 2	0	1000	Ω

Note: Curves can be modified via InteliConfig. Some standard curves are also prepared in InteliConfig.

IMPORTANT: For right behavior of function Total Fuel Consumption, curve for analog input FUEL LEVEL (PAGE 362) has to be in percentage.

5.4.21 Stabilization

When the **Engine start (page 76)** sequence is finished, the Gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

> **Minimal Stabilization Time (page 173)** 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 272)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated), but contrary to the previous timer, the GCB can be closed if generator voltage and frequency are within limits.

In situations where the GCB is closed automatically (AUTO mode), the closing of GCB will occur as soon as the generator voltage and frequency will get into limits and the **Minimal Stabilization Time (page 173)** has elapsed.

In the event that the generator voltage or frequency are not within limits of the **Maximal Stabilization Time (page 272)** 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 191).

Note: The value of the Minimal Stabilization Time (page 173) setpoint has to be lower than the value of Maximal Stabilization Time (page 272) setpoint.

5.4.22 Start-stop sequence

State	Condition of the transition	Action	Next state
Ready	Start request	PRESTART (PAGE 353) on **Prestart Time (page 164)** counter started	Prestart
	RPM > 2 or Oil pressure > **Starting Oil Pressure (page 165)** or Generator voltage > 10V or D+ voltage is higher than **D+ Threshold (page 177)**		Stop (Stop fail)
	OFF Mode selected or Shutdown alarm active		Not Ready
Not Ready	RPM < 2, Oil pressure not detected, Generator voltage < 10 V, D+ not Active no shutdown alarm active, other than OFF Mode selected		Ready
Prestart	Prestart time elapsed	FUEL SOLENOID (PAGE 342) on, STARTER (PAGE 356) or **Maximum Cranking Time (page 163)** counter started	Cranking
Cranking	RPM > Starting RPM	STARTER (PAGE 356) or PRESTART (PAGE 353) off	Starting
	D+ input activated or oil pressure detected or Generator voltage > 25% Nominal voltage	STARTER (PAGE 356) or PRESTART (PAGE 353) off	Cranking
	Maximum Cranking Time (page 163), 1st attempt	STARTER (PAGE 356) or FUEL SOLENOID (PAGE 342) off, STOP SOLENOID (PAGE 357) on, **Cranking Fail Pause (page 272)** timer started	Crank pause
	Maximum Cranking Time (page 163) elapsed, last attempt	STARTER (PAGE 356) or PRESTART (PAGE 353) off	Shutdown (Start fail)
	all cranking attempts elapsed	FUEL SOLENOID (PAGE 342) off, STOP SOLENOID (PAGE 357) on	Shutdown (Start fail)
Crank pause	**Cranking Fail Pause (page 272)**	STARTER (PAGE 356) or FUEL	Cranking

	elapsed	SOLENOID (PAGE 342) on, STOP SOLENOID (PAGE 357) off, **Maximum Cranking Time (page 163)** counter started	
Starting	**Idle Time (page 171)** elapsed	**Minimal Stabilization Time (page 173)** and **Maximal Stabilization Time (page 272)** counter started	Running
	any shutdown condition	FUEL SOLENOID (PAGE 342) off, STOP SOLENOID (PAGE 357) on	Shutdown
Running	Stop request	READY TO LOAD (PAGE 355) off,**Cooling Time (page 175)** counter started	Cooling
	RPM = 0 or any other shutdown condition	READY TO LOAD (PAGE 355) off, FUEL SOLENOID (PAGE 342) off	Shutdown
	GCB CLOSE/OPEN (PAGE 343) closed		Loaded
Loaded	**GCB CLOSE/OPEN (PAGE 343)** opened		Running
	RPM = 0 or any other shutdown condition	FUEL SOLENOID (PAGE 342) off, STOP SOLENOID (PAGE 357) on, READY TO LOAD (PAGE 355) off,	Shutdown
Cooling	**Cooling Time (page 175)** elapsed	FUEL SOLENOID (PAGE 342) off, STOP SOLENOID (PAGE 357) on	Stop
	RPM = 0 or any other shutdown condition	FUEL SOLENOID (PAGE 342) off, STOP SOLENOID (PAGE 357) on	Shutdown
	Start request	READY TO LOAD (PAGE 355) on	Running
Stop	RPM = 0, Oil pressure not detected, Generator voltage <10 V, D+ not active		Ready
	If at least one of engine running indication is detected when **Stop Time (page 175)** elapsed.		Stop (Stop fail)

Note: *If all generator parameters are OK and **Minimal Stabilization Time (page 173)** elapsed, indicates that GCB is possible to close. In AUTO Mode GCB is closed in this moment automatically.*

Note: *The start-up sequence can be interrupted atn any time by a stop request.*

5.4.23 User setpoints

Controller allows user to create their own setpoints, as well as edit and delete created setpoints. The number of setpoints created by the user is limited to 20. All setpoints created by user are located in a group selected by a user. The Comm. object number (**CO**) can be found via InteliConfig (Tools tab → Generate Cfg image (COM)). User setpoints can be used to manage User protections and PLC.
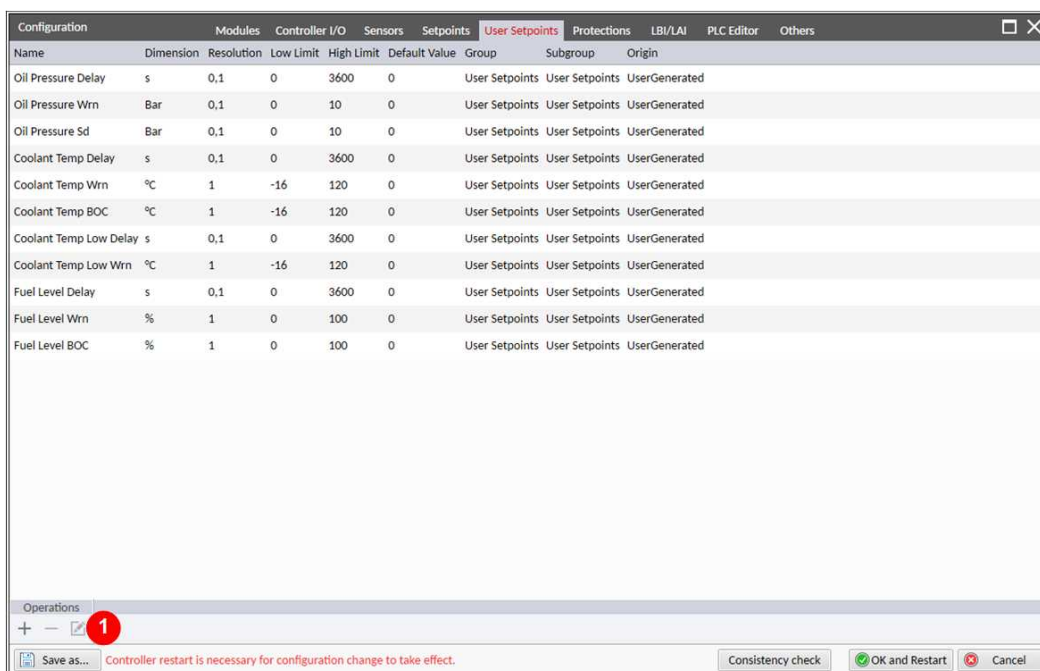
1	**Add** User setpoint	+
	Delete selected User setpoint	×
	Edit selected User setpoint	✎

Image 5.33 Setting parameters of a user setpoint

Contents of the user setpoint

Name	Max. 32 characters *Note: Does not consider duplicities (It is possible to have setpoints with the same name, but it is not recommended.)*
Dimension	Can be chosen from a list or User can create their own with a limit of 32 characters.
Resolution	Max. 4 decimal place
Low Limit	Range of the data type INT32 (restricted by resolution). Value is set as a constant (can not be set as setpoint). Max. value cannot exceed High Limit.
High Limit	Range of the data type INT32 (restricted by resolution). Value is set as a constant (can not be set as setpoint). Min. value cannot be lower than Low Limit.
Default value	Must be in range between Low and High Limit (restricted by resolution).
Group	Group in which setpoint will be shown. Position of a setpoint in a list.
Subgroup	Subgroup in which setpoint will be shown.

5.4.24 User texts

Selected texts in controller can be changes by user. In InteliConfig PC tool go to configuration window and tab others. There is tab User texts.

Example of texts which can be changed by user:

> Maintanance timers
> Exercise timers
> Rental timers
> User Buttons
> Remote Control Switches
> Universal Hours Counters

5.4.25 Voltage phase sequence detection

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

> **ALI Gen Ph Rotation Opposite (page 379)**
> **ALI Mains Ph Rotation Opposite (page 380)**

⬤ **back to Functions**

5.5 User management and data access control

> Accessing, monitoring or controlling the device via any communication interface requires a user to be logged-in.

> When a task (read data, write data , control) is to be performed the Role of the user who is currently logged-in must be higher or equal to the Role required for the particular task.

> User must have their user account defined by the administrator of the controller before the user can log-in into the controller and perform monitoring, control or configuration tasks.

Note: For trusted interfaces there is an "implicit user"(see Implicit account on page 109) automatically logged in always while no other explicit user is logged in.

5.5.1 Types of interfaces

The controller communication interfaces are split into two categories according to what kind of environment the interface is exposed to.

> **Trusted**

>> Trusted interfaces are operated locally inside a closed environment/ infrastructure where additional measures against misuse or attack take place (e.g. physical access limitation). Due to the nature of this interface less strict cybersecurity rules may be applied.

>> Trusted interfaces provide **Implicit account (page 109)** function which allows the performance of certain operations without requiring an explicit user to log in.

>> Trusted interfaces are USB, RS232, RS485.

> **Untrusted**

>> General-purpose interfaces, which may be exposed to public networks, such as the Internet, are untrusted. The communication is running through networks which are not under control of the entity who operates the controller. Thus, strict cybersecurity rules must apply for this type of interface.

>> Untrusted interface are Ethernet and cellular module.

5.5.2 User accounts

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

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

User account must have the following properties

Username	Consists of 6-15 alphanumeric characters, must contain at least 1 letter. This is the main identifier of the particular user account.
Password	Consists of 6-15 alphanumeric characters, must contain at least 1 letter and 1 digit. This is the password that is used together with user name to authenticate (log-in).
User identifier (UID)	Optional 4-digit identification string which can be used for simplified login at trusted interfaces (e.g. from InteliVision display when connected via Ethernet.
PIN	4-digit "password" to be used together with UID.
Role mask	Determines **Access to controller data (page 115)**

Implicit account

At trusted interfaces there is an *implicit user* automatically logged-in at any time if no other explicit user is logged-in at the respective interface. This allows terminal devices (e.g. internal display) to show controller values even without the need for a specific person to be logged-in.

> The implicit account is fixedly defined in the firmware.

> The implicit account has fixed Role 1, unless production mode is activated (**see Production mode on page 109**).

> Implicit user is logged in any time no other user is logged in at the respective interface.

User login

To login to the controller the **username and password must be provided into the login form** of the application (**InteliConfig (page 12)**, **WebSupervisor (page 12)**).

Alternatively, at **trusted interfaces**, it is possible to **login using UID and PIN** instead of username and password. This method of login is designed to simplify the login procedure at devices without alphanumeric keyboard (e.g. InteliVision).

*Note: The controller is featured with a protection against brute force attack to user account credentials. For details **see Account break protection on page 115**.*

Changing password and PIN

The password and/or PIN for currently logged user can be changed. The user must be logged with username and password even if PIN has to be changed.

Production mode

Production mode is used to simplify working with the controller while manufacturing, putting into operation or service works.

In production mode the **Implicit account (page 109)** has Role adjusted to **administrator level**. Thus, in production mode at trusted interfaces (like USB) the operator is allowed to perform any operation which normally requires administrator to log in without the need of logging in.

> **IMPORTANT: Production mode is intended only for the manufacturing and/or service purposes while the controller is in the respective facility and must be turned off before the controller is put into regular operation.**

There is active alarm **Wrn Production Mode (page 378)** in the alarm list any time production mode is active. To turn off the Production mode go to User management and uncheck the checkbox Production mode or go to Production Mode display screen and select disable.

Factory default accounts

Each controller comes from the production with one factory default administrator account having following credentials:

Username: "administrator"

Password: <serial number of the controller>

> **Example:** 12345678

User ID: "0001"

User PIN: "0000"

When the controller is being configured for operation the desired user accounts including the administrator account should be created and then the factory default account can be deleted.

Note: There must always remain at least one administrator account in the system. The controller will not allow deleting last administrator account.

Wrn Default Password appears in Alarm list when the default administrator password is set and communication module is plugged in the controller. The purpose of alarm is to inform that the controller might be or is connected to an untrusted interface and cybersecurity rules are not fulfilled because there is default administrator password.

Reset accounts to factory default

If credentials (username and/or password) for administrator account are lost, it is possible to reset all user accounts to the factory default state. For more information **see Resetting the administrator password on page 116**.

After reset procedure user accounts are in factory default state.

Wrn Default Password (page 368) appears in Alarm list when the default administrator password is set and communication module is plugged in the controller. The purpose of the alarm is to inform that the controller might be or is connected to an untrusted interface and cybersecurity rules are not fulfilled because there is default administrator password.

5.5.3 Managing accounts

User accounts can be managed from InteliConfig while an online connection to the controller is established. A user with administrator level must be logged with username/password and is prompted to re-enter accounts password before the user management dialog is opened.

> IMPORTANT: The total available number of accounts in the controller is 5.
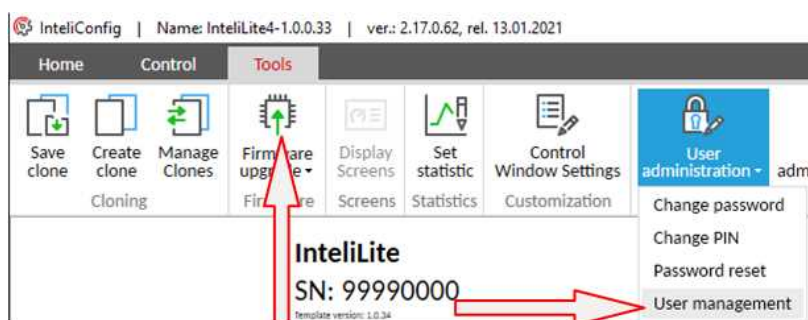
Adding an account

Click on the "**+**" button in the lower left corner of the user management window, then provide the account properties as described in **User accounts (page 108)**.

Note: Rules for the User accounts (page 108) credentials apply and some items are optional

Deleting an account

Select the account that has to be deleted and click on the "**-**" button in the lower left part of the user management window.

Note: You can not delete your own administrator account unless there is another administrator account present in the controller.

Changing account properties

Select the account that needs to be edited and click on the "pencil" button in the lower left part of the user management window. Then modify the desired property or properties. You can modify one or more properties at once.

Note: It is not possible to change user name or UID. Instead of this create a new account with the required changes and delete the original one.

Cloning accounts

Cloning feature allows user to clone user accounts together with controller firmware and configuration.

Note: If the archive where the save of the clone is made is configured with the plug-in module, it's firmware can also be a part of the clone.

Save the clone

To prepare the clone you need to click on the Save Icon. The following window appears.

Image 5.34 Save the clone

> Plug-in Module FW bookmark

>> If is required to clone firmware of connected plug-in modules, click to checkbox "Include Plug-in Modules FW"

> User Management bookmark

>> User has to create accounts in this section. These newly created accounts are stored in the clone

>> At least one user with administrator rights (level 3) must be defined. Recovery Email address has to be set.

>> AirGateKey is not mandatory but recommended when the AirGate connection is used to access the controller
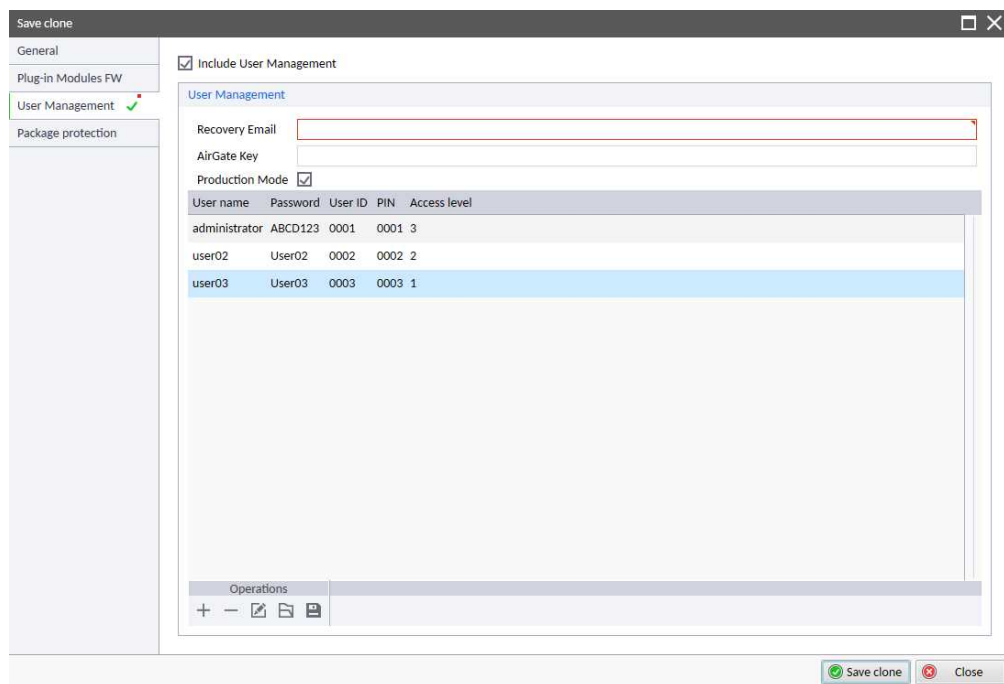
Image 5.35 Create accounts

> Package protection

>> Set up password for clone file

Create clone

To load the clone to the controller click on the Create Clone icon.
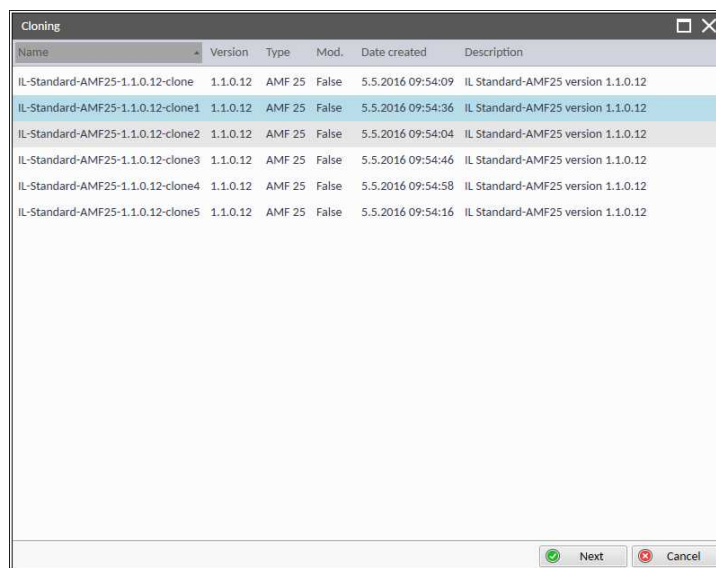
Image 5.36 Create clone

1. Select required clone and click on Next button
2. Following window appears
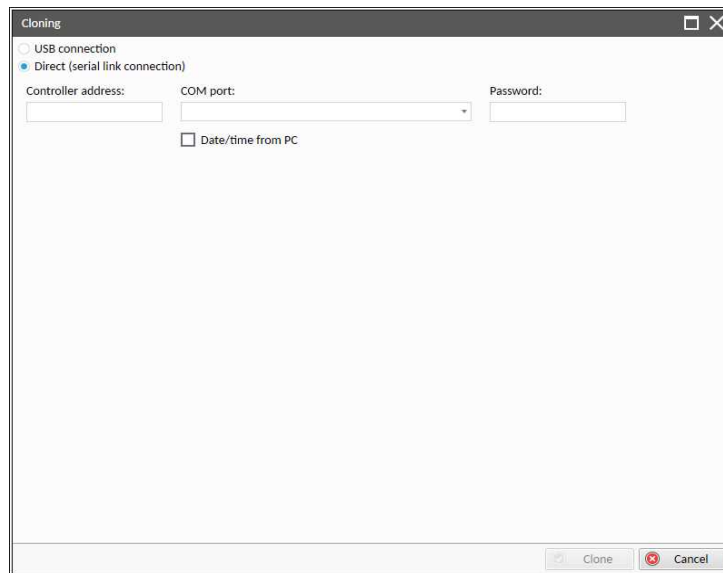
Image 5.37 Create clone

3. Select required connection type

4. Fill in the password in case the clone was saved by selected Package protection option

5. Click on Clone button

Manage clones

Click on the ImEx clone icon for managing clones. Following window appears.
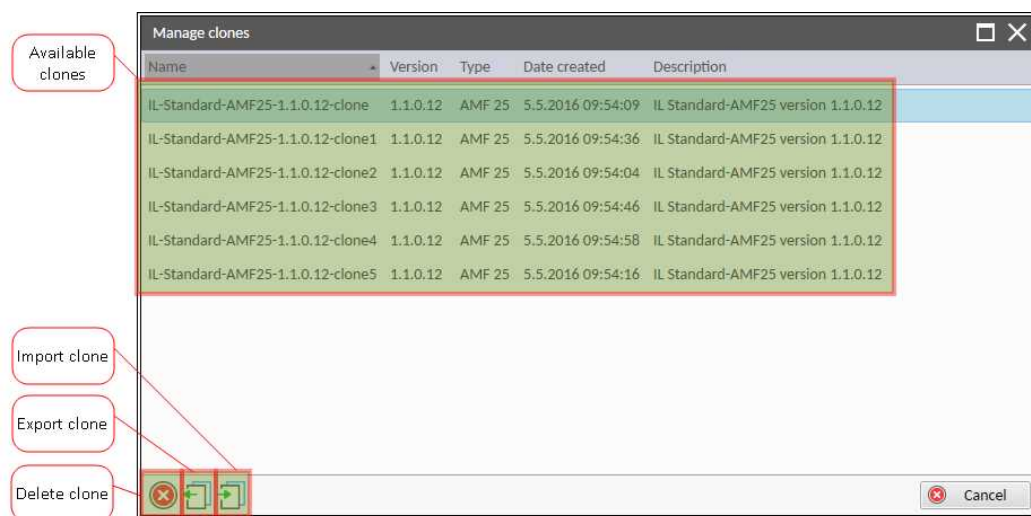
Image 5.38 ImEx Clone

Exporting clone

It is possible to export clone from InteliConfig software into any location. To export the clone click on the Export clone icon. Following window appears.
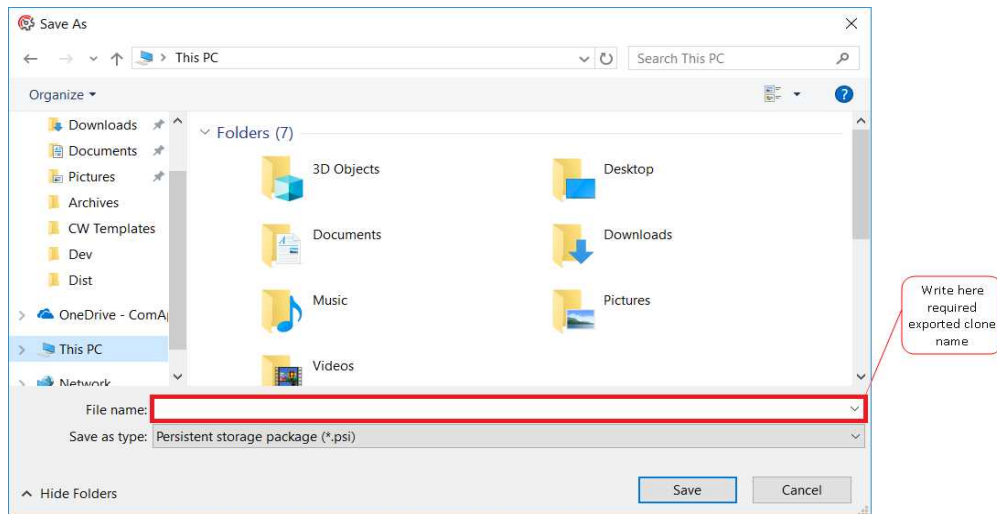
Image 5.39 Save as clone

1. Type required clone name into File name bar
2. Choose required folder
3. Click on Save button

Importing clone

It is possible to import clone from any location. For importing the clone click on the Import clone icon. Following window appears.
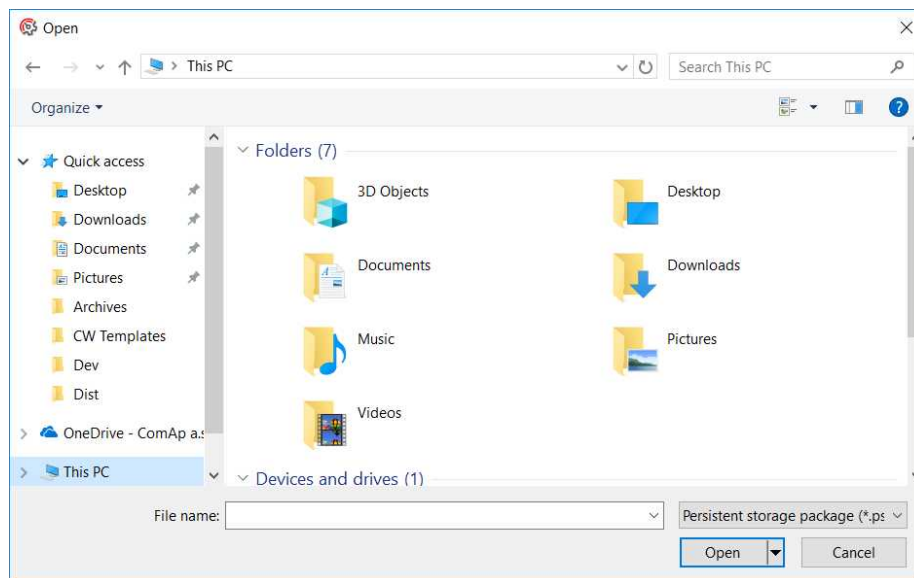
Image 5.40 Open clone

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

5.5.4 Account break protection

The controller protects the user accounts against a brute-force attack, i.e against breaking into the controller by fast repeating attempts to login with credentials generated from the range of all possible combinations.

If the account break protection detects a possible attack and blocks an account or interface the alarm **Wrn Brute Force Protection Active (page 379)** is activated. The alarm can be used to send an active message (e.g. e-mail) to inform about that situation. The exact behavior of the controller depends on the situation.

Password protection

1. If a user performs five consecutive attempts to login using username/password, providing correct username but incorrect password, the respective user account is blocked for a time period of 1 minute. The attempts count regardless of the interface from which it is performed.

2. During the blocking period it is not possible to login with the respective account (username) from any interface even if the correct password is provided.

3. After the blocking period elapses, another attempt to login with the respective account (username) is possible. If this attempt fails again the account is blocked again, now for period of 2 minutes.

4. The points repeats 1-3 times further, the duration of the blocking period is multiplied by 2 in each consequential cycle. However, the maximal blocking time is 20 minutes, the blocking time is never higher.

PIN protection

If a user performs **ten consecutive attempts** to login using UID/PIN, providing **correct UID** but **incorrect PIN**, the user account is permanently blocked for login using this UID/PIN. The user must login with username/password and change the PIN to unblock this login method again.

Interface protection

If anyone performs **twenty consecutive attempts** to login via one particular interface and does not provide either a valid username nor a valid uid the respective interface is blocked for 2 minutes.

During this period it is not possible to use that interface for any login. The blocking period is not progressive in this case.

5.5.5 Access to controller data

Every request for reading data from the controller or writing data into it requires a user to be logged. **Role of the user who is currently logged-in must be assigned to the particular task**.

There are 3 roles available:

> Administrator role. All objects/commands are fixedly assigned to this role.

> Roles 1..2 are configurable roles. Each communication object/command can be assigned independently to each of these roles.

> Modbus client role. Each communication object/command can be assigned to this role.

Reading data

For each object the Access right "Read" (R) is fixedly granted to each role. That means **reading of data** (except some system objects) **is available for any user**.

Writing data

For each object the Access right "Write" (W) can be granted to one or more roles. For each object the Access right "Write" (W) is fixedly granted to administrator role.

Special situations

There are several operations that require administrator role:

> Programming firmware

> Programming configuration

> Managing user accounts

These rights can not be granted to any other role.

5.5.6 Cybernetic security

The cybernetic security is formed by:

> Protection against a brute-force attack to the password

> Secure method to reset the password

> A new technology of encryption of the remote communication

Note: Cybernetic security was designed according to ISA 62443, level 2.

Protection against the brute force attack

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

> If the invalid password is entered 5 times, the controller gets blocked from entering the password for a predetermined amount of time.

> Each further entering of the invalid password cause the consequent blocking time is to be increased.

> If the invalid password is entered repeatedly the controller gets blocked for entering the password permanently and the password must be reset to a default value as described below.
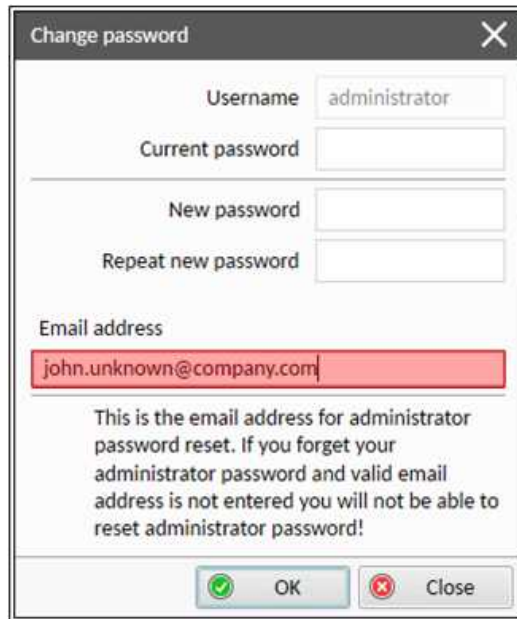
Note: Blocking of the controller for entering the password has no influence on controller / Gen-set operation

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

Resetting the administrator password

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

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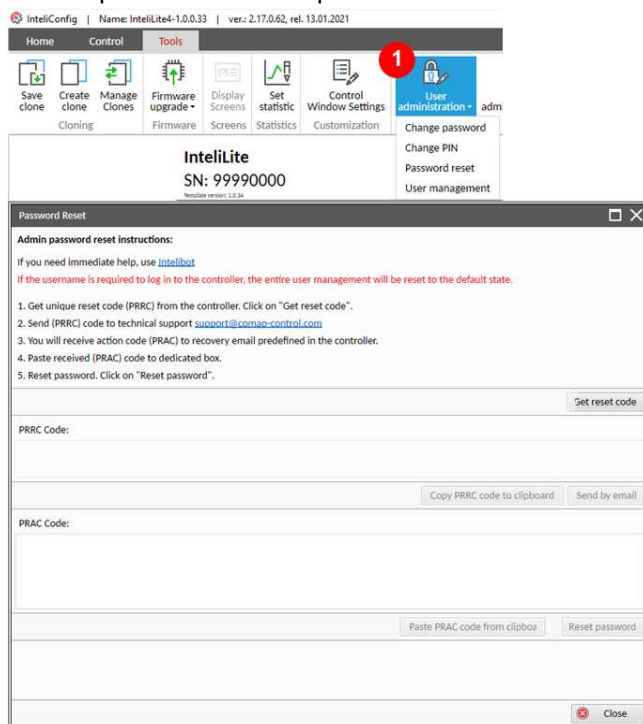
Reset password procedure

1. Connect InteliConfig.
2. Get the password reset request code and send it via e-mail to support@comap-control.com

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

Dear customer,

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

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

Code:

```
AHIU/LNxy6sHWxdq/ofpxDCdQCMkgSdHcFp2mny8B9MoK4bV48VepeasJZSJoZf90rwA
Kmi4V4QYcDOvJunVwm64U94q5ddq2EaJi8zsoPDjBFBqiK0LViw+7m0a81n3QWkAIw9Q
hdxalOkWOll7Hz/+Ljd+mV717QT95ITCKocL98soEwQzvzWjkCjJYSboHJO6cbCd05WE
2faWVh9Ab7rWMcaTW3fkvqL/VTkUn8FiDh6BlX5AC0cZiFFFMLOJuaMewdjVwew/7bHJ
NtLy+tmcc8s2OkuNjZZ+XLe/SQ64CHQK2LYwSVHAwWVrlm/9GVtPGGemqjhzXpaEKCzc
XZQ=
```

4. Paste the code into the password reset window

Encryption of the communication

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

Hardening the storage of a credentials

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

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

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6 Communication

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6.1 PC

6.1.1 Direct communication

A RS232, USB, RS485 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 44**.

RS232 interface uses **COM1 Mode (page 229)** 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.
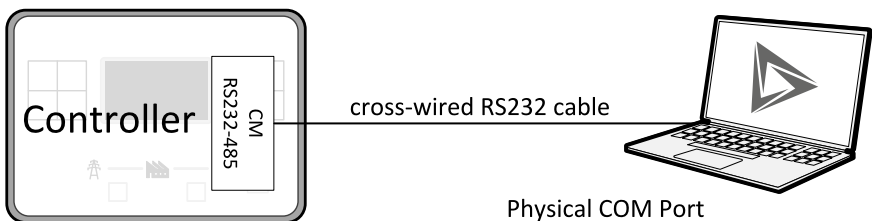
Image 6.1 Cross-wired RS232 cable is used
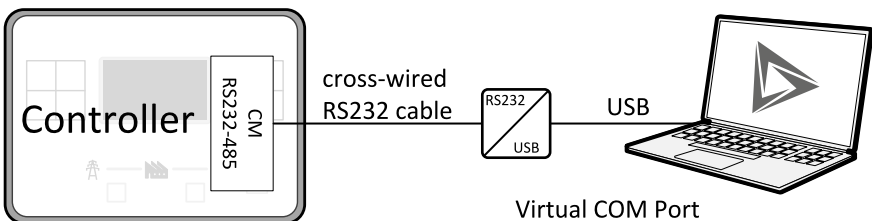
Image 6.2 Cross-wired RS232 cable and USB is used

Connection via RS485

Note: Also USB-RS485 convertor can be used.

Connection via USB

USB interface uses HID profile.

6.1.2 Remote communication

Internet connection

AirGate

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

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address (page 251)** must contain AirGate server address. It can be entered in text form as well as numeric form. There is a public AirGate server available at the address "global.airgate.link".

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

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

> AirGate ID
> AirGate server
> Controller address
> User name and Password
> AirGate Key

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

SMS

Event SMS

The InteliNano AMF 5 controller equipped with the CM2-4G-GPS communication module is able to send Event SMS according to the setting of setpoint:

> **Event Message (page 258)**

Note: First, the setpoint Telephone Number 1 (page 245) must be adjusted to enable this function.

The following events can be received by mobile phone:

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

Message structure:

> Gen-set Name (hh:mm:ss dd.mm.yyyy)
> hh:mm:ss Load on Gen-set

Alarm SMS

The InteliNano AMF 5 controller equipped with the CM2-4G-GPS communication module is able to send Alarm SMS according to the setting of setpoints:

> **Wrn Message (page 261)**

> **Sd Message (page 260)**

> **BOC Message (page 259)**

Note: First, the setpoint Telephone Number 1 (page 245) must be adjusted to enable this function.

Message structure:

> Gen-set Name

> AL=(Alarm 1, Alarm 2, Alarm x)

Note: An asterisk means that alarm is unconfirmed and an exclamation mark means that alarm is active.

Emails

Event Email

The InteliNano AMF 5 controller equipped with the CM3-Ethernet or CM2-4G-GPS communication module is able to send an Event Email according to the setting of setpoint:

> **Event Message (page 258)**

Note: Setpoints Email Address 1 (page 255) and SMTP Sender Address (page 253) or SMTP Server Address (page 252) must be adjusted to enable this function.

Message structure:

Controller

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

Alarm 1

Alarm 2

Alarm 3

Events

----

hh:mm:ss Event 1

hh:mm:ss Event 2

hh:mm:ss Event 3

Alarm Email

The InteliNano AMF 5 controller equipped with the CM3-Ethernet or CM2-4G-GPS communication module is able to send Alarm Emails according to the setting of setpoints:

> **Wrn Message (page 261)**

> **Sd Message (page 260)**

> **BOC Message (page 259)**

*Note: Setpoints **Email Address 1 (page 255)** and **SMTP Sender Address (page 253)** or **SMTP Server Address (page 252)** must be adjusted to enable this function.*

Message structure:

Controller

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

\--

Alarm 1

Alarm 2

Alarm 3

History events

\--

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

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

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

Note: An asterisk means that alarm is unconfirmed and an exclamation mark means that alarm is active.

6.2 Connection to 3rd party systems

⬤ **back to Communication**

6.2.1 MODBUS-RTU

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

> MODBUS-RTU can be used on serial interfaces (via CM-RS232-485 communication module). The MODBUS-RTU server must be activated by switching the setpoint **COM1 Mode (page 229)** or **COM2 Mode (page 231)** into the Modbus position. The serial speed for MODBUS-RTU communication is adjusted by the setpoint **COM1 MODBUS Communication Speed (page 230)** or **COM2 MODBUS Communication Speed (page 232)**.

IMPORTANT: Do not use setpoints for regulation purposes. Avoid fast periodical re-writing of any setpoint. Use remote control registers instead.

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

Address space

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

MODBUS address	Meaning	Access	MODICON object type	MODBUS function
0000 .. 0999	Binary objects	Read only	Discrete Inputs	Read: 01, 02
1000 .. 2999	Values	Read only	Input Registers	Read: 03, 04

3000 .. 3999	Setpoints	Read/Write	Holding Registers	Read: 03, 04 Write: 06, 16
4200 .. 7167	Reserved registers	Read/Write, depends on each specific register	Input Registers Holding Registers	Read: 03, 04 Write: 06, 16

Configurable part of the map

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

Discrete inputs

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

> Single bit of any value of any binary type.

> Protection (e.g. 2nd-level protection of the state "xyz"). The input is high if the protection is active regardless of if it is configured or not.

Input registers

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

> Any controller value of any data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 126)**.

Holding registers

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

> Any controller setpoint of a primitive data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 126)**.

Default contents of the configurable part

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

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

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

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

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

Mapping data types to registers

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

Data type	Meaning	Number of registers	Data maping
Integer8	1-byte signed integer	1	MSB = sign extension LSB = value
Unsigned8	1-byte unsigned integer	1	MSB = 0 LSB = value
Integer16	2-byte signed integer	1	MSB = value, MSB LSB = value, LSB
Unsigned16	2-byte unsigned integer	1	MSB = value, MSB LSB = value, LSB
Integer32	4-byte signed integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Unsigned32	4-byte unsigned integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Binary8	8-bit binary value	1	MSB = 0 LSB = value, bits 0-7
Binary16	16-bit binary value	1	MSB = value, bits 8-15 LSB = value, bits 0-7
Binary32	32-bit binary value	2	MSB1 = value, bits 24-31 LSB1 = value, bits 16-23 MSB2 = value, bits 8-15 LSB2 = value, bits 0-7
Char	1-byte ASCII character	1	MSB = 0 LSB = ASCII value of the character
StrList	Index into a list of strings	1	MSB = 0 LSB = index into the list
ShortStr	Zero-terminated string of max 15 ASCII characters.	8	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character

Data type	Meaning	Number of registers	Data maping
			MSB2 = ASCII value of the 3. character
			LSB2 = ASCII value of the 4. character
			…
LongStr	Zero-terminated string of max 31 ASCII characters.	16	MSB1 = ASCII value of the 1. character
			LSB1 = ASCII value of the 2. character
			MSB2 = ASCII value of the 3. character
			LSB2 = ASCII value of the 4. character
			…
Date	Date (dd-mm-yy)	2	MSB1 = BCD (dd)
			LSB1 = BCD (mm)
			MSB2 = BCD (yy)
			LSB2 = 0
Time	Time (hh-mm-ss)	2	MSB1 = BCD (hh)
			LSB1 = BCD (mm)
			MSB2 = BCD (ss)
			LSB2 = 0
Alarm	An item of the Alarmlist	27	MSB1 = reserved for future use
			LSB1 = reserved for future use
			MSB2 = Alarm level *)
			LSB2 = Alarm status **)
			MSB3 = alarm string ***)
			LSB3 = alarm string
			MSB4 = alarm string
			LSB5 = alarm string
			…

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

Error codes (exception codes)

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

The controller responds with the error codes in as follows:

> 01 – Illegal function is returned if an incompatible type of operation is applied for a specific object, e.g. if function 03 is applied to a binary object.

> 02 – illegal address is returned if the client tries to perform an operation with an object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).

> 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be obtained by reading the registers 4205 – 4206.

Reserved registers

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

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

Register addresses	Number of registers	Access	Data type	Meaning
4566 - 4592	27	read	Alarm	14. record in alarm list
4593 - 4619	27	read	Alarm	15. record in alarm list
4620 - 4646	27	read	Alarm	16. record in alarm list

List of commands and arguments

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

1. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.

2. Write the command code into the register 44210 (register address 4209). Use function 6.

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

4. If the command was executed the return value is as listed in the table. If the command was accepted but there was an error during execution the return value indicates the reason:

   a. 0x00000001 – invalid argument

   b. 0x00000002 – command refused (e.g. controller not in MAN, breaker cannot be closed in the specific situation etc.)

Action	Command code	Argument	Return value
Engine start *)	0x01	0x01FE0000	0x000001FF
Engine stop *)	0x01	0x02FD0000	0x000002FE
Fault reset *)	0x01	0x08F70000	0x000008F8
GCB toggle *)	0x02	0x11EE0000	0x000011EF
GCB on	0x02	0x11EF0000	0x000011F0
GCB off	0x02	0x11F00000	0x000011F1

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

Modbus Remote Start/Stop

There is possibility when the controller is in AUTO mode to activate functionality remote start/stop by writing data FF00 into register 4700 applying function 5. The message Modbus Remote Start is written into history. To deactivate Modbus remote start/stop write data 0000.

Modbus RTU examples

> **Reading of Battery voltage**

>> Export table of values from InteliConfig

Table: Values								
Allowed MODBUS functions: 03, 04								
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01036	8213	**BatteryVoltage**	**V**	Integer	2	**1**	0	400	Controller I/O

Request: (Numbers in Hex)							
01	03	04	1D	00	01	15	3C
Controller address	Modbus function	Register address 041D$_{hex}$ **1053**$_{dec}$		Number of registers		CRC	

Response: (Numbers in Hex)						
01	03	02	00	F0	B8	00
Controller address	Modbus function	Length of data 02$_{hex}$ 2 bytes read	Data 00F0$_{hex}$ **240**$_{dec}$		CRC	

We read value 240 from register 01036. 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**

» Configure a free MODBUS register for setpoint to be read. (InteliConfig -> ControllerConfiguration -> Others -> MODBUS)

» It is possible to export table of used MODBUS registers from InteliConfig.

Table: Values									
Allowed MODBUS functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
03000	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	0	5000	Basic Settings

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

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

Read nominal power is 200 kW.

❯ Reading all binary inputs as Modbus register

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

Request: (Numbers in Hex)							
01	03	04	2C	00	01	44	F3
Controller address	Modbus function	Register address $042C_{hex}$ **1068_{dec}**		Number of registers		CRC	

Response: (Numbers in Hex)							
01	03	02		00	12	38	49
Controller address	Modbus function	Length of data 02_{hex} 2 bytes read		Data 0012_{hex} **00010010_{bin}**		CRC	

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

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

› Reading specific binary inputs

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	0	GCB Feedback	Controller I/O
00001	Value	8235	Binary Inputs	1	MCB Feedback	Controller I/O
00002	Value	8235	Binary Inputs	2	Emergency Stop	Controller I/O

We will read state of MCB Feedback binary input.

Request: (Numbers in Hex)							
01	01	00	01	00	01	AC	0A
Controller address	Modbus function	Register address 0001_{hex} **0001_{dec}**		Number of registers		CRC	

Response: (Numbers in Hex)						
01	01	01	01	90	48	
Controller address	Modbus function	Length of data 01_{hex} 1 byte read	Data 01_{hex} active	CRC		

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

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

❯ Starting the Engine

User with Role 0 must have full access for Engine Cmd otherwise the command will not be invoked.

Table **Reserved registers (page 128)**				
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 129)**			
Action	Command code	Argument	Return value
Engine start	0x01	0x01FE0000	0x000001FF
Engine stop	0x01	0x02FD0000	0x000002FE

Request 1/2: (Numbers in Hex)						
01	10	10	6F	00	03	06
Controller address	Modbus function $10_{hex} = 16_{dec}$	Register address $106F_{hex} = \mathbf{4207}_{dec}$		Number of registers		Data length in bytes

Request 2/2: (Numbers in Hex)							
01	FE	00	00	00	01	68	0B
Argument				Command code		CRC	

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

Nominal Power – writing

>> Configure a free MODBUS register for a setpoint to be written. (InteliConfig -> ControllerConfiguration -> Others -> MODBUS).

Table: Setpoints								
Allowed MODBUS functions: 03, 04, 06, 16								
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
03000	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	1	5000	Basic Settings

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

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

Writen setpoint nominal power is 100 kW.

CRC calculation

The check field allows the receiver to check the validity of the message. The check field value is the Cyclical Redundancy Check (CRC) based on the polynomial $x^{16}+x^{15}+x^{2}+1$. CRC is counted from all message bytes preceding the check field.

Online CRC calculator: http://www.lammertbies.nl/comm/info/crc-calculation.html Use CRC-16 (Modbus) Write LSB first.

For writing nominal power 100 kW the CRC is calculated from this data: $01060BC00064_{hex}$

⏶ **back to Communication**

7 Technical data

Power supply

Power supply range	8-36 VDC
Power consumption (without modules)	2 W
RTC battery	Replaceable (3 V)
Fusing power	2 A w/o BOUT consumption
E-Stop fusing	10 A
Max. power dissipation	5.5 W

Operating conditions

Protection degree (front panel)	IP50 , IP65 with optional gasket seal
Operating temperature	-20 ˚C to +70 ˚C
Max. operating altitude	5000 m above see level, with derating over 2000 m
Storage temperature	-30 ˚C to +80 ˚C
Operating humidity	95 % non-condensing (EN 60068-2-30)
Vibration	5-25 Hz, ± 1.6 mm 25-100 Hz, a = 400 m/s^2
Shocks	a = 500 m/s^2
Surrounding air temperature rating 70 °C Suitable for pollution degree 2	

D+

Max. output current	250 mA

Linear measurement and protection range

Measurement inputs	3ph-n Gen voltage , 3ph-n Mains
Measurement range	10-277 V AC* / 10-480 V AC (EU) 10-346 V AC* / 10-600 V AC (US/Canada)
Max measured voltage	350 V AC Ph-N 660 V AC Ph-Ph
Accuracy	2 %
Frequency range	5-80 Hz, guaranteed meas range 30-70 Hz (accuracy 0.1 Hz) Voltage frequency range 2 Voltage frequency range 3
Input impedance	0.72 MΩ ph-ph , 0.36 MΩ ph-n

*Note: *) Maximum effective voltage on the voltage terminals must be lower than 300 V against minus battery voltage and for overvoltage CAT III or lower.*

Display

Type	Graphical backlighted monochromatic 3.2"
Resolution	132 × 64 px

Communications

USB Device	USB-C
CAN	Non-isolated, 250 / 50 kbps, Terminator impedance 120 Ω Fixed Internal Terminator

Current measurement

Measurement inputs	3ph Gen current
Measurement range	/1A or /5A
Max. allowed current	10 A
Accuracy	±30 mA for 0-2 A; 2 % of value for 2-5 A
Input impedance	<0.1 Ω

E-Stop

Dedicated terminal for safe E-Stop input.

Physical supply for binary outputs 1 & 2.

Binary inputs

Number	4
Close/Open indication	0-2 VDC close contact 6-36 VDC open contact

Binary outputs

Number	6
Max. current	BO1,2=5 A (60 °C); BO1,2=4 A (70 °C), BO3-6=0.5 A
Switching to	positive supply terminal

Analog inputs

Number	1x switchable (R/U/I) 2x R
Range	R = 0-2500 Ω; U = 0-10 V; I = 0-20 mA
Accuracy	R: ±3 % ± 7 Ω in range 0-250 Ω R: ±6 % in range 250-2500 Ω U: ±1.5 % ±150 mV I: ±1.5 % ±0.3 mA

+5 V Power supply output

Max. current	25 mA

Magnetic pickup

Voltage input range	4 Vpk-pk to 50 Vpk-pk in range 4 Hz to 1 kHz 6 Vpk-pk to 50 Vpk-pk in range 1 to 5 kHz 10 Vpk-pk to 50 Vpk-pk in range 5 to 10 kHz
Frequency input range	4 Hz to 10 kHz
Frequency measurement tolerance	0.2 % from measured value

8 Appendix

⬛ **back to Table of contents**

8.1 Controller objects

8.1.1 List of controller objects types

8.1.2 Setpoints

What setpoints are:

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

All setpoints can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure.

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

For full list of setpoints go to the chapter **List of setpoints (page 139)**.

List of setpoints

Group: Basic settings

Subgroup: Name

Gen-Set Name

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	0 .. 15 characters [-]		
Default value	InteliNano AMF	Alternative config	NO
Step	[-]		
Comm object	8637	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

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

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

⬤ **back to List of setpoints**

Subgroup: Power settings

Nominal Power

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	Alternative config	YES
Step	1 kW		
Comm object	8276	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 191)** protection is based on this setpoint.

> *Note: This setpoint is used when setpoint **Connection type (page 146)** 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.*

⬤ **back to List of setpoints**

Nominal Power Split Phase

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	Alternative config	YES
Step	1 kW		
Comm object	9977	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**		
Description			
Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 191)** protection is based on this setpoint.			

*Note: This setpoint is used when setpoint **Connection type (page 146)** is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.*

🔺 **back to List of setpoints**

Subgroup: Current settings

Nominal Current

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	Alternative config	YES
Step	1 A		
Comm object	8275	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**.		
Description			
It is current limit for current protections and means maximal continuous current. Nominal Current can be different from rated current value.			

🔺 **back to List of setpoints**

Gen CT Ratio Prim

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	1 .. 10000 [A]		
Default value	500 A	Alternative config	NO
Step	1 A		
Comm object	8274	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set.			

⬆ **back to List of setpoints**

Gen CT Ratio Sec

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	- [/1A / /5A]		
Default value	/5A	Alternative config	NO
Step	-		
Comm object	10556	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set.			

⬆ **back to List of setpoints**

CT Location

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Load / Gen-set / None [-]		
Default value	Gen-set	Alternative config	NO
Step	[-]		
Comm object	11625	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts position of current measurement.

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

When option None is selected, following objects are hidden/changed:
- > Current screen is hidden
- > Generator Power screen is hidden
- > Statistics screens – values Gen-set kWh, Gen-set kVArh, Mains kWh and Mains kWArh are hidden
- > Main screen – kW meter is replaced by generator voltage meter
  - » Generator L1-N voltage is displayed for Monopahse, Splitphase L1L2, Splitphase L1L3 and High Leg delta connection types
  - » Generator L1-L2 voltage is displayed for 3ph3w and 3ph4w connection types
- > Group Load is hidden
- > Group Statistics – values Gen-set kWh, Gen-set kVArh, Mains kWh and Mains kWArh are hidden

⬛ **back to List of setpoints**

Subgroup: Voltage settings

Connection type

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	Alternative config	YES
Step	[-]		
Comm object	11628	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Connection type:

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

Autodetect		
	High Leg Delta	L1 >=100 V; L1 <=140 V L2 >=140 V L3 >=100 V; L3 <=140 V
	3Ph Low Y	L1 <=160 V L2 <=160 V L3 <=160 V
	3Ph High Y	L1 >160 V L2 >160 V L3 >160 V
	SplPhL1L3	L1 >=100 V L2 <= 20 V L3 >=100 V

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

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Nominal Voltage Ph-N

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 20 000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	8277	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**.		
Description			
Nominal voltage (phase to neutral).			

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Nominal Voltage Ph-Ph

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 40 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	11657	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**.		
Description			
Nominal system voltage (phase to phase).			

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Nominal Voltage 3Ph Low Y

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	Alternative config	YES
Step	1 V		
Comm object	20811	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 146)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 148)** by the voltage autodetect function, if detected **Connection type (page 146)** is 3Ph Low Y (controller can not distinguish between the 4 wire and 3 wire connection), detected phase-phase voltage is lower than 300 V in all three phases and phase-neutral voltage is lower than or equal to 160 V in all three phases.			

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Nominal Voltage 3Ph High Y

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 20 000 [V]		
Default value	277 V	Alternative config	YES
Step	1 V		
Comm object	20812	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 146)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 148)** by the voltage autodetect function, if detected **Connection type (page 146)** is 3Ph High Y, detected phase-phase voltage is higher than or equal to 300 V in all three phases and phase-neutral voltage is higher than 160 V in all three phases.			

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Nominal Voltage High Leg D

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 20 000 [V]		
Default value	277 V	Alternative config	YES
Step	1 V		
Comm object	20813	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 146)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 148)** by the voltage autodetect function, if detected **Connection type (page 146)** is High Leg D. Set this setpoint to 120 V with high leg delta system, which works with the high leg voltage 208 V (L2-N).			

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Nominal Voltage SplitPhase

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	Alternative config	YES
Step	1 V		
Comm object	20814	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 146)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 148)** by the voltage autodetect function, if detected **Connection type (page 146)** is SplPhL1L2 or SplPhL1L3.			

⬤ **back to List of setpoints**

Nominal Voltage MonoPhase

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	Alternative config	YES
Step	1 V		
Comm object	20815	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 146)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Nominal Voltage Ph-N (page 148)** by the voltage autodetect function, if detected **Connection type (page 146)** is MonoPhase.			

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Subgroup: Frequency settings

Nominal Frequency

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	30.0 .. 65.0 [Hz]		
Default value	50.0 Hz	Alternative config	YES
Step	1.0 Hz		
Comm object	8278	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz).			

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Gear Teeth

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	FGen->RPM / 1 .. 500 [-]		
Default value	FGen->RPM	Alternative config	NO
Step	1		
Comm object	8252	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Number of teeth on the engine flywheel where the pick-up is installed. Set to zero if no pick-up is used and the Engine speed will be counted from the generator frequency. *Note: If no pickup is used, the D+ or W terminal should be used to prevent possible overcranking, which can occur if at least 25% of nominal generator voltage is not present immediately after exceeding firing speed.*			

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Nominal RPM

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	100 .. 4 000 [RPM]		
Default value	1 500 RPM	Alternative config	YES
Step	1 RPM		
Comm object	8253	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM – revolutions per minute).			

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Subgroup: Controller settings

Controller Mode

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	OFF / MAN / AUTO[-]		
Default value	OFF	Alternative config	NO
Step	[-]		
Comm object	8315	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint can be used for changing the Controller mode remotely, e.g. via Modbus. Use the mode selector on the main screen for changing the mode from the front panel. Use mode selector in the control window for changing the mode from InteliConfig.			

⬤ **back to List of setpoints**

Power On Mode

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Previous / OFF [-]		
Default value	Previous	Alternative config	NO
Step	[-]		
Comm object	13000	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts controller mode after power on of controller.

Previous	When controller is power on, controller is switched to last mode before power off.
OFF	When controller is power on, controller is switched to OFF Mode.

Note: Remote modes – In case that some LBI remote mode is activated during power on of controller than this LBI has higher priority than this setpoint – controller mode is forced into mode selected via LBI. After deactivation of LBI, controller is switched into value selected via setpoint Power On Mode

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Default Application Select

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	AMF / MRS [-]		
Default value	AMF	Alternative config	NO
Step	[-]		
Comm object	12157	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the controller application.

AMF	Normal AMF operation
MRS	When MRS mode is selected the controller will not perform AMF functions anymore. MCB button [I/O] will be inactive and also mains measurement and protections will be disabled. The Gen-set in AUTO mode will be able to start by REMOTE START/STOP (PAGE 330) binary input.

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CB Control In MAN Mode

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Full Ctrl / Aut Trans [-]		
Default value	Full Ctrl	Alternative config	YES
Step	[-]		
Comm object	14962	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	All the time		
Description			

The behavior of transition of load in MAN mode is adjusted via this setpoint.

Full Ctrl	No limitation of CB control in MAN mode (operator can close any breaker manually
Aut Trans	Operator can control MCB and GCB breaker. However once transition is evoked the controller performs the automatic transfer of the load.Transition of load is done in 1 step. **Example:** Load is on genset - GCB is closed. When MCB is pressed following operation performs: GCB is open and MCB is closed.

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GCB Control Mode

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Internal / External / No Button [-]		

Default value	Internal	Alternative config	YES
Step	[-]		
Comm object	11771	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	All the time		
Description			

This setpoint adjusts control mode of GCB.

Internal	The breaker is controlled only from controller. Any unexpected change of **GCB FEEDBACK (PAGE 327)** causes **Sd GCB Fail (page 387)** immediately.
	Incorrect reaction of the **GCB FEEDBACK (PAGE 327)** on internal GCB Close/Open command causes **Sd GCB Fail (page 387)**
External	Controller does not control the GCB at all. The GCB is controlled externally, when the **GCB FEEDBACK (PAGE 327)** get changed, then the event "GCB Opened" or "GCB Closed" is recorded to the history log.
	Controller always accept the **GCB FEEDBACK (PAGE 327)** without of issuing any alarm.
	When the Sd protection shuts down the engine, the GCB stays closed. The BOC protection does not open the GCB, controller goes to cooling when the BOC protection is tripped (GCB stays closed until opened externally).
	IMPORTANT: Gen-set with closed GCB is not blocked against starting.
No Button	GCB button and LBI GCB button are deactivated.
	❯ When selected in AMF mode, there is active warning **Wrn Wrong GCB Control Mode (page 381)**. The behavior of the controller is the same as GCB Control Mode would be switched to Internal
	❯ When selected in MRS mode and MAN mode the GCB is closed automatically the same way as in Auto mode – no manual command needed.

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Reset To Manual

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	Alternative config	NO YES*
Step	[-]		
Comm object	9983	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
If this function is enabled, the controller will switch automatically to MAN mode when there is a red alarm in the alarm list and fault reset button is pressed. This is a safety function that prevents the Gen-set starting again automatically in specific cases when fault reset button is pressed.			

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Backlight Timeout

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Disabled / 1 .. 255 [min]		
Default value	Disabled	Alternative config	NO
Step	1 min		
Comm object	10121	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
The display backlight is switched off when this timer exceed. When setpoint is adjusted to disabled then the display will be backlighted all the time.			

⬢ **back to List of setpoints**

Fail Safe Binary State

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Log0 / Log1 / Last valid state [-]		
Default value	Last valid state	Alternative config	NO YES*
Step	-		
Comm object	21215	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts behavior of the controller when the received binary input value are invalid due to the loss of communication for example. Binary inputs are received from external devices like ECUs.

Log0	All invalid values are replaced by logical zero.
Log1	All invalid values are replaced by logical one.
Last Valid State	All invalid values are replaced by the last valid state.

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Low Power Mode

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Disabled / 1 .. 360 [min]		
Default value	Disabled	Alternative config	NO
Step	1 min		
Comm object	8548	Related applications	MRS
Config level	Advanced		
Setpoint visibility			
Description			

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

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

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User Logging Record

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Alternative config	NO
Step	[-]		
Comm object	23885	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoints enables / disables history records when any user is log in.

Enabled	Every time user login/logout to the controller, there is a message: User with user index (n) logged in/out … written in the history.
Disabled	Login/logout message is not written into history.

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Subgroup: Phase Rotation

Phase Rotation Protection

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Enabled/Disabled [-]		
Default value	Enabled	Alternative config	NO
Step	[-]		
Comm object	19709	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator Phase Rotation protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoint **Phase Rotation (page 159)**.
Disabled:	Protection is disabled.

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Phase Rotation

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Clockwise / Counterclockwise [-]		
Default value	Clockwise	Alternative config	NO
Step	[-]		
Comm object	15122	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	All the time		
Description			
This setpoint adjust the phase sequence of voltage terminals.			

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Subgroup: HMI Settings

Main Screen Line 1

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	RPM / PF / Run Hours / ATT / AIN1 / AIN2 / AIN3 [-]		
Default value	PF	Alternative config	NO
Step	[-]		
Comm object	13346	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts line 1 on Main screen.			

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Main Screen Line 2

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	RPM / PF / Run Hours / ATT / AIN1 / AIN2 / AIN3 [-]		
Default value	RPM	Alternative config	NO
Step	[-]		
Comm object	14628	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts line 2 on Main screen.			

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Screen Filter

Setpoint group	Basic settings	Related FW	1.1.0
Range [units]	Enable / Disabled [-]		
Default value	Disabled	Alternative config	NO
Step	[-]		
Comm object	15889	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Every analog value showed on CU screen is filtered when setpoint is enabled.
List of values which are filtered when filter is ON.

> Generator Voltage L1-L2
> Generator Voltage L2-L3
> Generator Voltage L3-L1
> Generator Voltage L1-N
> Generator Voltage L2-N
> Generator Voltage L3-N
> Generator Frequency
> Load kVA
> Load kVA L1
> Load kVA L2
> Load kVA L3
> Load kVAr
> Load kVAr L1
> Load kVAr L2
> Load kVAr L3
> Load kW
> Load kW L1
> Load kW L2
> Load kW L3

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Main Screen Gauge

Setpoint group	Basic settings	**Related FW**	1.1.0
Range [units]	Gen kW / Gen V / RPM [-]		
Default value	Gen kW	**Alternative config**	NO
Step	[-]		
Comm object	20578	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts value which is displayed on main screen gauge.			

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Group: Communication Settings

Subgroup: Controller Address

Controller Address

Setpoint group	Communication Settings	Related FW	1.1.0
Range [units]	1 .. 32 [-]		
Default value	1	Alternative config	NO
Step	1		
Comm object	24537	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Controller identification number. It is possible to set controller address different from the default value (1) so that more controllers can be interconnected (via RS485) and accessed e.g. InteliConfig.

> **IMPORTANT: This address is not used for MODBUS communication.**

> *Note: When opening connection to the controller it's address has to correspond with the setting in PC tool.*

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Subgroup: Modbus Server Address

Modbus Server Address

Setpoint group	Communication Settings	Related FW	1.1.0
Range [units]	1 .. 247 [-]		
Default value	1	Alternative config	NO
Step	1		
Comm object	24188	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Controller identification number. It is possible to set controller address different from the default value (1) so that more controllers or other devices can be interconnected (via RS485) and accessed from Modbus terminal.

> **IMPORTANT: This address is used only for MODBUS communication.**

> *Note: When opening connection to the controller it's address has to correspond with the setting in PC tool.*

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Group: Engine settings

Cranking Attempts

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	1 .. 20 [-]		
Default value	3	**Alternative config**	NO
Step	1		
Comm object	8255	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Maximal number of cranking attempts.			

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Maximum Cranking Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	1 .. 255 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8256	**Related applications**	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Maximum time limit of cranking time.			

> **IMPORTANT: There is a protection against broken pinion on starter. In case that there are no RPM after 5 seconds of starting, cranking is interrupted and cranking fail pause follows.**

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Prestart Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	2.0 s	Alternative config	NO
Step	1.0 s		
Comm object	8394	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Time of closing of the PRESTART (PAGE 353) output prior to the engine start. Set to zero if you want to leave the output PRESTART (PAGE 353) open.
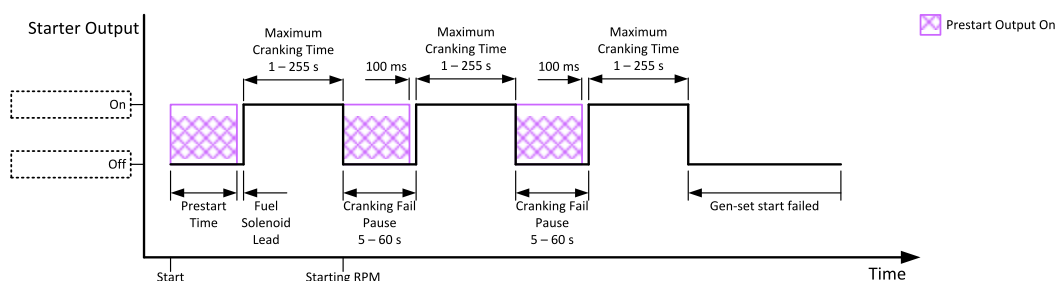
Image 8.1 Prestart Time |||

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Starting RPM

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	5 .. 50 [%]		
Default value	25%	Alternative config	NO
Step	1 % of **Nominal RPM (page 152)**		
Comm object	8254	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the "firing" speed level as percent value of the **Nominal RPM (page 152)**. If this level is exceeded the engine is considered as started.		

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Starting Oil Pressure

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	Disabled / 0,1 .. 10,0 [bar]		
Default value	4,5 bar	Alternative config	NO
Step	0,1 bar		
Comm object	9681	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Oil pressure limit for starting. The controller will stop cranking (STARTER (PAGE 356) goes OFF) if the oil pressure rises above this limit.

Option Disabled – when this option is selected, Oil Pressure value (value from CU analog Oil Pressure, value from ECU analog Oil pressure and state of binary input Oil Pressure) is not used for disengagement of starter and for engine running evaluation.

> IMPORTANT: Value from analog input has higher priority than value from ECU.

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Glow Plugs Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0.0 .. **Prestart Time (page 164)** [s]		
Default value	0.0 s	Alternative config	NO
Step	1.0 s		
Comm object	14412	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint defines the time before starting when logical binary output GLOW PLUGS (PAGE 347) will be active.

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Subgroup: Choke

Choke Function

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	Disabled /Fixed Time / Temp Based [-]		
Default value	Disabled	Alternative config	NO
Step	[-]		
Comm object	15717	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO CHOKE (PAGE 338) is configured.		
Description			

This setpoint defines choke function behavior.

Disabled	Choke function is disabled and logical binary output CHOKE (PAGE 338) is activated under no circumstances.
Fixed Time	Choke time is fixedly defined by **Choke Time (page 166)** setpoint.
Temp Based	Choke time is calculated using actual engine (coolant) temperature. Setpoints **Choke Start Temp (page 167)** and **Choke Increment (page 168)** are taken into consideration.

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Choke Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 3600 [s]		
Default value	0 s	Alternative config	NO
Step	1 s		
Comm object	13011	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO CHOKE (PAGE 338) is configured and setpoint **Choke Function (page 166)** = Fixed Time.		
Description			

Defines time logical binary output CHOKE (PAGE 338) is activated for when fixed time is used. When setpoint **Choke Function (page 166)** is set to *Temp Based* value, *Choke Time* value have no effect.

> *Note: If setpoint Choke Lead (page 170) is set to nonzero value, total time the CHOKE output is activated still matches value set by Choke Time setpoint. This mean Choke Timeshould be longer than Choke Leadto ensure expected Choke behavior.*

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Choke Start Temp

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	-20,0 .. 80,0 [°C]		
Default value	0,0 °C	Alternative config	NO
Step	0,1 °C		
Comm object	15716	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO CHOKE (PAGE 338) is configured and setpoint **Choke Function (page 166)** = 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 168)**. When setpoint **Choke Function (page 166)** is set to *Fixed Time* value, setpoint *Choke Start Temp* has no effect.

Choke Increment

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0,00 .. 20,00 [s/°C]		
Default value	0,00 s/°C	Alternative config	NO
Step	0,01 s/°C		
Comm object	15715	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO Choke (PAGE 338) is configured and setpoint **Choke Function (page 166)** = Temp Based.		
Description			

This setpoint adjust the maximal time of activation of binary output Choke (PAGE 338). Calculated time depends on engine (coolant) temperature. Setpoint adjust curve which is used for calculating actual Choke Time. When setpoint **Choke Function (page 166)** is set to *Fixed Time* value, setpoint *Choke Increment* has no effect.
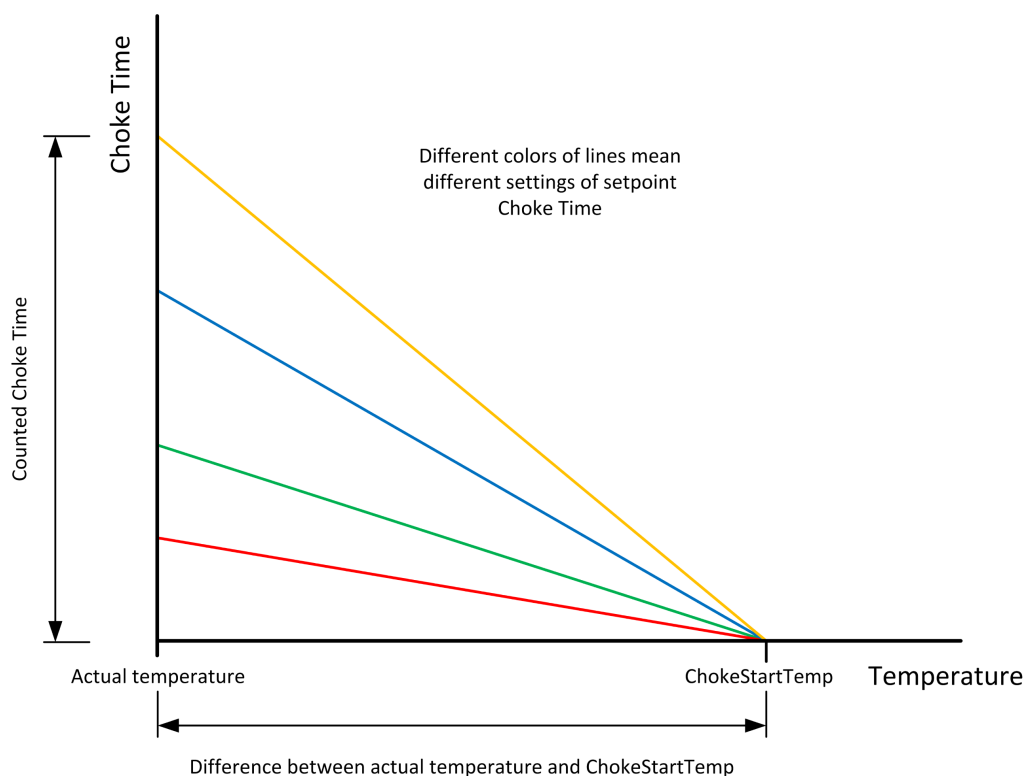
Note: If setpoint Choke Lead (page 170) is set to nonzero value, total time the Choke output is activated still matches calculated value (based on actual temperature and setpoints Choke Increment and Choke Start Temp (page 167)) This mean that adjusted parameters should ensure that calculated Choke Time will be longer than Choke Leadto ensure expected Choke behavior.

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Choke Voltage

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	Disabled / 1–100 [%]		
Default value	Disabled	Alternative config	NO
Step	1 %		
Comm object	15718	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO CHOKE (PAGE 338) is configured.		
Description			

This setpoint adjust threshold level for deactivation of CHOKE (PAGE 338) 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.
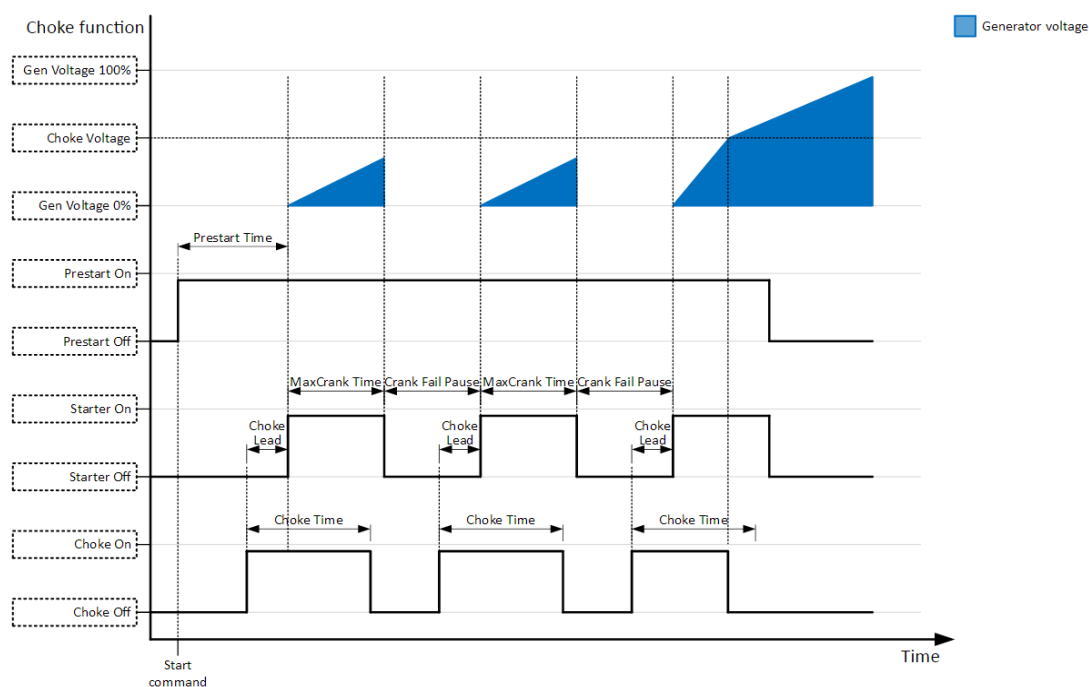
🔺 **back to List of setpoints**

Choke Lead

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. Prestart Time [s]		
Default value	0 s	Alternative config	NO
Step	1 s		
Comm object	15774	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only when LBO CHOKE (PAGE 338) is configured.		
Description			
This setpoint adjust the lead of logical binary output CHOKE. **CHOKE (PAGE 338)** is activated before logical binary output **STARTER (PAGE 356)**.			

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

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Fuel Solenoid Lead

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0,0 .. 25,0 [s]		
Default value	0,5 s	Alternative config	NO
Step	0,1 s		
Comm object	10525	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Delay between **FUEL SOLENOID (PAGE 342)** and **STARTER (PAGE 356)** logical binary outputs. **FUEL SOLENOID (PAGE 342)** is active before **STARTER (PAGE 356)**. Lead time is adjusted via this setpoint. Image 8.2 Fuel Solenoid Lead			
Note: LBO PRESTART (PAGE 353) goes to logical zero when Fuel Solenoid Lead goes to logical one.			
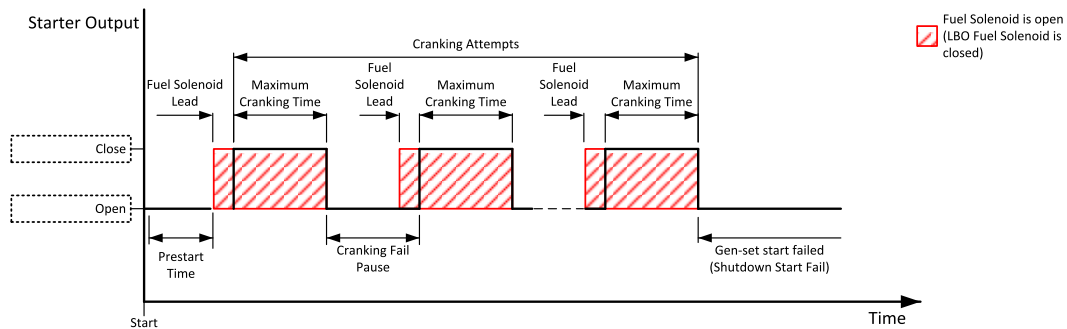
🔺 **back to List of setpoints**

Idle Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 600 [s]		
Default value	12 s	Alternative config	NO
Step	1 s		
Comm object	9097	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Idle Time delay starts when RPM exceeds **Starting RPM (page 164)**. Start fail is detected when during Idle state RPM decreases below 2 RPM. The output **IDLE/NOMINAL (PAGE 349)** 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.			
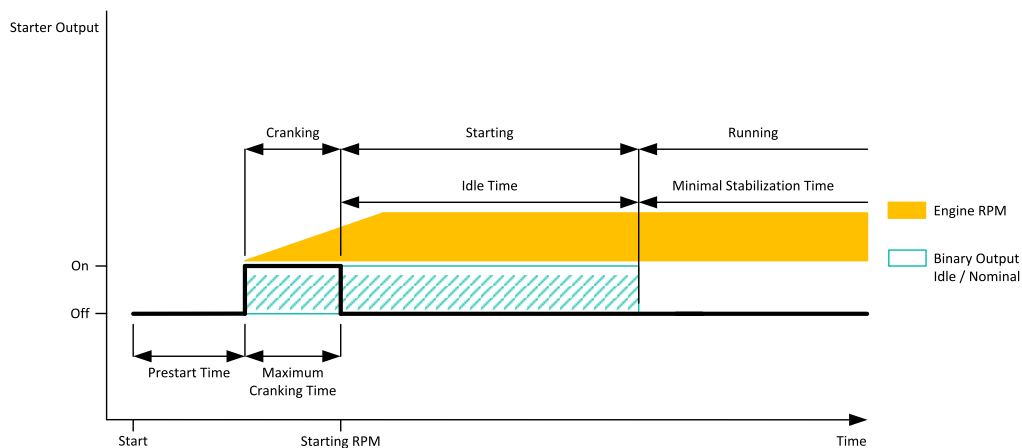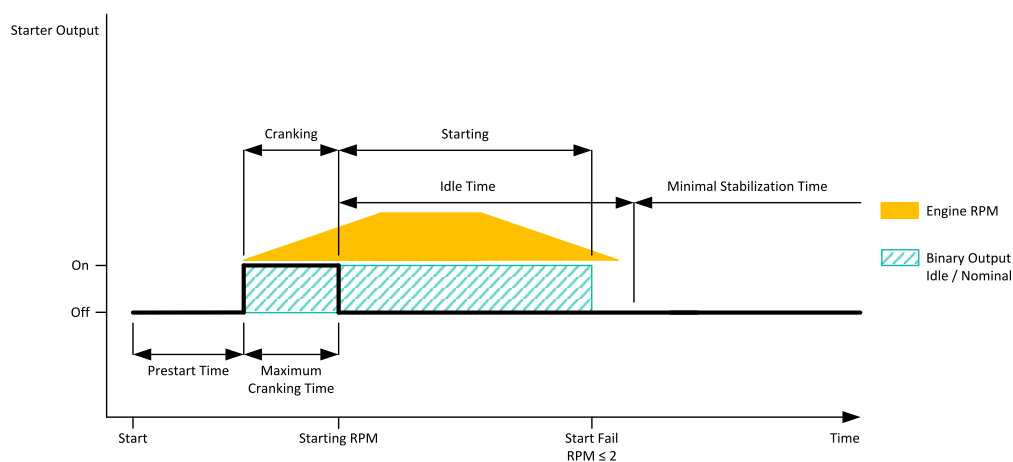
Image 8.3 Idle Time 1

Image 8.4 Idle Time 2

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Minimal Stabilization Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	1 .. **Maximal Stabilization Time (page 272)** [s]		
Default value	2 s	Alternative config	NO
Step	1 s		
Comm object	8259	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

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

Note: When starting the engine, setpoint should be set >300 s.
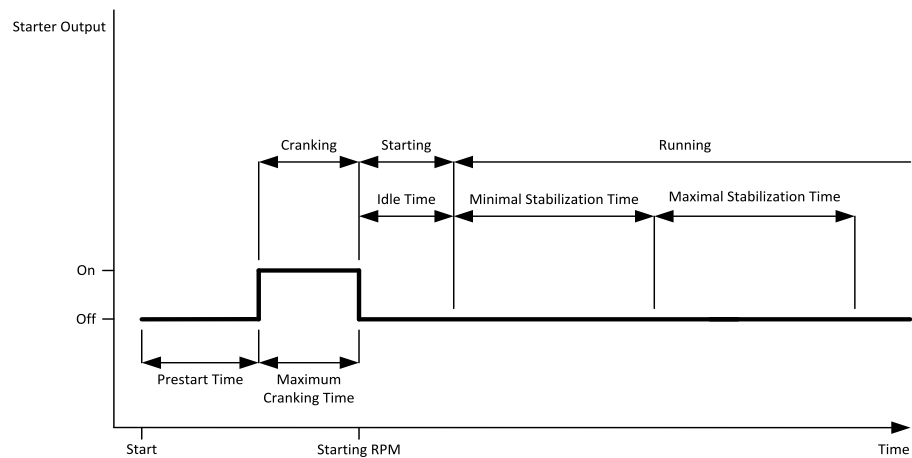
Image 8.5 Minimal Stabilization Time

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Subgroup: Aftertreatment

DPF Regeneration RPM

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	1000 .. 2500 [RPM]		
Default value	1500 [RPM]	Alternative config	YES
Step	1 [RPM]		
Comm object	19049	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if ECU is configured and Aftertreatment support is enabled.		
Description			
This setpoint defines the speed during the Manual DPF regeneration procedure, when the LBI DESCRIPTION (PAGE 323) is closed. Overspeed protection are calculated based on this setpoint.			

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Subgroup: Stopping

Cooling Speed

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	Idle / Nominal [-]		
Default value	Nominal	Alternative config	NO
Step	[-]		
Comm object	10046	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Selects the function of the binary output IDLE/NOMINAL (PAGE 349) during engine cooling state.			

Idle	Cooling is executed at Idle speed and generator protections are switched off.
Nominal	Cooling is executed at Nominal speed and generator protections are active.

Note: When ECU is connected the predefined value 900 RPM for Idle speed is requested.

Note: Binary output IDLE/NOMINAL (PAGE 349) must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor.

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Subgroup: Stopping Timers

Cooling Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 3 600 [s]		
Default value	30 s	Alternative config	NO
Step	1 s		
Comm object	8258	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Runtime of the unloaded Gen-set to cool the engine before stop.			

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Stop Time

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	Alternative config	NO
Step	1 s		
Comm object	9815	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

Under normal conditions the engine must certainly stop within this period after the **FUEL SOLENOID (PAGE 342)** has been de-energized and the **STOP SOLENOID (PAGE 357)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off.
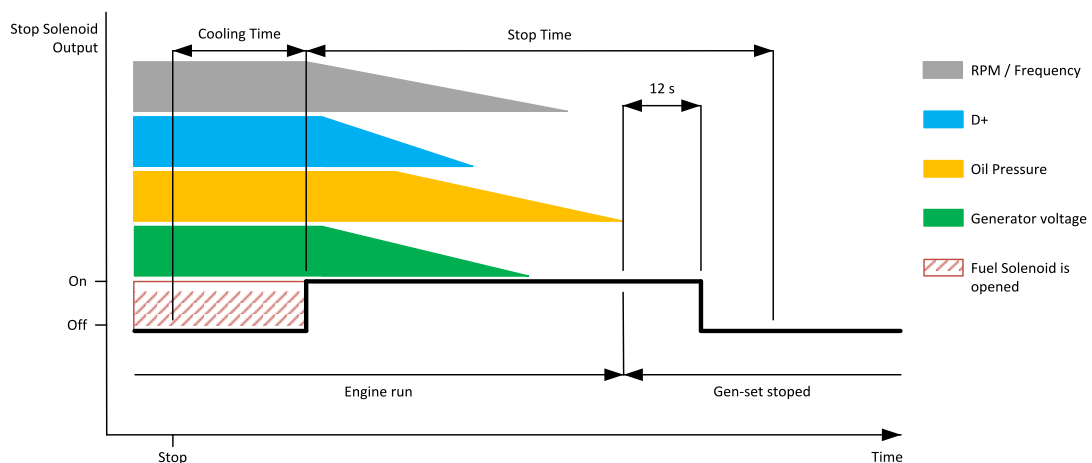
Image 8.6 Stop Time 1

Image 8.7 Stop Time 2
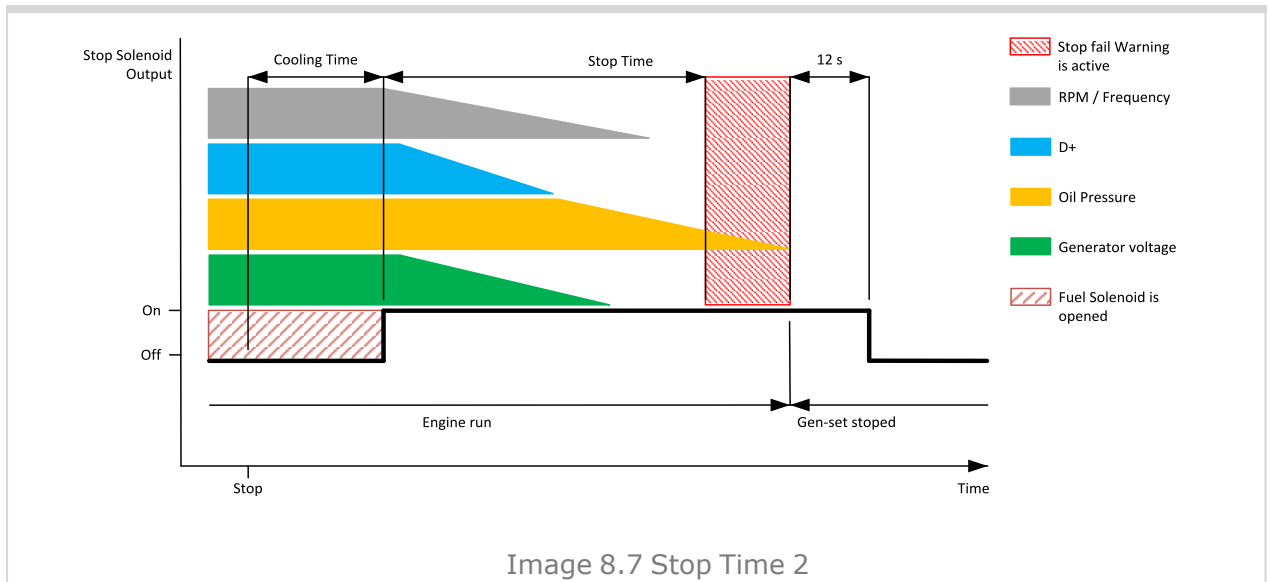
⏶ **back to List of setpoints**

Subgroup: D+ Function

D+ Function

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	Enabled / ChargeFail / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9683	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Behavior of D+ terminal.			

Enabled	The D+ terminal is used for both functions – "running engine" detection and charge fail detection.
ChargeFail	The D+ terminal is used for charge fail detection only. There are 2 operation states. First state is excitation of alternator - this state is active until Idle Time elapses. Second state is evaluation of alternator voltage - this state is active after Idle Time elapses until engine is stopped.
Disabled	The D+ terminal is not used.
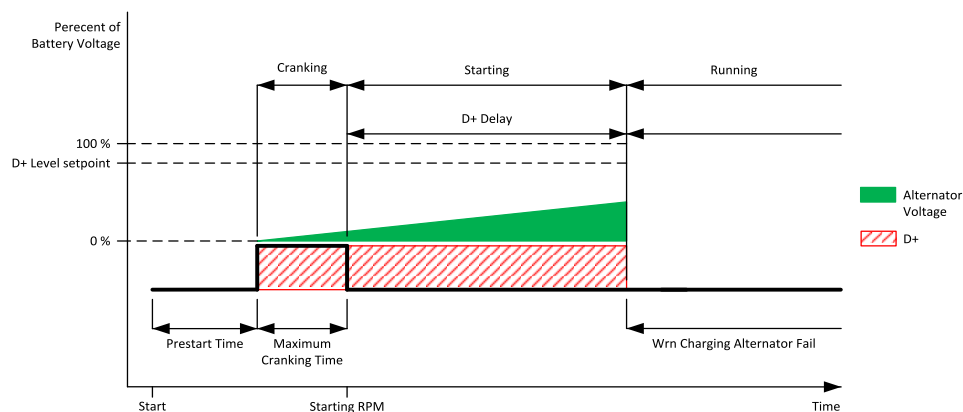
Image 8.8 D+ Function 2

> **Note:** *Delay of this function is adjusted via **D+ Delay (page 178)** setpoint, threshold of this function is adjusted via **D+ Threshold (page 177)** setpoint.*

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D+ Threshold

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0..100 [%]		
Default value	80 %	Alternative config	NO
Step	1 % of actual value of **Battery Volts (page 290)**		
Comm object	14959	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 176)** is not set to *Disabled* value.		
Description			
This setpoint adjusts threshold level for **D+ Function (page 176)**. This treshold has to be reached before Idle time elapses.			

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D+ Delay

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	1..255 [s]		
Default value	1 s	Alternative config	NO
Step	1 s		
Comm object	14960	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 176)** is not set to *Disabled* value.		
Description			
This setpoint adjusts delay for **D+ Function (page 176)**. This delay is used for:			

> Alarm **Wrn Charging Alternator Fail (page 372)**.

> For engine running condition – evaluation of Stop Fail alarm based on D+ value

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D+ Alarm Type

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	No Protec/Wrn/Sd [-]		
Default value	Wrn	Alternative config	NO
Step	[-]		
Comm object	15751	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 176)** is not set to *Disabled* value.		
Description			
This setpoint adjusts type of alarm **Wrn Charging Alternator Fail (page 372)**.			

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Subgroup: Engine Protections

Overspeed Sd

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	**Underspeed Sd (page 272)** 50 .. 200 [%]		
Default value	115%	Alternative config	NO
Step	1 % of **Nominal RPM (page 152)**		
Comm object	8263	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for over speed protection. Relative to the nominal speed.			

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Starting Overspeed Sd

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	100 ..200 [%]		
Default value	115%	Alternative config	NO
Step	1 %		
Comm object	11033	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

The rise up threshold for overspeed protection. The time for which this level is accepted is defined as **Starting Overspeed Time (page 180)**. This period starts to be counted once the RPM exceeds the value **Starting RPM (page 164)**. The threshold **Overspeed Sd (page 178)** starts to be valid once this period elapsed.

The type of reaction of the overspeed protection within the **Starting Overspeed Time (page 180)** is defined by the setpoint **Starting Overspeed Protection (page 180)**, so it is either considered as Sd Overspeed or unsuccessful start attempt. Then the next start attempt is enabled once the engine was stopped. History record Starting Overspeed should be written in this case.
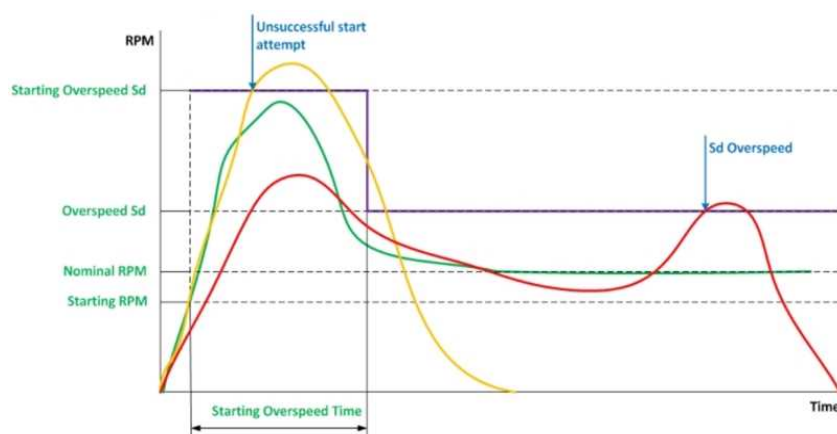
Image 8.9 Staring speed overshoot > Ovespeed Sd
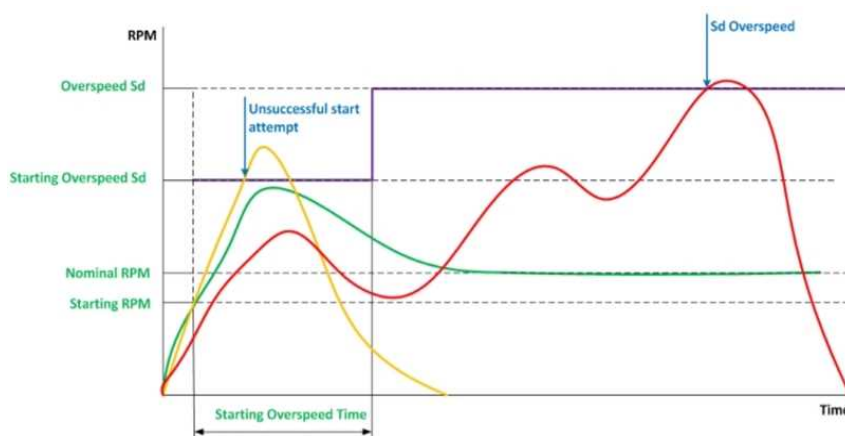
Image 8.10 Staring speed overshoot < Ovespeed Sd

Starting Overspeed Time

Setpoint group	Engine protection	**Related FW**	1.1.0
Range [units]	0 .. 255 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	14108	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Time when **Starting Overspeed Sd (page 179)** level is used for overspeed protection. This time starts countdown when starting RPM are reached.			

Starting Overspeed Protection

Setpoint group	Engine settings	**Related FW**	1.1.0
Range [units]	OverSpd Sd / NextStartAt [-]		
Default value	OverSpd Sd	**Alternative config**	NO
Step	[-]		
Comm object	15808	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
The setpoint allows user to chose which kind of protection will be triggered if speed limit is reached during **Starting Overspeed Time (page 180)**.			

Sd overspeed option will result in controller shutting down the engine and displaying Sd Starting Overspeed alarm and NextStartAt option will result in controller stopping the engine and trying to start again. The number of attempts is defined by **Cranking Attempts (page 163)**.

Fuel Tank Volume

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 10 000 [l]		
Default value	200 l	Alternative config	NO
Step	1 l		
Comm object	11103	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if the logical analog input FUEL LEVEL (PAGE 362) is or ECU is configured		
Description			
Define a capacity of Gen-set fuel tank.			

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Oil Pressure Delay

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	3.0 s	Alternative config	YES
Step	0.1 s		
Comm object	65535	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Oil Pressure (page 381)**/**Sd Oil Pressure (page 392)** user protection.			

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Oil Pressure Wrn

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0.0 .. 10.0 [bar]		
Default value	2.0 bar	Alternative config	YES
Step	0.1 bar		
Comm object	65534	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Oil Pressure (page 381)** user protection.			

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Oil Pressure Sd

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0.0 .. 10.0 [bar]		
Default value	1.0 bar	Alternative config	YES
Step	0.1 bar		
Comm object	65533	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Sd Oil Pressure (page 392)** user protection.			

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Coolant Temp Delay

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	5.0 s	Alternative config	YES
Step	0.1 s		
Comm object	65532	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Coolant Temp (page 371)**/**BOC Coolant Temp (page 392)** user protection.			

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Coolant Temp Wrn

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	-16 .. 120 [°C]		
Default value	80 °C	Alternative config	YES
Step	1 °C		
Comm object	65531	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Coolant Temp (page 371)** user protection.			

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Coolant Temp BOC

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	-16 .. 120 [°C]		
Default value	90 °C	Alternative config	YES
Step	1 °C		
Comm object	65530	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **BOC Coolant Temp (page 392)** user protection.			

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Fuel Level Delay

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0.0 .. 3600.0 [s]		
Default value	10.0 s	Alternative config	YES
Step	0.1 s		
Comm object	65527	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Wrn Fuel Level (page 371)**/**BOC Fuel Level (page 392)** user protection.			

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Fuel Level Wrn

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0 .. 100 [%]		
Default value	20 %	Alternative config	YES
Step	1 %		
Comm object	65526	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **Wrn Fuel Level (page 371)** user protection.			

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Fuel Level BOC

Setpoint group	User Setpoints	Related FW	1.1.0
Range [units]	0 .. 100 [%]		
Default value	10 %	Alternative config	YES
Step	1 %		
Comm object	65525	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for **BOC Fuel Level (page 392)** user protection.			

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Subgroup: Fuel Pump

Fuel Pump On

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. **Fuel Pump Off (page 185)** [%]		
Default value	20 %	Alternative config	NO
Step	1 %		
Comm object	10100	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	All the time		
Description			

Threshold level for switching the binary output FUEL PUMP (PAGE 342) on.
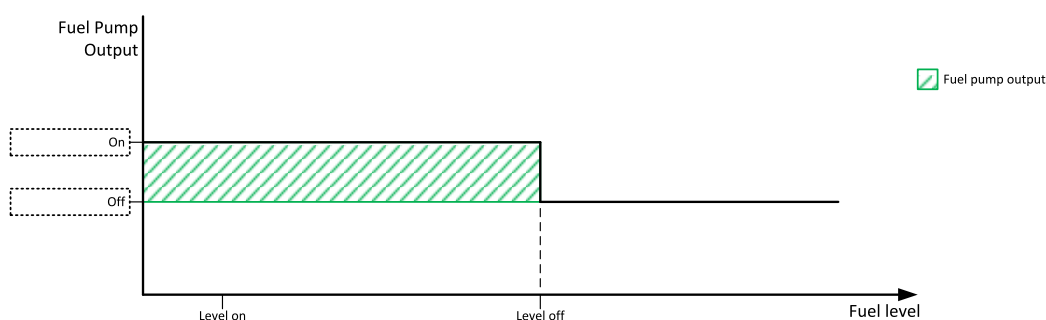
Image 8.11 Fuel Pump On

> IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 326) is configured then binary output FUEL PUMP (PAGE 342) is control by this binary input. Setpoints Fuel Pump On and Fuel Pump Off (page 185) are not evaluated!

Note: Value from analog input has higher priority than ECU.
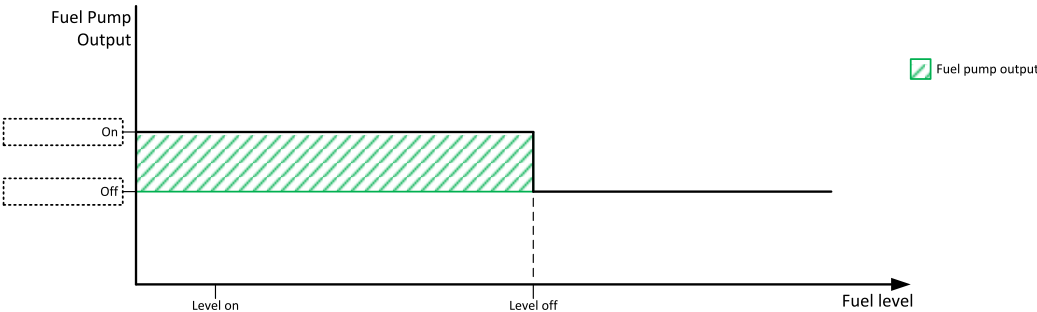
⏏ **back to List of setpoints**

Fuel Pump Off

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	**Fuel Pump On (page 184) .. 100 [%]**		
Default value	90 %	Alternative config	NO
Step	1 %		
Comm object	10101	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	All the time		
Description			

Threshold level for switching the binary output FUEL PUMP (PAGE 342) off.

Image 8.12 Fuel Pump Off

IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 326) is configured then binary output FUEL PUMP (PAGE 342) is control by this binary input. Setpoints **Fuel Pump On (page 184)** and **Fuel Pump Off** are not evaluated!

Note: Value from analog input has higher priority than ECU.

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Transfer Wrn Delay

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	Disabled / 1 .. 600 [s]		
Default value	30 s	Alternative config	NO
Step	1 s		
Comm object	10685	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if the logical binary output FUEL PUMP (PAGE 342) is configured		
Description			
If the controller does not see the fuel increase during fuel transfer within this time alarm **Wrn Fuel Transfer Failed (page 372)** will be displayed and the FUEL PUMP (PAGE 342) will be turned off. Alarm **Wrn Fuel Transfer Failed (page 372)** will be displayed but this alarm becomes immediately inactive and it will be possible to delete this message by the Fault reset button. If the fault is deleted the controller will initiate the transfer again.			

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Subgroup: Battery Protections

Battery Undervoltage

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	8.0 V .. **Battery Overvoltage (page 187)** [V]		
Default value	18.0 V	Alternative config	NO
Step	0.1 V		
Comm object	8387	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for low battery voltage.			

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Battery Overvoltage

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	**Battery Undervoltage (page 186)** .. 40.0 [V]		
Default value	36.0 V	Alternative config	NO
Step	0.1 V		
Comm object	9587	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for high battery voltage.			

Battery <> Voltage Delay

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 600 [s]		
DefaultFixed value	5 s	Alternative config	NO
Step	1 s		
Comm object	8383	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Battery Undervoltage (page 186)** and **Battery Overvoltage (page 187)** protection.			
IMPORTANT: This is a fixed parameter, it isn't possible to adjust it in any manner. This parameter isn't visible either in controller or in PC tools.			

Manual ECU Activation Timeout

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0 .. 300 [min]		
Default value	60 min	Alternative config	NO
Step	1 min		
Comm object	19707	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			
The setpoint allows user to set length of ECU manual activation in OFF mode. LBO ECU Power Relay is activated by Start button. This LBO is active until Stop button is pressed, or until timeout elapses or until mode is changed.			

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Group: Maintenance Timers

Subgroup: Maintenance Timer 1

Maintenance Timer 1 RunHours

Setpoint group	Maintenance Timers	Related FW	1.1.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	Alternative config	NO
Step	1 h		
Comm object	13853	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again.			

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Maintenance Timer 1 Interval

Setpoint group	Maintenance Timers	Related FW	1.1.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	Alternative config	NO
Step	1 month		
Comm object	20583	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance Timer 1 Interval (page 293)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again. Setting of the setpoint does not change when the reset is done, only the **Maintenance Timer 1 Interval (page 293)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 1 Protection

Setpoint group	Maintenance Timers	Related FW	1.1.0
Range [units]	Warning / BOC [-]		
Default value	Warning	Alternative config	NO
Step	[-]		
Comm object	20586	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 1 RunHours (page 189)** and **Maintenance Timer 1 Interval (page 189)**. Maintenance timer can be reset with LBI Maintenance Timer 1 Reset (page 328).			

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Group: Generator settings

Subgroup: Overload Protection

Overload BOC

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	**Overload Wrn (page 191)** .. 200 [%]		
Default value	120 %	Alternative config	NO
Step	1 % of **Nominal Power (page 143)**		
Comm object	8280	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of Nominal power) protection. Protection is BOC (Breaker Open and Gen-set Cooldown). *Note: When there is no control of breakers, the type of protection is Sd not BOC.*			

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Overload Wrn

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0 .. 200 [%]		
Default value	120 %	Alternative config	NO
Step	1 % of **Nominal Power (page 143)**		
Comm object	9685	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of **Nominal Power (page 143)**) protection. This is only warning.			

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Overload Delay

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	Alternative config	NO
Step	0.1 s		
Comm object	8281	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for protections **Overload BOC (page 191)** and **Overload Wrn (page 191)**.			

⏶ **back to List of setpoints**

Subgroup: Current Protection

Short Circuit BOC

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	100 .. 500 [%]		
Default value	250 %	Alternative config	NO
Step	1 % of **Nominal Current (page 144)**		
Comm object	8282	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Protection occurs when generator current reaches this preset threshold. Type of the protection is BOC. *Note: When there is no control of breakers, the type of protection is Sd not BOC.*			

⏶ **back to List of setpoints**

Short Circuit BOC Delay

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0.00 .. 10.00 [s]		
Default value	0.04 s	Alternative config	NO
Step	0.01 s		
Comm object	9991	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Delay for **Short Circuit BOC (page 192)** protection.			

⏶ **back to List of setpoints**

Current Unbalance BOC

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	1 .. 200 [%] of **Nominal Current (page 144)**		
Default value	50 %	Alternative config	NO
Step	1 % of **Nominal Current (page 144)**		
Comm object	8284	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**		
Description			
Threshold for generator current asymmetry (unbalance). Protection is BOC (Breaker Open and Gen-set Cooldown). *Note: When there is no control of breakers, the type of protection is Sd not BOC.*			

⬤ **back to List of setpoints**

Current Unbalance BOC Delay

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	Alternative config	NO
Step	0.1 s		
Comm object	8285	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**		
Description			
Delay for **Current Unbalance BOC (page 193)** protection.			

⬤ **back to List of setpoints**

Subgroup: Voltage Protection

Generator Overvoltage Sd

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	Generator Overvoltage Wrn (page 194) .. 200 [%]		
Default value	110 %	Alternative config	NO
Step	1 % of Nominal Voltage Ph-N (page 148) or Nominal Voltage Ph-Ph (page 148)		
Comm object	8291	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used. *Note: Phase to phase and phase to neutral voltages are used for this protection.*			

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Generator Overvoltage Wrn

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	Generator Undervoltage Wrn (page 195) .. Generator Overvoltage Sd (page 194) [%]		
Default value	110 %	Alternative config	NO
Step	1 % of Nominal Voltage Ph-N (page 148) or Nominal Voltage Ph-Ph (page 148)		
Comm object	9686	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used. *Note: Phase to phase and phase to neutral voltages are used for this protection.*			

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Generator Undervoltage Wrn

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	Generator Undervoltage BOC (page 195) .. Generator Overvoltage Wrn (page 194) [%]		
Default value	70 %	Alternative config	NO
Step	1 % of Nominal Voltage Ph-N (page 148) or Nominal Voltage Ph-Ph (page 148)		
Comm object	9687	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. *Note: Phase to phase and phase to neutral voltages are used for this protection.*			

⏶ **back to List of setpoints**

Generator Undervoltage BOC

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0 .. Generator Undervoltage Wrn (page 195) [%]		
Default value	70 %	Alternative config	NO
Step	1 % of Nominal Voltage Ph-N (page 148) or Nominal Voltage Ph-Ph (page 148)		
Comm object	8293	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. *Note: Phase to phase and phase to neutral voltages are used for this protection.* *Note: When there is no control of breakers, the type of protection is Sd not BOC.*			

⏶ **back to List of setpoints**

Generator <> Voltage Delay

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	Alternative config	NO
Step	0,1 s		
Comm object	9103	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Generator Overvoltage Sd (page 194)**, **Generator Overvoltage Wrn (page 194)**, **Generator Undervoltage BOC (page 195)** and **Generator Undervoltage Wrn (page 195)** protection.			

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Subgroup: Frequency Protection

Generator Overfrequency BOC

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	**Generator Overfrequency Wrn (page 196)** .. 200,0 [%]		
Default value	110,0 %	Alternative config	NO
Step	0,1 % of **Nominal Frequency (page 151)**		
Comm object	8296	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 overfrequency.			
Note: When there is no control of breakers, the type of protection is Sd not BOC.			

⏶ **back to List of setpoints**

Generator Overfrequency Wrn

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	**Generator Underfrequency Wrn (page 197)** .. **Generator Overfrequency BOC (page 196)** [%]		
Default value	110,0 %	Alternative config	NO
Step	0,1 % of **Nominal Frequency (page 151)**		
Comm object	9688	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 overfrequency.			

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Generator Underfrequency Wrn

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	Generator Underfrequency BOC (page 197) .. Generator Overfrequency Wrn (page 196) [%]		
Default value	85,0 %	Alternative config	NO
Step	0,1 % of Nominal Frequency (page 151)		
Comm object	9689	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 underfrequency.			

⏷ back to List of setpoints

Generator Underfrequency BOC

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0,0 .. Generator Underfrequency Wrn (page 197) [%]		
Default value	85,0 %	Alternative config	NO
Step	0,1 % of Nominal Frequency (page 151)		
Comm object	8298	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 underfrequency.			
Note: When there is no control of breakers, the type of protection is Sd not BOC.			

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Generator <> Frequency Delay

Setpoint group	Generator settings	Related FW	1.1.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	Alternative config	NO
Step	0,1 s		
Comm object	8297	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Generator Overfrequency BOC (page 196)**, **Generator Overfrequency Wrn (page 196)**, **Generator Underfrequency Wrn (page 197)** and **Generator Underfrequency BOC (page 197)** protection.			

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Subgroup: Reverse Power Protection

IDMT Reverse Power Level

Setpoint group	Generator settings	**Related FW**	1.1.0
Range [units]	0 .. 50 [%]		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 143)**		
Comm object	8486	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Level for generator Reverse Power Protection. Protection gets active when the level of active power [kW] gets under limit given by setpoint **IDMT Reverse Power Level (page 198)** for time longer than calculated delay. Delay is calculated by following formula: **Reaction time [s**] = (Reverse Power Delay * (IDMT Reverse Power Level * Nominal Power/100)) / (ABS (Generator P) - (IDMT Reverse Power Level * Nominal Power/100))			

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IDMT Reverse Power Delay
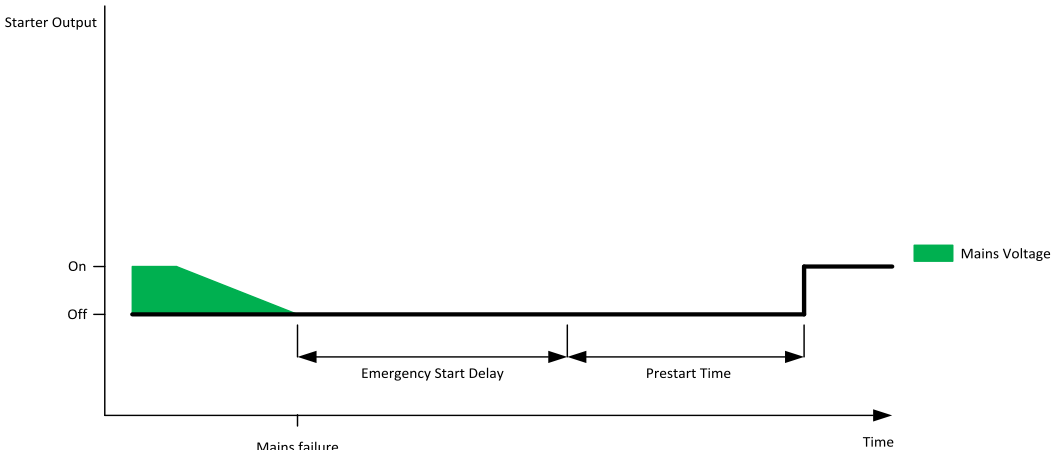
Setpoint group	Generator settings	**Related FW**	1.1.0
Range [units]	0.0 .. 600 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8552	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
IDMT curve shape selection for generator Reverse Power Protection. Protection gets active when the level of active power [kW] gets under limit given by setpoint **IDMT Reverse Power Level (page 198)** for time longer than calculated IDMT delay.			

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Group: Mains Settings

Emergency Start Delay

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	0 .. 6 000 [s]		
Default value	5 s	Alternative config	NO
Step	1 s		
Comm object	8301	Related applications	AMF
Config level	Standard		
Setpoint visibility			
Description			
Delay after the mains failure to the start command of the Gen-set.			

Image 8.13 Emergency Start Delay

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Mains Return Delay

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	1 .. 3 600 [s]		
Default value	20 s	Alternative config	NO
Step	1 s		
Comm object	8302	Related applications	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
This setpoint adjust the delay, how long mains has to be returned after mains fail to start load transfer to mains.			

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Transfer Delay

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	Alternative config	NO
Step	0.1 s		
Comm object	8303	Related applications	AMF
Config level	Standard		
Setpoint visibility	All the time		
Description			

Transition Delay between power sources.

Delay after GCB opening to MCB closing during the return procedure. Delay after MCB opening to GCB closing if the setpoint **MCB Opens On (page 205)** is set to GENRUN.

The time charts bellow show recommended setting of Transfer Delay setpoint. If the Transfer Delay setpoint is set shorter than the time required for opening of the circuit breaker, the controller closes **GCB CLOSE/OPEN (PAGE 343)** output straight away (100 ms) after the **MCB FEEDBACK (PAGE 329)** input deactivates.
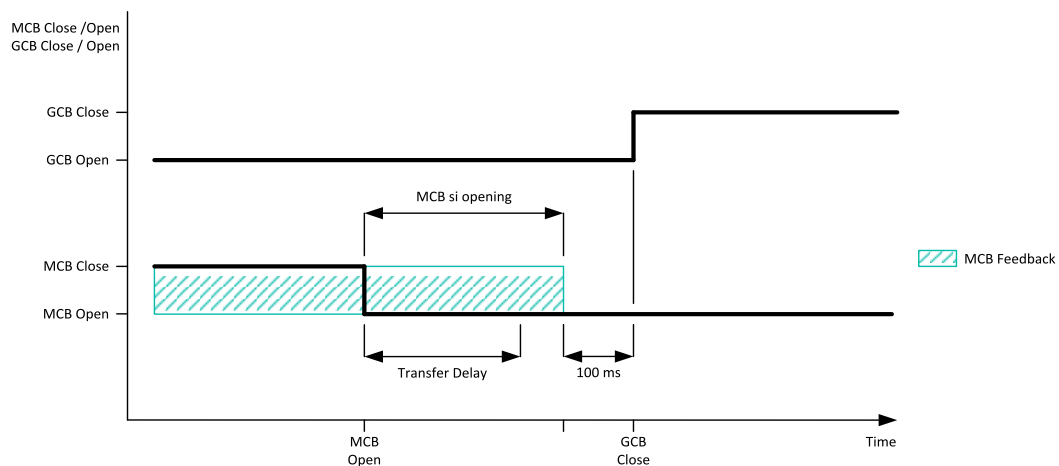
Image 8.14 Transfer Delay 1

If some delay between **MCB FEEDBACK (PAGE 329)** deactivation and closing of **GCB CLOSE/OPEN (PAGE 343)** output is required, then the Transfer Delay must be set to sum of "MCB opening" + "Delay" time.
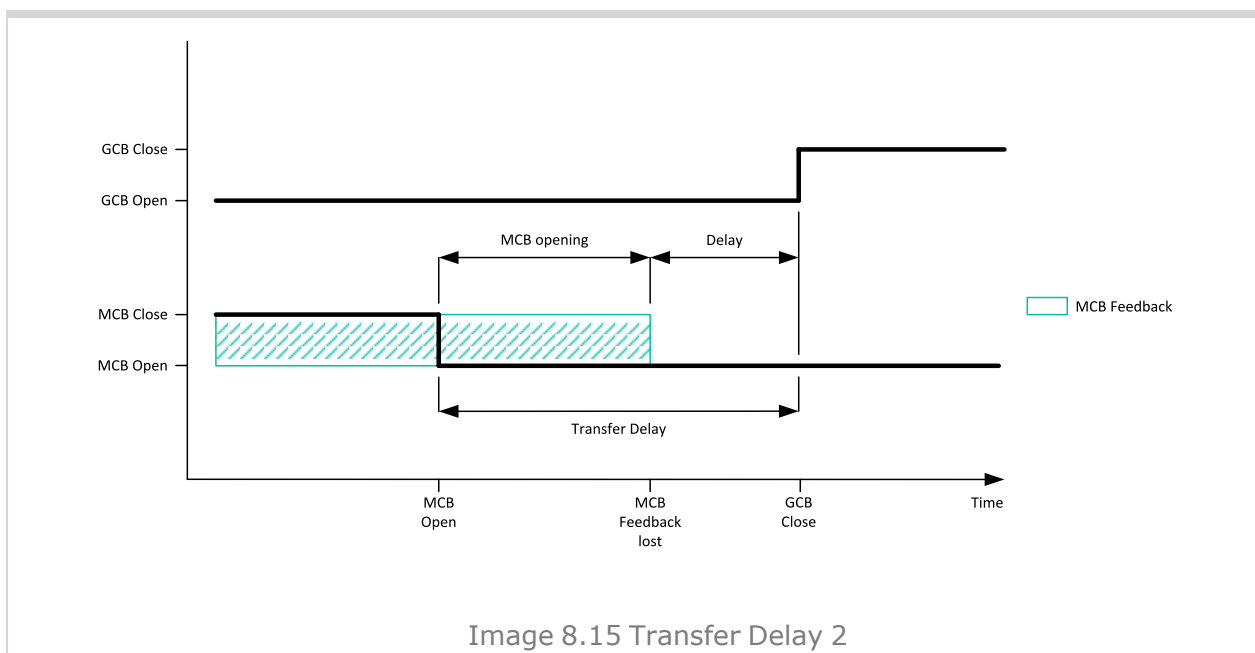
Image 8.15 Transfer Delay 2

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Mains Overvoltage

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	**Mains Undervoltage (page 202)** .. 150 [%]		
Default value	110 %	Alternative config	NO
Step	1 % of **Nominal Voltage Ph-Ph (page 148)**		
Comm object	8305	Related applications	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
Threshold for Mains overvoltage. All three phases are checked. Maximum out of three is used.			

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Mains Undervoltage

Setpoint group	Mains Settings	**Related FW**	1.1.0
Range [units]	50 .. **Mains Overvoltage (page 201)** [%]		
Default value	60 %	**Alternative config**	YES
Step	1 % of **Nominal Voltage Ph-Ph (page 148)**		
Comm object	8307	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
Threshold for Mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

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Mains Overvoltage Delay

Setpoint group	Mains Settings	**Related FW**	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	8306	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
Delay for **Mains Overvoltage (page 201)** protection.			

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Mains Undervoltage Delay

Setpoint group	Mains Settings	**Related FW**	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	8308	**Related applications**	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
Delay for **Mains Undervoltage (page 202)** protection.			

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Subgroup: Mains Frequency Limits

Mains Overfrequency

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	**Mains Underfrequency (page 203)** .. 150 [%]		
Default value	102.0 %	Alternative config	NO
Step	1.0 % of **Nominal Frequency (page 151)**		
Comm object	8310	Related applications	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
Threshold for Mains overfrequency.			

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Mains Underfrequency

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	50 .. **Mains Overfrequency (page 203)** [%]		
Default value	98.0 %	Alternative config	NO
Step	1.0 % of **Nominal Frequency (page 151)**		
Comm object	8312	Related applications	AMF
Config level	Standard		
Setpoint visibility	All the time		
Description			
Threshold for Mains underfrequency.			

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Mains < > Frequency Delay

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	0.5 s	Alternative config	NO
Step	0.1 s		
Comm object	8311	Related applications	AMF
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			
Delay for **Mains Underfrequency (page 203)** and **Mains Overfrequency (page 203)** protection.			

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MCB Logic

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	Close On / Close Off [-]		
Default value	Close Off	**Alternative config**	NO
Step	[-]		
Comm object	8444	**Related applications**	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			

The setpoint influences the behavior of the output **MCB CLOSE/OPEN (PAGE 350)**.

Close On When the output **MCB CLOSE/OPEN (PAGE 350)** is active – MCB should be closed.

Close Off When the output **MCB CLOSE/OPEN (PAGE 350)** is active – MCB should be opened.

Image 8.16 MCB Logic 1

Image 8.17 MCB Logic 2
(missing snippet link)

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MCB Opens On

Setpoint group	Mains Settings	Related FW	1.1.0
Range [units]	Mains Fail / Gen Run [-]		
Default value	Gen Run	Alternative config	NO
Step	[-]		
Comm object	9850	Related applications	AMF
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 154)**		
Description			

Setpoint adjust the behavior of opening MCB in AUTO mode when there is mains fail.

Mains Fail	The command to open the MCB is given immediately after mains fail condition is evaluated.
Gen Run	MCB will be opened when engine will be running and it will be possible to transfer load from Mains to Gen-set (after stabilization phase). *Note: This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.*

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Group: Analog Switches

Subgroup: Analog Switches 1

AIN Switch01 On

Setpoint group	Analog Switches	Related FW	1.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	Alternative config	NO
Step	the step is defined by an analog sensor curve		
Comm object	11407	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 334)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 334)** on. The value is measured from **AIN SWITCH 01 (PAGE 361)** analog input.

Image 8.18 General analog input 1 switch

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AIN Switch01 Off

Setpoint group	Analog Switches	Related FW	1.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	Alternative config	NO
Step	the step is defined by an analog sensor curve		
Comm object	11410	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN Switch01 (page 334)** is configured		
Description			

Threshold level for switching the binary output **AIN Switch01 (page 334)** off. The value is measured from **AIN Switch 01 (page 361)** analog input.
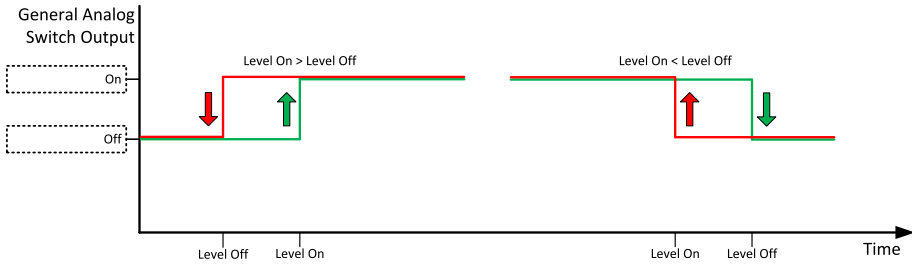
Image 8.19 General analog input 1 switch

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Subgroup: Analog Switches 2

AIN Switch02 On

Setpoint group	Analog Switches	Related FW	1.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	Alternative config	NO
Step	the step is defined by an analog sensor curve		
Comm object	11408	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 334)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH02 (PAGE 334)** on. The value is measured from **AIN SWITCH 02 (PAGE 361)** analog input. Image 8.20 General analog input 2 switch			
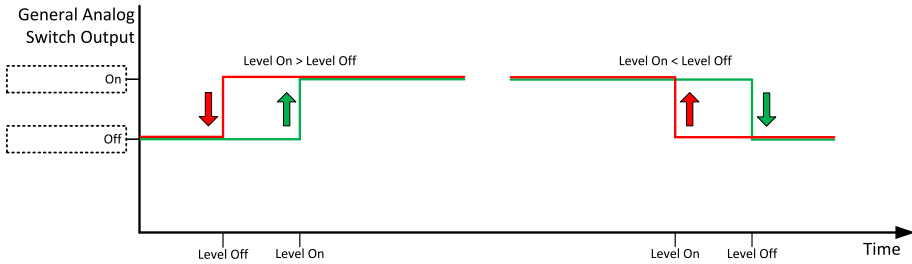
⏷ **back to List of setpoints**

AIN Switch02 Off

Setpoint group	Analog Switches	**Related FW**	1.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11411	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 334)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH02 (PAGE 334)** off. The value is measured from **AIN SWITCH 02 (PAGE 361)** analog input. Image 8.21 General analog input 2 switch			

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Group: Scheduler

Subgroup: Time & Date

Time

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	HH:MM:SS [-]		
Default value	00:00:00	Alternative config	NO
Step	[-]		
Comm object	24554	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Real time clock adjustment.			
Note: RTC has no backup battery. This setpoint needs to be set-up after connection of +/- terminal.			

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Date

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	DD/MM/YYYY [-]		
Default value	1.1.2015	Alternative config	NO
Step	[-]		
Comm object	24553	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Actual date adjustment.			
Note: RTC has no backup battery. This setpoint needs to be set-up after connection of +/- terminal.			

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Time Stamp act

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Disabled / Condition / Always [-]		
Default value	DISABLED	Alternative config	NO
Step	[-]		
Comm object	10532	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

The setpoint selects the Time stamp function mode.

Disabled	The function is disabled.
Condition	While the binary input TIME STAMP ACT (PAGE 331) is active the Time stamps records are recorded into the history log with period adjusted by setpoint **Time Stamp Period (page 211)**. When binary input TIME STAMP ACT (PAGE 331) is not active, Time stamps records are recorded into the history log with period adjusted by setpoint **Time Stamp Period OFF (page 212)**.
Always	The Time stamps records are recorded into the history log with period adjusted by setpoint **Time Stamp Period (page 211)** all the time while the controller is switched on.

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Time Stamp Period

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	0 .. 240 [min]		
Default value	60 min	Alternative config	NO
Step	1 min		
Comm object	8979	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Time interval for periodic history records. This period is used when **Time Stamp act (page 211)** is adjusted to option always or when **Time Stamp act (page 211)** is adjusted to option condition and LBI TIME STAMP ACT (PAGE 331) is active.

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Time Stamp Period OFF

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	0 .. 240 [min]		
Default value	0 min	Alternative config	NO
Step	1 min		
Comm object	17771	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Time interval for periodic history records.This period is used when **Time Stamp act (page 211)** is adjusted to option condition and LBI TIME STAMP ACT (PAGE 331) is not active.			

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DST Switching Mode

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	[AUTO / MANUAL / DISABLED]		
Default value	AUTO	Alternative config	NO
Step	[-]		
Comm object	20250	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Switches the mode of Daylight Saving Time (DST).			

AUTO	Activation, deactivation of the DST, and changing of the RTC Time value accordingly is performed automatically by the controller. The user always sees valid local time without any action from his side.
MANUAL	Activation, and deactivation of the DST is performed manually by the user via the setpoint **Time Mode (page 213)**. Changing of the RTC Time value accordingly is then performed automatically by the controller. So the user does not need to readjust the RTC time, he only needs to select the proper **Time Mode (page 213)**.
DISABLED	**Time Mode (page 213)** is fixedly set to STD and the function does not perform any changes of RTC time.

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DST Period Rule

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	AUSTRALIA, CHILE, EUROPE, MEXICO, NEW ZEALAND, PARAGUAY, US/CANADA [-]		
Default value	AUSTRALIA	**Alternative config**	NO
Step	[-]		
Comm object	20251	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if **DST Switching Mode (page 212)** = AUTO		
Description			
Selection of the rule that will be applied for the calculation of the Daylight Saving Time (DST) validity period.			

DST Period Rule	DST Validity period
EUROPE	01:00 GMT last Sunday in March – 01:00 GMT last Sunday in October.
US/CANADA	02:00 local time 2nd Sunday in March – 03:00 local time 1st Sunday in November.
MEXICO	02:00 local time 1st Sunday in April – 03:00 local time last Sunday in October.
AUSTRALIA	02:00 local time 1st Sunday in October – 03:00 local time 1st Sunday in April.
NEW ZEALAND	02:00 local time last Sunday in September – 03:00 local time 1st Sunday in April.
CHILE	00:00 local time 1st Sunday in September – 00:00 local time 1st Sunday in April.
PARAGUAY	00:00 local time 1st Sunday in October – 00:00 local time 4th Sunday in March.

Time Mode

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	- [STD / DST]		
Default value	STD	**Alternative config**	NO
Step	[-]		
Comm object	20249	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if **DST Switching Mode (page 212)** = MANUAL		
Description			
In manual **DST Switching Mode (page 212)** this input is used to adjust the actual time mode. In any other **DST Switching Mode (page 212)** this input is not taken into account.			

Time Zone

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00	Alternative config	NO
Step	[-]		
Comm object	24366	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone.

Note: If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.

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Subgroup: Timer 1

Timer 1 Function

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Disable / Manual On / No Func / Rem Start/Stop / Auto Run / Mode OFF [-]		
Default value	Disable	Alternative config	NO
Step	[-]		
Comm object	15358	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

It is possible to choose from following timer functions. Binary output EXERCISE TIMER 1 (PAGE 341) is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

Controller activates timer whenever it is powered up even in period, where timer should be already running.

Disable	The Timer is disabled.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:** This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the timer is internally is switched to the OFF mode.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the REMOTE START/STOP (PAGE 330) binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the MAINS FAIL BLOCK (PAGE 328) binary input.

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Timer 1 Setup

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	[-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	10969	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Related setpoints for timer 1 are:			

Related setpoints for timer 1 are:

- Timer 1 Function (page 215)
- Timer 1 Repetition (page 217)
- Timer 1 First Occur. Date (page 216)
- Timer 1 First Occur. Time (page 217)
- Timer 1 Duration (page 217)
- Timer 1 Repeated (page 218)
- Timer 1 Repeat Day (page 218)
- Timer 1 Day (page 219)
- Timer 1 Repeated Day In Week (page 219)
- Timer 1 Repeat Day In Month (page 219)
- Timer 1 Repeat Week In Month (page 220)
- Timer 1 Refresh Period (page 221)
- Timer 1 Weekends (page 222)

⏏ back to List of setpoints

Timer 1 First Occur. Date

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Date of first occurrence of **Timer 1 Function (page 215)**.			

⏏ back to List of setpoints

Timer 1 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Time of first occurrence of **Timer 1 Function (page 215)**.			

⏏ **back to List of setpoints**

Timer 1 Duration

Setpoint group	Scheduler	**Related FW**	1.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Timer 1 Function (page 215) duration time.			

⏏ **back to List of setpoints**

Timer 1 Repetition

Setpoint group	Scheduler	**Related FW**	1.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Defines repetition of **Timer 1 Function (page 215)**.			

Off	**Timer 1 Function (page 215)** will not be activated.
Once	**Timer 1 Function (page 215)** will be activated only one time.
Repeated	**Timer 1 Function (page 215)** will be repeatedly activated.

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Timer 1 Repeated

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			

Repeated interval of **Timer 1 Function (page 215)**.

Daily	**Timer 1 Function (page 215)** is repeated every day.
Weekly	**Timer 1 Function (page 215)** is repeated every week in chosen days.
Monthly	**Timer 1 Function (page 215)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 1 Function (page 215)** is repeated in adjusted period.

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Timer 1 Repeat Day

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 1 Function (page 215)**.

Repeated Day	Chose one day in month when **Timer 1 Function (page 215)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 1 Function (page 215)** will be activated.

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Timer 1 Day

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button.			

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Timer 1 Repeated Day In Week

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Use this setpoint to select the day of week when timer will be activated. *Note: More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 1 Repeat Day In Month

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	1..31 [day]		
Default value	0	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
Use this setpoint to chose the day in month when the **Timer 1 Function (page 215)** will be activated.			

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Timer 1 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			
This setpoint adjust the week of month in which the **Timer 1 Function (page 215)** will be activated.			

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Timer 1 Refresh Period

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			

Refresh period of **Timer 1 Function (page 215)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 1 Repeated (page 218)**.

Daily	Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated. **Example:** If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of **Timer 1 Function (page 215)**, the **Timer 1 Function (page 215)** will be activated.
Weekly	Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated. **Example:** If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of **Timer 1 Function (page 215)**, the **Timer 1 Function (page 215)** will be activated in selected days adjusted by **Timer 1 Day (page 219)**.
Monthly	Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated. **Example:** If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of **Timer 1 Function (page 215)**, the **Timer 1 Function (page 215)** will be activated in selected day of month adjusted by **Timer 1 Repeat Day In Month (page 219)** or in selected days of week of month adjusted by **Timer 1 Day (page 219)** and **Timer 1 Repeat Week In Month (page 220)**.
Short Period	Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated. **Example:** If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of **Timer 1 Function (page 215)**, the **Timer 1 Function (page 215)** will be activated.

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Timer 1 Weekends

Setpoint group	Scheduler	Related FW	1.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	Alternative config	NO
Step	[-]		
Comm object	0	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 215)**		
Description			

Behavior of **Timer 1 Function (page 215)** on weekends.

Including	**Timer 1 Function (page 215)** counter is running on the weekends and **Timer 1 Function (page 215)** can be active.
Skip	**Timer 1 Function (page 215)** counter is running on the weekends but **Timer 1 Function (page 215)** isn't active.
Postpone	**Timer 1 Function (page 215)** counter isn't running on the weekends and **Timer 1 Function (page 215)** isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date.

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Group: Geo-Fencing

Subgroup: Geo Fencing

Geo-Fencing

Setpoint group	Geo-Fencing	**Related FW**	1.1.0
Range [units]	Disabled / Enabled / LBI Enable [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11681	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables or disables geo-fencing function.

Disabled	**Fence 1 Protection (page 225)** and **Fence 2 Protection (page 227)** are disabled.
Enabled	**Fence 1 Protection (page 225)** and **Fence 2 Protection (page 227)** are enabled.
LBI Enable	**Fence 1 Protection (page 225)** and **Fence 2 Protection (page 227)** are enabled only when logical binary input GEO-FENCING ENABLE (PAGE 328) is active.

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Subgroup: Position

Home Latitude

Setpoint group	Geo-Fencing	**Related FW**	1.1.0
Range [units]	-90,0000..90,0000 [°]		
Default value	0,0000 °	**Alternative config**	NO
Step	0,0001 °		
Comm object	14606	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint adjust latitude of "home" position. Home is position where gen-set should runs. Positions on north hemisphere have positive value, position on south hemisphere have negative value.

Note: This value with Home Longitude (page 224) are used for counting Fence 1 Radius (page 226) and Fence 2 Radius (page 228).

Note: This value can be also obtained automatically via logical binary input GEO HOME POSITION (PAGE 327). In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.

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Home Longitude

Setpoint group	Geo-Fencing	**Related FW**	1.1.0
Range [units]	-180,0000..180,0000 [°]		
Default value	0,0000 °	**Alternative config**	NO
Step	0,0001 °		
Comm object	14607	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint adjust longitude of "home" position. Home is position where gen-set should runs. Positions on east hemisphere have positive value, position on west hemisphere have negative value.

> *Note: This value with **Home Latitude (page 223)** are used for counting **Fence 1 Radius (page 226)** and **Fence 2 Radius (page 228)**.*

> *Note: This value can be also obtained automatically via logical binary input GEO HOME POSITION (PAGE 327). In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.*

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Subgroup: Fence 1

Fence 1 Protection

Setpoint group	Geo-Fencing	Related FW	1.1.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	Alternative config	NO
Step	[-]		
Comm object	14610	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Protection type for geo-fencing 1 protection. Fence of circle area is adjusted by setpoint **Fence 1 Radius (page 226)**. Delay for protection is adjusted by setpoint **Fence 1 Delay (page 226)**.			

Protection types

HistRecOnl	Position of gen-set is only measured and displayed on the LCD screen but not used for protection. History record is made if position is out of **Fence 1 Radius (page 226)**.
Wrn	Position of Gen-set is used for warning protection only. Protection is activated when position of the Gen-set is out of **Fence 1 Radius (page 226)**.
Sd	Position of Gen-set is used for shutdown protection. Protection is activated when position of the Gen-set is out of **Fence 1 Radius (page 226)**.
BOC	Position of Gen-set is used for BOC (Breaker Open and Cooling) protection. Protection is activated when position of the Gen-set is out of **Fence 1 Radius (page 226)**.

*Note: Protection is activated also when GPS signal is lost for **Fence 1 Delay (page 226)**.*

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Fence 1 Radius

Setpoint group	Geo-Fencing	Related FW	1.1.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	Alternative config	NO
Step	0,1 km		
Comm object	11677	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Radius for circle area 1. When the Gen-set leaves this area, **Fence 1 Protection (page 225)** is activated after **Fence 1 Delay (page 226)**. *Note: The center of this circle area is defined by "Home" position – setpoints **Home Longitude (page 224) and Home Latitude (page 223)**.*			

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Fence 1 Delay

Setpoint group	Geo-Fencing	Related FW	1.1.0
Range [units]	0..3600 [s]		
Default value	0 s	Alternative config	NO
Step	1 s		
Comm object	11682	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for **Fence 1 Protection (page 225)**.			

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Subgroup: Fence 2

Fence 2 Protection

Setpoint group	Geo-Fencing	Related FW	1.1.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	Alternative config	NO
Step	[-]		
Comm object	14611	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Protection type for geo-fencing 2 protection. Fence of circle area is adjusted by setpoint **Fence 2 Radius (page 228)**. Delay for protection is adjusted by setpoint **Fence 2 Delay (page 228)**.

Protection types

HistRecOnl	Position of gen-set is only measured and displayed on the LCD screen but not used for protection. History record is made if position is out of **Fence 2 Radius (page 228)**.
Wrn	Position of Gen-set is used for warning protection only. Protection is activated when position of the Gen-set is out of **Fence 2 Radius (page 228)**.
Sd	Position of Gen-set is used for shutdown protection. Protection is activated when position of the Gen-set is out of **Fence 2 Radius (page 228)**.
BOC	Position of Gen-set is used for BOC (Breaker Open and Cooling) protection. Protection is activated when position of the Gen-set is out of **Fence 2 Radius (page 228)**.

*Note: Protection is activated also when GPS signal is lost for **Fence 2 Delay (page 228)**.*

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Fence 2 Radius

Setpoint group	Geo-Fencing	Related FW	1.1.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	Alternative config	NO
Step	0,1 km		
Comm object	14608	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Radius for circle area 2. When the Gen-set leaves this area, **Fence 2 Protection (page 227)** is activated after **Fence 2 Delay (page 228)**. *Note: The center of this circle area is defined by "Home" position - setpoints **Home Longitude (page 224) and Home Latitude (page 223)**.*			

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Fence 2 Delay

Setpoint group	Geo-Fencing	Related FW	1.1.0
Range [units]	0..3600 [s]		
Default value	0 s	Alternative config	NO
Step	1 s		
Comm object	14609	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for **Fence 2 Protection (page 227)**.			

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Group: CM-RS232-485

COM1 Mode

Setpoint group	CM-RS232-485	**Related FW**	1.1.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24522	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Communication protocol switch for the COM1 channel.			

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.

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COM1 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24341	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 229)**		
Description			
If the direct mode is selected on COM1 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.			

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COM1 MODBUS Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	Alternative config	NO
Step	[-]		
Comm object	24477	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 229)**		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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COM1 Modbus Mode

Setpoint group	CM-RS232-485	Related FW	1.1.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	Alternative config	NO
Step	[-]		
Comm object	23867	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts communication mode of Modbus-RTU.			

Possible options

8N1	8 data bits, 1 stop bit, no parity
8N2	8 data bits, 2 stop bits, no parity
8E1	8 data bits, 1 stop bit, even parity

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Subgroup: COM2 Setting

COM2 Mode

Setpoint group	CM-RS232-485	Related FW	1.1.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	Alternative config	NO
Step	[-]		
Comm object	24451	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Communication protocol switch for the COM2 channel.			

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.

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COM2 Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	Alternative config	NO
Step	[-]		
Comm object	24340	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM2 Mode (page 231)**		
Description			
If the direct mode is selected on COM2 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.			

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COM2 MODBUS Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	Alternative config	NO
Step	[-]		
Comm object	24420	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM2 Mode (page 231)**		
Description			
If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here.			

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COM2 Modbus Mode

Setpoint group	CM-RS232-485	Related FW	1.1.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	Alternative config	NO
Step	[-]		
Comm object	23866	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts communication mode of Modbus-RTU.			

Possible options

8N1	8 data bits, 1 stop bit, no parity
8N2	8 data bits, 2 stop bits, no parity
8E1	8 data bits, 1 stop bit, even parity

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Group: CM-4G-GPS

Subgroup: Cellular Interface

Internet Connection

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Alternative config	NO
Step	[-]		
Comm object	24315	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjust the communication mode of module.			

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Network Mode

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	2G / 3G / 4G / Automatic [-]		
Default value	Automatic	Alternative config	NO
Step	[-]		
Comm object	24132	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts preferred connection type of CM2-4G-GPS module.			

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Access Point Name

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	internet	Alternative config	NO
Step	[-]		
Comm object	24363	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
APN (Access Point Name) of the network, provided by GSM operator.			

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APN Authentication

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	[-]		
Default value		Alternative config	
Step	[-]		
Comm object	23820	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of authentication used for the Access Point Name.			

Note: An Access Point Name (APN) is the name of a gateway between a mobile network (GPRS, 4G, etc.) and another computer network (Internet).

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APN User Name

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	[-]		
Default value		Alternative config	
Step	[-]		
Comm object	24361	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
User Name used for the Access Point Name.			

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APN User Password

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	[-]		
Default value		Alternative config	
Step	[-]		
Comm object	24360	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Password used for the Access Point Name.			

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Connection Check IP1

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	[-]		
Default value	"empty"	Alternative config	NO
Step	[-]		
Comm object	23978	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
IP address of reliable server in the internet. To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working. This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection. If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled			

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Connection Check IP2

Setpoint group	CM-4G-GPS	**Related FW**	1.1.0
Range [units]	[-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	23977	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
IP address of reliable server in the internet. To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working. This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection. If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled			

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Subgroup: TCP/IP Settings

DNS Mode

Setpoint group	CM-4G-GPS	**Related FW**	1.1.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	23988	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables to enter DNS server addresses manually, even with the **Internet Connection (page 233)** set to Automatic.			

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS IP Address 1 (page 237)** can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work

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DNS IP Address 1

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Alternative config	NO
Step	[-]		
Comm object	24314	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the DNS Address 1 is adjusted.

If **DNS Mode (page 236)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.

If **DNS Mode (page 236)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.

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Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	Disabled/ Enabled [-]		
Default value	Enabled	Alternative config	NO
Step	[-]		
Comm object	23968	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			

This setpoint enable or disable AirGate connection via CM2-4G-GPS.

DISABLED:	Only SMS are sent. Internet-enabled SIM card is not required. AirGate is not used.
ENABLED	This mode uses the "AirGate" service. Internet-enabled SIM card must be used. The AirGate server address is adjusted by the setpoint **AirGate Address (page 251)**.

> **IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.**

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AirGate Address

Setpoint group	CM-4G-GPS; CM-Ethernet	Related FW	1.1.0
Range [units]	[-]		
Default value	global.airgate.link	Alternative config	NO
Step	[-]		
Comm object	24364	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
This setpoint is used for entering the domain name or IP address of the AirGate server. Use the free AirGate server provided by ComAp at global.airgate.link. *Note: This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Airgate Port

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	1 .. 65535 [-]		
Default value	54440	Alternative config	NO
Step	1		
Comm object	24091	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
This port is used for TCP communication with the AirGate server. *Note: Use port 54440 for standard ComAp AirGate service.*			

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Subgroup: ComAp Client Settings

ComAp Client Inactivity Timeout

Setpoint group	CM-Ethernet CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	Alternative config	NO
Step	1 s		
Comm object	24098	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. InteliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

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Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz global.airgate.link:9925	Alternative config	NO
Step	[-]		
Comm object	23962	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.			

> *Note: You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.czglobal.airgate.link" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*

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SMTP Sender Address

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	23884	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. *Note: It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.* **IMPORTANT: This item is obligatory when emails are configured.**			

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SMTP User Name

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	23883	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

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SMTP User Password

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	23882	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

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SMTP Encryption

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	Alternative config	NO
Step	[-]		
Comm object	23965	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			

Encryption settings of SMTP communication.

NONE	E-SMTP protocol without encryption is used.
STARTTLS	Communication is started without encryption and then is switched to TLS encryption.
TLS	Communication runs in TLS encryption.

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Email Address 1

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	Related FW	1.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	24298	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.

Note: This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	Related FW	1.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	24297	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.

Note: This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.

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Subgroup: Message Settings

E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.1.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	18971	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Event Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Wrn Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	8482	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	10566	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Sd Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Sd Message. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Telephone Number 1

Setpoint group	CM-4G-GPS	**Related FW**	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24296	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. IMPORTANT: **Telephone number has to be entered without spaces.**			

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Telephone Number 2

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	24295	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. IMPORTANT: Telephone number has to be entered without spaces.			

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Subgroup: GPS Settings

GPS Tracking

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Alternative config	NO
Step	[-]		
Comm object	23975	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
If GPS tracking is enabled the module sends position/speed data to the controller with period 10 s.			

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Group: CM-Ethernet

IP Address Mode

Setpoint group	CM-Ethernet	**Related FW**	1.1.0
Range [units]	MANUAL / AUTOMATIC / DISABLED [-]		
Default value	AUTOMATIC	**Alternative config**	NO
Step	[-]		
Comm object	23939	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the ethernet connection is adjusted.

MANUAL	The Ethernet connection is fixed by means of the setpoints IP Addr, NetMask, GateIP, DNS IP Address.
	This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).
AUTOMATIC	The Ethernet connection setting is obtained **automatically from the DHCP server**. The obtained settings are then copied to the related setpoints. If the process of obtaining the settings from the DHCP server is not successful, the value *000.000.000.000* is copied to the setpoint IP address and the module continues to try to obtain the settings.
DISABLED	The Ethernet terminal is disabled.

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IP Address

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	0 .. 15 characters [-]		
Default value	192.168.1.254	Alternative config	NO
Step	[-]		
Comm object	23950	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 247)**		
Description			
The setpoint is used to set the address when you are in static mode . If **IP Address Mode (page 247)** is MANUAL this setpoint is used to adjust the IP address of the ethernet interface of the controller. Ask your IT specialist for help with this setting. If **IP Address Mode (page 247)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server. If **IP Address Mode (page 247)** is DISABLED Ethernet terminal is disabled. *Note: Only valid IP address can be inserted.*			

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Subnet Mask

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	Alternative config	NO
Step	[-]		
Comm object	23949	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 247)**		
Description			
The setpoint is used to select the method how the Subnet Mask is adjusted. If **IP Address Mode (page 247)** is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting. If **IP Address Mode (page 247)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server. If **IP Address Mode (page 247)** is DISABLED Ethernet terminal is disabled.			

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Gateway IP

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	Alternative config	NO
Step	[-]		
Comm object	23948	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 247)**		
Description			

The setpoint is used to select the method how the Gateway IP is adjusted.

If **IP Address Mode (page 247)** is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.

If **IP Address Mode (page 247)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 247)** is DISABLED Ethernet terminal is disabled.

A gateway is a device which connects the respective segment with the other segments and/or Internet.

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DNS Mode

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	Alternative config	NO
Step	[-]		
Comm object	23921	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables to enter DNS server addresses manually, even with the **IP Address Mode (page 247)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS IP Address 1 (page 250)** can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work

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DNS IP Address 1

Setpoint group	CM-Ethernet	**Related FW**	1.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	23947	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the DNS Address 1 is adjusted .

If **IP Address Mode (page 247)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.

If **IP Address Mode (page 247)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.

If **IP Address Mode (page 247)** is DISABLED Ethernet terminal is disabled.

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Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-Ethernet	**Related FW**	1.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	23935	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint selects the AirGate connection mode.

DISABLED:	This is a standard mode in which the controller listens to the incoming traffic and answers the TCP/IP queries addressed to it. This mode requires the controller to be accessible from the remote device (PC), i.e. it must be accessible at a public and static IP address if you want to connect to it from the internet.
ENABLED	This mode enables the AirGate service. The AirGate server address is adjusted by the setpoint **AirGate Address (page 251)**. Also the standard TCP/IP is enabled.

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AirGate Address

Setpoint group	CM-4G-GPS; CM-Ethernet	Related FW	1.1.0
Range [units]	[-]		
Default value	global.airgate.link	Alternative config	NO
Step	[-]		
Comm object	24364	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
This setpoint is used for entering the domain name or IP address of the AirGate server. Use the free AirGate server provided by ComAp at global.airgate.link. *Note: This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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AirGate Port

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	1 .. 65535 [-]		
Default value	23	Alternative config	NO
Step	1		
Comm object	23919	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used for TCP data communication with the AirGate server. *Note: Use port 21, 23 or 6127 for standard ComAp AirGate service.*			

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Subgroup: ComAp Client Settings

ComAp Client Inactivity Timeout

Setpoint group	CM-Ethernet CM-4G-GPS	Related FW	1.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	Alternative config	NO
Step	1 s		
Comm object	24098	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. InteliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

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Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz global.airgate.link:9925	Alternative config	NO
Step	[-]		
Comm object	23942	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.			

> *Note: You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.czglobal.airgate.link" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*

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SMTP Sender Address

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	23881	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. *Note: It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.* IMPORTANT: This item is obligatory when emails are configured.			

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SMTP UserName

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	23880	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

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SMTP User Password

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	23879	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

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SMTP Encryption

Setpoint group	CM-Ethernet	Related FW	1.1.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	Alternative config	NO
Step	[-]		
Comm object	23938	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			

Encryption settings of SMTP communication.

NONE	E-SMTP protocol without encryption is used.
STARTTLS	Communication is started without encryption and then is switched to TLS encryption.
TLS	Communication runs in TLS encryption.

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Email Address 1

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	Related FW	1.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	24298	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.			
Note: This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.			

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	Related FW	1.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	Alternative config	NO
Step	[-]		
Comm object	24297	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.			
Note: This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.			

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Subgroup: Messages Settings

BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	10566	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	Depends on CU languages [-]		
Default value	English	Alternative config	NO
Step	[-]		
Comm object	24299	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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AHI Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	18994	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables AHI Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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ALI Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	18993	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables ALI Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Hst Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	10568	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Hst Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

⬤ **back to List of setpoints**

Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	18971	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Event Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

⬤ **back to List of setpoints**

ECU FC Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	18723	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables ECU FC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

⬤ **back to List of setpoints**

BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	10566	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

⬤ **back to List of setpoints**

Sd Override Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	11413	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Sd Override Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

🔺 **back to List of setpoints**

Sd Message

Setpoint group	CM-4G-GPS CM-Ethernet	Related FW	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	Alternative config	NO
Step	[-]		
Comm object	8484	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Sd Message. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

🔺 **back to List of setpoints**

Wrn Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	1.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

⬆ **back to List of setpoints**

Group: Alternate Config

Subgroup: Configuration 1

Nominal RPM 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	100 .. 4000 [RPM]		
Default value	1 500 RPM	Alternative config	YES
Step	1 RPM		
Comm object	9915	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM revolutions per minute).			
Note: This value is used when any other alternate configuration is not active.			

Nominal Frequency 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	30 .. 65 [Hz]		
Default value	50 Hz	Alternative config	YES
Step	1 Hz		
Comm object	9913	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz).			
Note: This value is used when any other alternate configuration is not active.			

Nominal Voltage Ph-N 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	Alternative config	YES
Step	1 V		
Comm object	12052	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**.		
Description			
Nominal system voltage (phase to neutral).			
Note: This value is used when any other alternate configuration is not active.			

⬤ **back to List of setpoints**

Nominal Voltage Ph-Ph 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	Alternative config	YES
Step	1 V		
Comm object	12055	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection Type 1 (page 264)**.		
Description			
Nominal system voltage (phase to phase).			
Note: This value is used when any other alternate configuration is not active.			

⬤ **back to List of setpoints**

Nominal Current 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	Alternative config	YES
Step	1 A		
Comm object	12049	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

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

Note: This value is used when any other alternate configuration is not active.

🔺 **back to List of setpoints**

Connection Type 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	Alternative config	YES
Step	[-]		
Comm object	12058	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Connection type:

Mono Phase	Single phase voltage measurement L1-N
	1x CT (Current Transformer)
SplPhL1L2	Double Delta connection
	Split Phase
	Two phase voltage measurement L1,L2 with 180° phase shift
	2x CT (Current Transformer)
SplPhL1L3	Double Delta connection
	Split Phase
	Two phase voltage measurement L1,L3 with 180° phase shift
	2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection
	Open Delta
	Ungrounded Wye

	Corner-Grounded Delta	
	Split Phase Delta	
	Three phase voltage measurement L1,L2,L3 with 120° phase shift	
	No neutral is available 3x CT (Current Transformer)	
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY	
	Three phase voltage measurement L1,L2,L3 with 120° phase shift	
	3x CT (Current Transformer)	
High Leg D	High Leg Delta connection	
	Three phase voltage measurement L1,L2,L3	
	3x CT (Current Transformer)	
Autodetect	High Leg Delta	L1 >=100 V; L1 <=140 V
		L2 >=140 V
		L3 >=100 V; L3 <=140 V
	3Ph Low Y	L1 <=160 V
		L2 <=160 V
		L3 <=160 V
	3Ph High Y	L1 >160 V
		L2 >160 V
		L3 >160 V
	SplPhL1L3	L1 >=100 V
		L2 <= 20 V
		L3 >=100 V
	SplPhL1L2	L1 >=100 V
		L2 >= 100 V
		L3 <= 20 V
	Mono Phase	L1 >=100 V
		L2 <= 20 V
		L3 <= 20 V
	Voltage Autodetect shutdown	

Note: This value is used when any other alternate configuration is not active.

🔺 **back to List of setpoints**

Nominal Power 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	Alternative config	YES
Step	1 kW		
Comm object	12046	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 191)** protection is based on this setpoint.

*Note: This setpoint is used when setpoint **Connection type (page 146)** is adjusted to Monophase or SplitphaseL1L2 or SplitphaseL1L3 or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

Note: This value is used when any other alternate configuration is not active.

⬤ **back to List of setpoints**

Nominal Power Split Phase 1

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	Alternative config	YES
Step	1 kW		
Comm object	15771	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 146)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 191)** protection is based on this setpoint.

*Note: This setpoint is used when setpoint **Connection type (page 146)** is adjusted to Autodetect and Autodetect detects connection type as Monophase or SplitphaseL1L2 or SplitphaseL1L3.*

Note: This value is used when any other alternate configuration is not active.

⬤ **back to List of setpoints**

Subgroup: Configuration 2

Nominal RPM 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	100 .. 4000 [RPM]		
Default value	1 500 RPM	Alternative config	YES
Step	1 RPM		
Comm object	9916	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM - revolutions per minute).			
Note: This value is used when binary input ALTERNATE CONFIG 2 *(PAGE 323) is active.*			

⬛ **back to List of setpoints**

Nominal Frequency 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	30 .. 65 [Hz]		
Default value	50 Hz	Alternative config	YES
Step	1 Hz		
Comm object	9914	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz).			
Note: This value is used when binary input ALTERNATE CONFIG 2 *(PAGE 323) is active.*			

⬛ **back to List of setpoints**

Nominal Voltage Ph-N 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12053	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 269)**.		
Description			
Nominal system voltage (phase to neutral). *Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 323) is active.*			

⬤ **back to List of setpoints**

Nominal Voltage Ph-Ph 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12056	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 269)**.		
Description			
Nominal system voltage (phase to phase). *Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 323) is active.*			

⬤ **back to List of setpoints**

Nominal Current 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	1 .. 10000 [A]		
Default value	350 A	Alternative config	YES
Step	1 A		
Comm object	12050	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

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

> *Note:* *This value is used when binary input* Aʟᴛᴇʀɴᴀᴛᴇ Cᴏɴꜰɪɢ *2 (ᴘᴀɢᴇ 323) is active.*

🔺 **back to List of setpoints**

Connection type 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	Alternative config	YES
Step	[-]		
Comm object	12059	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)	
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)	
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)	
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye	

	Corner-Grounded Delta		
	Split Phase Delta		
	Three phase voltage measurement L1,L2,L3 with 120° phase shift		
	No neutral is available 3x CT (Current Transformer)		
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY		
	Three phase voltage measurement L1,L2,L3 with 120° phase shift		
	3x CT (Current Transformer)		
High Leg D	High Leg Delta connection		
	Three phase voltage measurement L1,L2,L3		
	3x CT (Current Transformer)		
Autodetect	High Leg Delta	L1 >=100 V; L1 <=140 V	
		L2 >=140 V	
		L3 >=100 V; L3 <=140 V	
	3Ph Low Y	L1 <=160 V	
		L2 <=160 V	
		L3 <=160 V	
	3Ph High Y	L1 >160 V	
		L2 >160 V	
		L3 >160 V	
	SplPhL1L3	L1 >=100 V	
		L2 <= 20 V	
		L3 >=100 V	
	SplPhL1L2	L1 >=100 V	
		L2 >= 100 V	
		L3 <= 20 V	
	Mono Phase	L1 >=100 V	
		L2 <= 20 V	
		L3 <= 20 V	
	Voltage Autodetect shutdown		

Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 323) is active.

🔺 **back to List of setpoints**

Nominal Power 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	Alternative config	YES
Step	1 kW		
Comm object	12047	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 191)** protection is based on this setpoint.

Note: This setpoint is used when setpoint Connection type 2 (page 269) is adjusted to Monophase or SplitphaseL1L2 or SplitphaseL1L3 or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.

Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 323) is active.

⬖ back to List of setpoints

Nominal Power Split Phase 2

Setpoint group	Alternate Config	Related FW	1.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	Alternative config	YES
Step	1 kW		
Comm object	15772	Related applications	AMF, MRS
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 269)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 191)** protection is based on this setpoint.

Note: This setpoint is used when setpoint Connection type 2 (page 269) is adjusted to Autodetect and Autodetect detects connection type as Monophase or SplitphaseL1L2 or SplitphaseL1L3.

Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 323) is active.

⬖ back to List of setpoints

Fixed Setpoints

Maximal Stabilization Time

Setpoint group	Engine settings	Related FW	1.1.0
Fixed value	10 s		

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.

> **IMPORTANT: This is a fixed parameter, it is NOT possible to adjust it in any manner. This parameter isn't visible either in the controller nor in PC tools.**

⬢ **back to List of setpoints**

Cranking Fail Pause

Setpoint group	Engine settings	Related FW	1.1.0
Fixed value	8 s		

Description

Pause between **Cranking Attempts (page 163)**. PRESTART (PAGE 353) output is active in this pause until Cranking Fail Pause elapses.

> **IMPORTANT: This is a fixed parameter, it is NOT possible to adjust it in any manner. This parameter isn't visible either in the controller nor in PC tools.**

⬢ **back to List of setpoints**

Underspeed Sd

Setpoint group	Engine settings	Related FW	1.1.0
Fixed value	25 % of **Nominal RPM (page 152)**		

Description

Threshold for underspeed protection. Relative to the nominal speed.

> **IMPORTANT: This is a fixed parameter, it is NOT possible to adjust it in any manner. This parameter isn't visible either in the controller nor in PC tools.**

⬢ **back to List of setpoints**

Run Only Block Delay

Setpoint group	Engine settings	Related FW	1.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	Alternative config	YES
Step	0.1 s		
Comm object	10023	Related applications	AMF, MRS
Config level	Advanced		
Setpoint visibility	Always		
Description			

During the start of the Gen-set, some engine protections have to be blocked (e.g. Oil pressure). The protection blocking is based on the operating state of the engine automate. Once the engine automate reaches the state "Running" (engine reaches Starting RPM), this timer starts to count down. Protections with this blocking condition gets unblocked after this timer.

⬆ back to List of setpoints

Setpoint group	Engine settings	Related FW	1.1.0
Fixed value	10 s		
Description			

During the start of the Gen-set, some engine protections have to be blocked (e.g. Oil pressure). The protection blocking is based on the operating state of the engine automate. Once the engine automate reaches the state "Running" (engine reaches Starting RPM), this timer starts to count down. Protections with this blocking condition gets unblocked after this timer.

> **IMPORTANT: This is a fixed parameter, it is NOT possible to adjust it in any manner. This parameter isn't visible either in the controller nor in PC tools.**

⬆ back to List of setpoints

8.1.3 Values

What values are:

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

For a full list of values go to the chapter **List of values (page 275)**.

Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

> The value is not being evaluated in the scope of the current application and configuration.

> Sensor failure has been detected on an analog input.

> The configured ECU or extension module does not provide the particular value.

> The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as "####" in InteliConfig and on the controller screen. If such a value is read out via MODBUS, it will contain the data 32768 in the case of signed values and 65535 in the case of unsigned values.

List of values

⏶ **back to Controller objects**

Group: Engine

RPM

Value group	Engine	Related FW	1.1.0
Units	RPM		
Comm object	10123	Related applications	AMF, MRS
Description			

This value contains the current engine speed. The value is obtained from one of the following sources:

> ECU, if an ECU is configured

> Pickup input

> Generator frequency

⬆ **back to List of values**

ECU Frequency Select

Value group	Engine	Related FW	1.1.0
Units	-		
Comm object	12926	Related applications	AMF, MRS
Description			

Shows selected frequency of ECU. The value is calculated from setpoint **Nominal Frequency (page 151)**

> If is **Nominal Frequency (page 151)** in range from 45 Hz to 54 Hz, is considered as 50 Hz application. The value is set to 0.

> If is **Nominal Frequency (page 151)** in range from 55 Hz to 65 Hz, is considered as 60 Hz application. The value is set to 1.

⬆ **back to List of values**

Speed Request

Value group	Engine Speed/Load Control	Related FW	1.1.0
Units	%		
Comm object	10137	Related applications	AMF, MRS
Description			

This value contains the speed control signal expressed in %. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed in %.

Speed request	Requested speed	Accelerator pedal position
0%	1350 RPM	0%
50%	1500 RPM	50%
100%	1650 RPM	100%

Note: Accelerator pedal position will be 0 if the engine is not running or loaded.

⬆ **back to List of values**

Requested RPM

Value group	Engine	Related FW	1.1.0
Units	RPM		
Comm object	10006	Related applications	AMF, MRS
Description			
This value contains the speed which is currently requested by the controller from the attached ECU. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed directly in RPM.			

🔺 back to List of values

DPF Soot Load

Value group	Engine	Related FW	1.1.0
Units	%		
Comm object	12484	Related applications	AMF, MRS
Description			
Indicates the soot load percentage of diesel particulate filter (DPF).			

🔺 back to List of values

DPF Ash Load

Value group	Engine	Related FW	1.1.0
Units	%		
Comm object	12483	Related applications	AMF, MRS
Description			
Indicates the ash load percentage of diesel particulate filter (DPF).			

🔺 back to List of values

DEF Level

Value group	Engine	Related FW	1.1.0
Units	%		
Comm object	14522	Related applications	AMF, MRS
Description			
The level of diesel exhaust fluid tank.			

🔺 back to List of values

EGR Valve Padm Status

Value group	Engine	**Related FW**	1.1.0
Units	-		
Comm object	18576	**Related applications**	AMF, MRS

Description

Actual status of EGR - Padmini. Status is evaluated by pulses received on LBI **EGR VALVE PADM STATUS** (PAGE 325).

Value has 9 bites:

Bite	Status	Code/Error
1	EGR OK	After ignition, LBI is activated,then deactivated for s and activated again
2	EGR faulty/no supply	No blink - inactive all the time
3	Temp sensor faulty/open	2 pulses, 3,5s pause, repeat
4	Temp sensor out from the body	3 pulses, 3,5s pause, repeat
5	Valve wire open	4 pulses, 3,5s pause, repeat
6	Valve not connected/faulty	5 pulses, 3,5s pause, repeat
7	Valve not lifting/short	6 pulses, 3,5s pause, repeat
8	Valve not closing	7 pulses, 3,5s pause, repeat
9	Signal fail	Different number of pulses or width of pulses out of tolerance

Evaluation is based on pulses - from beginning of prestart until end of cooling. Width of pulses should be 500ms (tolerance 400-600ms). Pause between series of pulses is 3,5s (tolerance 3,4-3,6s).

> **Example:** Engine is stopped - all bites are 0, no alarm

> **Example:** Engine is started, LBI goes to 1 - bite 1 is active - EGR is OK, no alarm

> **Example:** Engine is started, LBI stays 0 - bite 2 is active - EGR is faulty - alarm is active

There is general alarm **EGR Valve Padm Faulty (page 381)** - active when value is not 1.

⬆ **back to List of values**

Group: Generator

Generator Frequency

Value group	Generator	Related FW	1.1.0
Units	Hz		
Comm object	8210	Related applications	AMF, MRS
Description			
Frequency of generator.			

⏶ **back to List of values**

Generator Voltage L1-L2

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	9628	Related applications	AMF, MRS
Description			
Generator phase to phase voltage between L1 and L2 phases.			

⏶ **back to List of values**

Generator Voltage L1-N

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	8192	Related applications	AMF, MRS
Description			
Generator voltage on phase 1.			

⏶ **back to List of values**

Generator Voltage L2-L3

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	9629	Related applications	AMF, MRS
Description			
Generator phase to phase voltage between L2 and L3 phases.			

⏶ **back to List of values**

Generator Voltage L2-N

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	8193	Related applications	AMF, MRS
Description			
Generator voltage on phase 2.			

⏶ **back to List of values**

Generator Voltage L3-L1

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	9630	Related applications	AMF, MRS
Description			
Generator phase to phase voltage between L3 and L1 phases.			

🔺 **back to List of values**

Generator Voltage L3-N

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	8194	Related applications	AMF, MRS
Description			
Generator voltage on phase 3.			

🔺 **back to List of values**

Nominal Current

Value group	Generator	Related FW	1.1.0
Units	A		
Comm object	9978	Related applications	AMF, MRS
Description			
Generator nominal current. Calculation of value Nominal Current in Autodetect: ❯ For Connection Type: SplPhL1L2 and SplPhL1L3 power factor 1 is used in the formula of calculation of value Nominal Current. For the other types: High Leg Delta, 3Ph Low Y, 3Ph High Y, Mono Phase power factor 0.8 is used. *Note: Visible only when **Connection type (page 146)** = Autodetect.*			

🔺 **back to List of values**

Nominal Power

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	9018	Related applications	AMF, MRS
Description			
Generator nominal power. *Note: Visible only when **Connection type (page 146)** = Autodetect.*			

🔺 **back to List of values**

Nominal Voltage

Value group	Generator	Related FW	1.1.0
Units	V		
Comm object	9917	Related applications	AMF, MRS
Description			
Generator nominal voltage.			
Note: *Visible only when* **Connection type (page 146)** *= Autodetect.*			

⏶ **back to List of values**

Group: Load

Load P

Value group	Load	**Related FW**	1.1.0
Units	kW		
Comm object	8202	**Related applications**	AMF, MRS
Description			
Load active power.			

⬤ **back to List of values**

Load P L1

Value group	Load	**Related FW**	1.1.0
Units	kW		
Comm object	8524	**Related applications**	AMF, MRS
Description			
Load active power in phase L1.			

⬤ **back to List of values**

Load P L2

Value group	Load	**Related FW**	1.1.0
Units	kW		
Comm object	8525	**Related applications**	AMF, MRS
Description			
Load active power in phase L2.			

⬤ **back to List of values**

Load P L3

Value group	Load	**Related FW**	1.1.0
Units	kW		
Comm object	8526	**Related applications**	AMF, MRS
Description			
Load active power in phase L3.			

⬤ **back to List of values**

Load Q

Value group	Load	**Related FW**	1.1.0
Units	kVAr		
Comm object	8203	**Related applications**	AMF, MRS
Description			
Load reactive power.			

⬤ **back to List of values**

Load Q L1

Value group	Load	Related FW	1.1.0
Units	kVAr		
Comm object	8527	Related applications	AMF, MRS
Description			
Load reactive power in phase L1.			

⬢ **back to List of values**

Load Q L2

Value group	Load	Related FW	1.1.0
Units	kVAr		
Comm object	8528	Related applications	AMF, MRS
Description			
Load reactive power in phase L2.			

⬢ **back to List of values**

Load Q L3

Value group	Load	Related FW	1.1.0
Units	kVAr		
Comm object	8529	Related applications	AMF, MRS
Description			
Load reactive power in phase L3.			

⬢ **back to List of values**

Load S

Value group	Load	Related FW	1.1.0
Units	kVA		
Comm object	8565	Related applications	AMF, MRS
Description			
Load apparent power.			

⬢ **back to List of values**

Load S L1

Value group	Load	Related FW	1.1.0
Units	kVA		
Comm object	8530	Related applications	AMF, MRS
Description			
Load apparent power L1.			

⬢ **back to List of values**

Load S L2

Value group	Load	Related FW	1.1.0
Units	kVA		
Comm object	8531	Related applications	AMF, MRS
Description			
Load apparent power L2.			

⏶ **back to List of values**

Load S L3

Value group	Load	Related FW	1.1.0
Units	kVA		
Comm object	8532	Related applications	AMF, MRS
Description			
Load apparent power L3.			

⏶ **back to List of values**

Load Power Factor

Load	Load	Related FW	1.1.0
Units	[-]		
Comm object	8204	Related applications	AMF, MRS
Description			
Load power factor.			

⏶ **back to List of values**

Load Power Factor L1

Load	Load	Related FW	1.1.0
Units	[-]		
Comm object	8533	Related applications	AMF, MRS
Description			
Load power factor on phase L1.			

⏶ **back to List of values**

Load Power Factor L2

Load	Load	Related FW	1.1.0
Units	[-]		
Comm object	8534	Related applications	AMF, MRS
Description			
Load power factor on phase L2.			

⏶ **back to List of values**

Load Power Factor L3

Load	Load	Related FW	1.1.0
Units	[-]		
Comm object	8535	**Related applications**	AMF, MRS
Description			
Load power factor on phase L3.			

 ⬤ **back to List of values**

Load Character

Value group	Load	Related FW	1.1.0
Units	[-]		
Comm object	8395	**Related applications**	AMF, MRS
Description			
Character of the load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

 ⬤ **back to List of values**

Load Character L1

Value group	Load	Related FW	1.1.0
Units	[-]		
Comm object	8626	**Related applications**	AMF, MRS
Description			
Character of the load on phase L1. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

 ⬤ **back to List of values**

Load Character L2

Value group	Load	Related FW	1.1.0
Units	[-]		
Comm object	8627	**Related applications**	AMF, MRS
Description			
Character of the load on phase L2. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

 ⬤ **back to List of values**

Load Character L3

Value group	Load	Related FW	1.1.0
Units	[-]		
Comm object	8628	Related applications	AMF, MRS
Description			
Character of the load on phase L3. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

 back to List of values

Load Current L1

Value group	Generator	Related FW	1.1.0
Units	A		
Comm object	8198	Related applications	AMF, MRS
Description			
Current phase L1 of Load.			

 back to List of values

Load Current L2

Value group	Generator	Related FW	1.1.0
Units	A		
Comm object	8199	Related applications	AMF, MRS
Description			
Current phase L2 of Load.			

 back to List of values

Load Current L3

Value group	Generator	Related FW	1.1.0
Units	A		
Comm object	8200	Related applications	AMF, MRS
Description			
Current phase L3 of Load.			

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Group: Mains

Mains Frequency

Value group	Mains	Related FW	1.1.0
Units	Hz		
Comm object	8211	Related applications	AMF, MRS
Description			
Frequency of Mains.			

⬆ **back to List of values**

Mains Voltage L1-N

Value group	Mains	Related FW	1.1.0
Units	V		
Comm object	8195	Related applications	AMF, MRS
Description			
Mains voltage on phase 1.			

⬆ **back to List of values**

Mains Voltage L2-N

Value group	Mains	Related FW	1.1.0
Units	V		
Comm object	8196	Related applications	AMF, MRS
Description			
Mains voltage on phase 2.			

⬆ **back to List of values**

Mains Voltage L3-N

Value group	Mains	Related FW	1.1.0
Units	V		
Comm object	8197	Related applications	AMF, MRS
Description			
Mains voltage on phase 3.			

⬆ **back to List of values**

Mains Voltage L1-L2

Value group	Mains	Related FW	1.1.0
Units	V		
Comm object	9631	Related applications	AMF, MRS
Description			
Mains phase to phase voltage between L1 and L2 phases.			

⬆ **back to List of values**

Mains Voltage L2-L3

Value group	Mains	Related FW	1.1.0
Units	V		
Comm object	9632	Related applications	AMF, MRS
Description			
Mains phase to phase voltage between L2 and L3 phases.			

⬢ **back to List of values**

Mains Voltage L3-L1

Value group	Mains	Related FW	1.1.0
Units	V		
Comm object	9633	Related applications	AMF, MRS
Description			
Mains phase to phase voltage between L3 and L1 phases.			

⬢ **back to List of values**

Group: Controller I/O

Battery Volts

Value group	Controller I/O	Related FW	1.1.0
Units	V		
Comm object	8213	Related applications	AMF, MRS
Description			
Controller supply voltage.			

🔺 **back to List of values**

D+

Value group	Controller I/O	Related FW	1.1.0
Units	V		
Comm object	10603	Related applications	AMF, MRS
Description			
D+ terminal voltage.			

🔺 **back to List of values**

Analog Input 1

Value group	Controller I/O	Related FW	1.1.0
Units	Configurable		
Comm object	9151	Related applications	AMF, MRS
Description			
This is the value of the analog input 1 of the controller.			

🔺 **back to List of values**

Analog Input 2

Value group	Controller I/O	Related FW	1.1.0
Units	Configurable		
Comm object	9152	Related applications	AMF, MRS
Description			
This is the value of the analog input 2 of the controller.			

🔺 **back to List of values**

Analog Input 3

Value group	Controller I/O	Related FW	1.1.0
Units	Configurable		
Comm object	9153	Related applications	AMF, MRS
Description			
This is the value of the analog input 3 of the controller.			

🔺 **back to List of values**

Binary Inputs

Value group	Controller I/O	Related FW	1.1.0
Units	[-]		
Comm object	8235	Related applications	AMF, MRS
Description			
State of the binary inputs of the controller.			

⬤ **back to List of values**

E-Stop

Value group	Controller I/O	Related FW	1.1.0
Units	%		
Comm object	15780	Related applications	AMF, MRS
Description			

Shows number of E-STOP input – the same principle of visualization like binary inputs.

Principle of value (principle of normally close binary input):

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

⬤ **back to List of values**

Binary Outputs

Value group	Controller I/O	Related FW	1.1.0
Units	[-]		
Comm object	8239	Related applications	AMF, MRS
Description			
State of the binary outputs of the controller.			

⬤ **back to List of values**

Group: Statistics

Genset kWh

Value group	Statistics	Related FW	1.1.0
Units	kWh		
Comm object	8205	Related applications	AMF, MRS
Description			
Counter of Gen-set active power.			

🔺 **back to List of values**

Genset kVArh

Value group	Statistics	Related FW	1.1.0
Units	kVArh		
Comm object	8539	Related applications	AMF, MRS
Description			
Counter of Gen-set reactive power.			

🔺 **back to List of values**

Mains kWh

Value group	Statistics	Related FW	1.1.0
Units	kWh		
Comm object	11025	Related applications	AMF, MRS
Description			
Counter of mains active power .			

🔺 **back to List of values**

Mains kVArh

Value group	Statistics	Related FW	1.1.0
Units	kVArh		
Comm object	11026	Related applications	AMF, MRS
Description			
Counter of mains reactive power.			

🔺 **back to List of values**

Maintenance Timer 1 RunHours

Value group	Statistics	Related FW	1.1.0
Units	hours		
Comm object	11616	Related applications	AMF, MRS
Description			

Countdown until next maintenance 1.

Statistic value for **Maintenance Timer 1 RunHours (page 189)**.

 back to List of values

Maintenance Timer 1 Interval

Value group	Statistics	Related FW	1.1.0
Units	days		
Comm object	16387	Related applications	AMF, MRS
Description			

Countdown until next maintenance 1.

Statistic value for **Maintenance Timer 1 Interval (page 189)**.

 back to List of values

Num E-Stops

Value group	Statistics	Related FW	1.1.0
Units	[-]		
Comm object	11195	Related applications	AMF, MRS
Description			

Emergency stop alarms counter.

> *Note: This value counts only in case that Gen-set was stopped due to E-Stop or Emergency Stop.*

 back to List of values

Shutdowns

Value group	Statistics	Related FW	1.1.0
Units	[-]		
Comm object	11196	Related applications	AMF, MRS
Description			

Shutdown alarms counter. This counter counts all occurrences of a shutdown alarm, not only real shutdowns of the Gen-set, i.e. the counter is increased by 2 if two shutdown alarms appear simultaneously.

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Thermal Protections Occurrences

Value group	Statistics	Related FW	1.1.0
Units	[-]		
Comm object	11613	Related applications	AMF, MRS
Description			
This value counts occurrences of thermal protections.			

⬤ **back to List of values**

Total Fuel Consumption

Value group	Statistics	Related FW	1.1.0
Units	L		
Comm object	9040	Related applications	AMF, MRS
Description			
Value containing total amount of consumed fuel by engine. The controller automatically updates this value every 30 s. The controller can calculate it in three ways:			

- ❯ Direct reading from ECU
- ❯ Calculation based on actual fuel consumption reading from ECU
- ❯ Calculation from fuel level drop in tank (using Fuel Level Analog Input)

⬤ **back to List of values**

Num Starts

Value group	Statistics	Related FW	1.1.0
Units	[-]		
Comm object	8207	Related applications	AMF, MRS
Description			
Engine start commands counter. The counter is increased by 1 even if the particular start command will take more than one attempt.			

⬤ **back to List of values**

Running Hours

Value group	Statistics	Related FW	1.1.0
Units	hours		
Comm object	8206	Related applications	AMF, MRS
Description			
Engine operation hours counter. The engine hours are incremented in the controller while the engine is running.			

> *Note: If an ECU is configured and it provides engine hours value, the value is taken from the ECU.*

⬤ **back to List of values**

Group: Info

Active Application

Value group	Info	**Related FW**	1.1.0
Units	[-]		
Comm object	14446	**Related applications**	AMF, MRS
Description			
This Value mirrors the active application in the controller.			

> **Example:** AMF or MRS.

🔺 **back to List of values**

Controller Mode

Value group	Info	**Related FW**	1.1.0
Units	[-]		
Comm object	9887	**Related applications**	AMF, MRS
Description			
The value contains actual controller mode.			

🔺 **back to List of values**

Application

Value group	IL Info Info	**Related FW**	1.1.0
Units	[-]		
Comm object	8480	**Related applications**	AMF, MRS
Description			
The value contains actual application in controller.			

> **Example:** AMF25, AMF20, AMF9, AMF8 or MRS16.

> **Example:** GC or AGC (Gen-set controller or advanced Gen-set controller).

🔺 **back to List of values**

Breaker State

Value group	IL Info Info	**Related FW**	1.1.0
Units	[-]		
Comm object	9245	**Related applications**	AMF, MRS
Description			
The value contains actual "breaker state" message which is shown on the main screen of the controller.			

🔺 **back to List of values**

Connection Type

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	12944	**Related applications**	AMF, MRS
Description			
The text of this value represents the connection type which is adjusted in setpoint **Connection type (page 146)**.			

⬤ **back to List of values**

Engine State

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	9244	**Related applications**	AMF, MRS
Description			
The value contains actual "engine state" message which is shown on the main screen of the controller.			

⬤ **back to List of values**

FW Branch

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	8707	**Related applications**	AMF, MRS
Description			
The value contains actual branch of firmware in controller.			

⬤ **back to List of values**

FW Version

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	24339	**Related applications**	AMF, MRS
Description			
Major and minor firmware version number.			

⬤ **back to List of values**

HW Version

Value group	Info	Related FW	1.1.0
Units	[-]		
Comm object	23887	Related applications	AMF, MRS
Description			
Major and minor hardware version number.			

🔺 **back to List of values**

ID String

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	24501	Related applications	AMF, MRS
Description			
Name of controller which is used in InteliConfig in command bar.			

🔺 **back to List of values**

Internal Temp

Value group	Info	Related FW	1.1.0
Units	[°C]		
Comm object	13774	Related applications	AMF, MRS
Description			
The value contains actual internal temperature.			

🔺 **back to List of values**

SPI Module A

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	14447	Related applications	AMF, MRS
Description			
The name of plug-in module which is inserted in slot A.			

🔺 **back to List of values**

Timer Text

Value group	IL Info Info	Related FW	1.1.0
Units	[-]		
Comm object	10040	Related applications	AMF, MRS
Description			

The value contains the numeric code of the "Current process timer" text which is shown on the main screen of the controller.

The assignment of texts to the codes can be obtained using InteliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -> Generate CFG image (all). The resulting file will contain the assignment of texts to the codes.

Timer Value

Value group	IL Info Info	Related FW	1.1.0
Units	[HH:MM:SS]		
Comm object	14147	Related applications	AMF, MRS
Description			

The value contains the "Current process timer" value which is shown on the main screen of the controller.

Group: Log Bout

Log Bout 1

Value group	Log Bout	Related FW	1.1.0
Units	[-]		
Comm object	9143	Related applications	AMF, MRS
Description			
State of binary outputs.			

🔺 **back to List of values**

Log Bout 2

Value group	Log Bout	Related FW	1.1.0
Units	[-]		
Comm object	9144	Related applications	AMF, MRS
Description			
State of binary outputs.			

🔺 **back to List of values**

Log Bout 3

Value group	Log Bout	Related FW	1.1.0
Units	[-]		
Comm object	9145	Related applications	AMF, MRS
Description			
State of binary outputs.			

🔺 **back to List of values**

Log Bout 4

Value group	Log Bout	Related FW	1.1.0
Units	[-]		
Comm object	9146	Related applications	AMF, MRS
Description			
State of binary outputs.			

🔺 **back to List of values**

Group: Fixed Protection States

Fixed Protections States 1

Value group	Fixed Protection States	Related FW	1.1.0
Units	[-]		
Comm object	20744	Related applications	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

🔺 **back to List of values**

Fixed Protections States 2

Value group	Fixed Protection States	Related FW	1.1.0
Units	[-]		
Comm object	20745	Related applications	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

🔺 **back to List of values**

Fixed Protections States 3

Value group	Fixed Protection States	Related FW	1.1.0
Units	[-]		
Comm object	20746	Related applications	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

🔺 **back to List of values**

Fixed Protections States 4

Value group	Fixed Protection States	Related FW	1.1.0
Units	[-]		
Comm object	20747	Related applications	AMF, MRS
Description			
Values of LBO Fixed Protections State.			

🔺 **back to List of values**

Group: User Protection States

User Protections States 1

Value group	User Protection States	Related FW	1.1.0
Units	[-]		
Comm object	20759	**Related applications**	AMF, MRS
Description			
Values of LBO User Protections State.			

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Group: CM-4G-GPS

Signal Strength

Value group	CM-4G-GPS	Related FW	1.1.0
Units	%		
Comm object	24302	Related applications	AMF, MRS
Description			
This value contains information about relative strength of the cellular signal received by the CM2-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases.			

🔺 **back to List of values**

Network Status

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	23972	Related applications	AMF, MRS
Description			
The text of this value represents the status of the GSM modem.			

Code	Description
Not availab	Not available
Available	Available
Attached	Attached

🔺 **back to List of values**

Last Email Result

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24307	**Related applications**	AMF, MRS
Description			

Result of last email, which was sent by controller.

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
4	Maximum transmitted data length not defined.
5	No response from SMTP server.
6	Command to SMTP server not sent.
7	Did not receive data from SMTP server.
8	HELO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
18	SMTP server rejected email data.
19	SMTP server rejected email data.
20	QUIT command was refused.
22	Process of sending email aborted.
23	Closing connection error.
24	Failed to accept server response after connection is established.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
28	Error during encoding process.
30	SMTP server address translation error (from DNS server).

🔺 **back to List of values**

Network Name

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24147	Related applications	AMF, MRS
Description			

The name of operator which to SIM card is connected.

Note: If roaming service is used then prefix "R" is added before the name of operator.

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Network Mode

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24146	Related applications	AMF, MRS
Description			

The type of data connection.

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GPS Status

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	23973	Related applications	AMF, MRS
Description			

Value describing the GPS signal.

Code	Description
Undefined	GPS signal is not available. Check antenna connection.
Searching	Looking up for signal from available satellites.
Fixed	GPS signal available.

🔺 **back to List of values**

Latitude

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24268	Related applications	AMF, MRS
Description			

Actual GPS latitude. Positions on north hemisphere have positive value, position on south hemisphere have negative value.

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Longitude

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24267	Related applications	AMF, MRS
Description			
Actual GPS longitude. Positions on east hemisphere have positive value, position on west hemisphere have negative value.			

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Active Satellites

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24265	Related applications	AMF, MRS
Description			
Number of available satellites for GPS location.			

 ⬆ **back to List of values**

Speed

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24264	Related applications	AMF, MRS
Description			
Actual speed of the controller calculated from the GPS coordinates.			

 ⬆ **back to List of values**

HomePosDist

Value group	CM-4G-GPS	Related FW	1.1.0
Units	km		
Comm object	11680	Related applications	AMF, MRS
Description			
Actual distance from home position. Home position is adjusted via setpoints **Home Latitude (page 223)** and **Home Longitude (page 224)** or by binary input Geo Home Position (page 327).			

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AirGate Status

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	23967	Related applications	AMF, MRS
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

AirGate Status

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable
Susp AGkeyEmpty	AirGate is not set in the controller

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AirGate ID

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24309	Related applications	AMF, MRS
Description			

Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.

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AirGate Servicing Node

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	23991	Related applications	AMF, MRS
Description			
IP address of AirGate 2 node to which the module is currently attached.			

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Primary DNS

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	23984	Related applications	AMF, MRS
Description			
Current domain name server.			

🔺 **back to List of values**

Secondary DNS

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	23983	Related applications	AMF, MRS
Description			
Backup domain name server.			

🔺 **back to List of values**

Current IP Address

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23971	Related applications	AMF, MRS
Description			
Current IP address of the controller.			

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Modem Status

Value group	CM-4G-GPS	Related FW	1.1.0
Units	[-]		
Comm object	24288	Related applications	AMF, MRS
Description			
The text of this value represents the status of the 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

Modem Status

Code	Description
OK	Module successfully initialized and connected to the cellular network
E01	Unsuccessful restore to the factory settings
E02	Modem configuration error
E SIM	SIM not inserted or locked by PIN. > Use another device (e.g. mobile phone) to disable the option for SIM to be locked by PIN
E04	It is not possible to set manually chosen network mode 2G/3G/4G/Automatic
E registration	It is not possible to register into cellular network. Possible reasons: > No signal (no coverage, broken or unconnected antenna) > Manually chosen network mode 2G/3G/4G is not available
E context	It is not possible to set PDP (Packet Data Protocol) context for defined APN (Access Point Name). Possible reasons: > Setpoint Access Point Name is not correctly set (format) > Wrong PDP context number
E connect	It is not possible to connect to cellular network (ATD*99***context) Possible reasons: > Setpoint Access Point Name is not correctly set (wrong text)
E08	Modem configuration error
E09	It is not possible to get signal strength
E10	It is not possible to get operator name
E11	Loss of registration into cellular network was detected
E12	Data error
E13	Data error
E14	Modem was restarted
E SMS send	It is not possible to send SMS. Possible reasons:

	> Wrong number
	> SIM doesn't support SMS
E18	Modem hardware configuration error
E conn lost	Loss of connection with cellular network
E19	Modem configuration error
Restart-config	Modem was restarted due to the change of controller setpoint
Restart-app	Modem was restarted due to the performed cellular connection check

🔺 **back to List of values**

Modem FW Version

Setpoint group	CM-4G-GPS	Related FW	1.1.0
Range [units]	1 .. 65535 [-]		
Default value	54440	**Alternative config**	NO
Step	1		
Comm object	24149	**Related applications**	AMF, MRS
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 233)**		
Description			
This value shows FW version of modem on CM2-4G-GPS plug-in card.			

🔺 **back to List of setpoints**

Modem IMEI

Value group	CM-4G-GPS	Related FW	1.1.0
Units			
Comm object	23828	**Related applications**	AMF, MRS
Description			
International Mobile Equipment Identity of modem.			

🔺 **back to List of values**

Group: CM-Ethernet

ETH Interface Status

Value group	CM-Ethernet	**Related FW**	1.1.0
Units	[-]		
Comm object	23924	**Related applications**	AMF, MRS
Description			
Current status of ethernet communication.			

⏏ **back to List of values**

Current IP Address

Value group	CM-Ethernet	**Related FW**	1.1.0
Units	[-]		
Comm object	23971	**Related applications**	AMF, MRS
Description			
Current IP address of the controller.			

⏏ **back to List of values**

Current Subnet Mask

Value group	CM-Ethernet	**Related FW**	1.1.0
Units	[-]		
Comm object	23930	**Related applications**	AMF, MRS
Description			
Current subnet mask.			

⏏ **back to List of values**

Current Gateway

Value group	CM-Ethernet	**Related FW**	1.1.0
Units	[-]		
Comm object	23929	**Related applications**	AMF, MRS
Description			
Current gateway address.			

⏏ **back to List of values**

Primary DNS

Value group	CM-Ethernet	**Related FW**	1.1.0
Units	[-]		
Comm object	23928	**Related applications**	AMF, MRS
Description			
Current domain name server.			

⏏ **back to List of values**

Secondary DNS

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23927	Related applications	AMF, MRS
Description			
Backup domain name server.			

🔺 **back to List of values**

AirGate ID

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23926	Related applications	AMF, MRS
Description			
Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.			

🔺 **back to List of values**

AirGate Servicing Node

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23915	Related applications	AMF, MRS
Description			
IP address of AirGate 2 node to which the module is currently attached.			

🔺 **back to List of values**

AirGate Status

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23910	Related applications	AMF, MRS
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

Code	Description
0	SIM card is not inserted
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable

⬟ **back to List of values**

Last Email Results

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23925	Related applications	AMF, MRS
Description			

Result of last email, which was sent by controller.

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
8	HELO command was refused.
9	EHLO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
20	QUIT command was refused.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
27	Email address can't be read.
30	SMTP server address translation error (from DNS server).
31	Cannot resolve SMTP server's IP address.
32	Error while reading email content data (24327).

⬛ **back to List of values**

MAC Address

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23932	Related applications	AMF, MRS
Description			

Current MAC address of the controller ethernet interface.

⬛ **back to List of values**

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Ethernet PHY Mode

Value group	CM-Ethernet	Related FW	1.1.0
Units	[-]		
Comm object	23916	Related applications	AMF, MRS
Description			

Ethernet interface mode:

10- HD	10 Mbit Half-Duplex
10- FD	10 Mbit Full-Duplex
100- HD	100 Mbit Half-Duplex
10- FD	100 Mbit Full-Duplex

⏶ **back to List of values**

Group: Date/Time

Subgroup: Time&Date

Date

Value group	Date/Time	Related FW	1.1.0
Units	DD.MM.YYYY		
Comm object	24553	Related applications	AMF, MRS
Description			
Shows setup date.			

⬥ **back to List of values**

Time

Value group	Date/Time	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	24554	Related applications	AMF, MRS
Description			
Shows setup time.			

⬥ **back to List of values**

Time Mode

Value group	Date/Time	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	20252	Related applications	AMF, MRS
Description			
Indicates actual time mode.			

   STD – Standard zone time (e.g GMT+1 for Prague).

   DST – Daylight Saving Time = STD+1 (e.g. GMT+2 for Prague).

⬥ **back to List of values**

Subgroup: Timers

Exercise Timer 1

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19664	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 1 in format HH:MM:SS.			

⬥ **back to List of values**

Exercise Timer 2

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19665	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 2 in format HH:MM:SS.			

⏚ **back to List of values**

Exercise Timer 3

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19666	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 3 in format HH:MM:SS.			

⏚ **back to List of values**

Exercise Timer 4

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19667	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 4 in format HH:MM:SS.			

⏚ **back to List of values**

Exercise Timer 5

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19668	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 5 in format HH:MM:SS.			

⏚ **back to List of values**

Exercise Timer 6

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19669	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 6 in format HH:MM:SS.			

🔺 **back to List of values**

Exercise Timer 7

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19670	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 7 in format HH:MM:SS.			

🔺 **back to List of values**

Exercise Timer 8

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19671	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 8 in format HH:MM:SS.			

🔺 **back to List of values**

Exercise Timer 9

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19672	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 9 in format HH:MM:SS.			

🔺 **back to List of values**

Exercise Timer 10

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19673	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 10 in format HH:MM:SS.			

⏶ **back to List of values**

Exercise Timer 11

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19674	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 11 in format HH:MM:SS.			

⏶ **back to List of values**

Exercise Timer 12

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19675	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 12 in format HH:MM:SS.			

⏶ **back to List of values**

Exercise Timer 13

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19676	Related applications	AMF, MRS
Description			
Shows actual value of exercise timer 13 in format HH:MM:SS.			

⏶ **back to List of values**

Exercise Timer 14

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19677	**Related applications**	AMF, MRS
Description			
Shows actual value of exercise timer 14 in format HH:MM:SS.			

🔺 **back to List of values**

Exercise Timer 15

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19678	**Related applications**	AMF, MRS
Description			
Shows actual value of exercise timer 15 in format HH:MM:SS.			

🔺 **back to List of values**

Exercise Timer 16

Value group	Scheduler	Related FW	1.1.0
Units	HH:MM:SS		
Comm object	19679	**Related applications**	AMF, MRS
Description			
Shows actual value of exercise timer 16 in format HH:MM:SS.			

🔺 **back to List of values**

8.1.4 Logical binary inputs

What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

Alphabetical groups of Logical binary inputs

For a full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 322)**.

Logical binary inputs alphabetically

⬤ **back to Controller objects**

LBI: A

Alternate Config 2

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	859		
Description			
This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Config group are switched to the second set (setpoints with number 2).			

⏶ **back to Logical binary inputs alphabetically**

AMF Start Block

Related FW	1.1.0	Related applications	AMF
Comm object	211		
Description			
This binary input can allow or block the AMF start. In case of running Gen-set in AUTO mode Gen-set goes to cooling procedure and stops.			

⏶ **back to Logical binary inputs alphabetically**

ATT Force Regen

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	680		
Description			
Aftertreatment Regeneration Force Switch			

> User manually activates regeneration function
> Push-button control – function activated by pulse (signals longer than 5 seconds will be carried as long as the input is active)

⏶ **back to Logical binary inputs alphabetically**

ATT Force Regen Alt

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1229		
Description			
Aftertreatment Regeneration Force Switch regeneration without voltage and frequency protections. **DPF Regeneration RPM (page 174)** are used.			

> User manually activates regeneration function
> Push-button control – function activated by pulse (signals longer than 5 seconds will be carried as long as the input is active)

⏶ **back to Logical binary inputs alphabetically**

ATT Inhibit Regen

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	679		
Description			
Aftertreatment Regeneration Inhibit Switch			

> User blocks automatic regeneration function

> 2 state switch control – function activated by still signal

🔺 **back to Logical binary inputs alphabetically**

LBI: C

Choke Inhibit

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	946		
Description			

Logical binary input CHOKE INHIBIT prevent Choke functionality when logical binary output **CHOKE (PAGE 338)** is activated. If CHOKE INHIBIT is activated when CHOKE LBO is active, CHOKE LBO is deactivated immediately and vice versa if LBI CHOKE INHIBIT is deactivated and LBO CHOKE should be active then is activated.

🔺 **back to Logical binary inputs alphabetically**

LBI: E

ECU Communication Fail Block

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	141		
Description			
Activation of this binary input blocks all protections (including user protections) for every single configured ECU.			

⬤ back to Logical binary inputs alphabetically

ECU Stopped Engine

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1427		
Description			
This LBI is useful in situations where Gen-set is controller by an ECU or other device which also includes engine protections and can stop the engine itself.			

⬤ back to Logical binary inputs alphabetically

EGR Valve Padm Status

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1415		
Description			
This binary inputs is used for evaluation of status of EGR - Padmini. Actual status is visible in value **EGR Valve Padm Status (page 279)**.			

⬤ back to Logical binary inputs alphabetically

Emergency MAN

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	45		
Description			
This input is designed to allow the Gen-set system or breakers to be controlled externally, not by the controller. This feature can be useful in case of some failure, which disables the Gen-set or breakers to be controlled by the controller, but the Gen-set itself is operational.			

The controller behaves in the following way:

> Shows the text EmergMan in the engine status on the main screen.

> Stops all functions regarding the Gen-set or breaker control, deactivates all outputs related to it.

> Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.

> When the input is deactivated, the controller takes control according to the situation in the moment of deactivation, i.e. the Gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated.

⬤ back to Logical binary inputs alphabetically

Emergency Stop

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	40		
Description			
The shutdown procedure will start immediately when this input is activated. Input is inverted (NC = normally closed) in default configuration. *Note: In case of controller hardware or software fail, safe stop of the engine doesn't have to be ensured. To back-up the Emergency Stop function it is recommended to connect separate circuit for disconnection of Fuel Solenoid and Starter signals.* For more detail see chapter Recommended wiring.			

⬆ **back to Logical binary inputs alphabetically**

LBI: F

Fuel Pump On/Off

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	694		
Description			
This binary input is used for manual control of binary output FUEL PUMP (PAGE 342). The output is deactivated automatically as soon as fuel level reaches 100 %. *Note: This binary input is basically designed for ON and OFF switch (switch with arrestment in these positions) because controller reacts to rising and falling edge of signal in this input.* **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 326) is configured then binary output FUEL PUMP (PAGE 342) is control by this binary input.** **IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 362) for proper function of this binary input.**			

⬆ **back to Logical binary inputs alphabetically**

LBI: G

GCB Feedback

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	63		
Description			
Use this input for indication whether the generator circuit breaker is open or closed.			

Image 8.22 GCB Feedback 1

Image 8.23 GCB Feedback 2

Note: InteliNano AMF 5 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.

🔺 **back to Logical binary inputs alphabetically**

Geo Home Position

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	219		
Description			
This binary input can be used to adjust home position of gen-set. In case that binary input is active, setpoints **Home Latitude (page 223)** and **Home Longitude (page 224)** are adjusted automatically from actual coordinates from GPS signal.			
Note: Input has to be activated for at least 2 seconds.			

🔺 **back to Logical binary inputs alphabetically**

Geo-Fencing Enable

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	218		
Description			
This binary input enables or disables **Fence 1 Protection (page 225)** and **Fence 2 Protection (page 227)** if **Group: Geo-Fencing (page 223)** is adjusted to value "LBI Enable".			

⬘ **back to Logical binary inputs alphabetically**

LBI: I

Idle Bypass

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1216		
Description			
When this LBI is active, controller will skip Idle phase.			

> ❯ LBI is active before idle time – CU goes directly to min stab time
> ❯ LBI is activated during idle time – idle time is skipped and CU goes to min stab time

⬘ **back to Logical binary inputs alphabetically**

LBI: M

Mains Fail Block

Related FW	1.1.0	Related applications	AMF
Comm object	622		
Description			
If the input is active, the automatic start of the Gen-set at Mains failure is blocked. In case of running Gen-set in AUTO mode, timer **Mains Return Delay (page 199)** is started and when it elapses GCB is opened, Gen-set goes to cooling procedure and stops.			

> *Note: This input simulates healthy Mains.*

⬘ **back to Logical binary inputs alphabetically**

Maintenance Timer 1 Reset

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1431		
Description			
This binary input resets maintenance timer to default value. It is possible to add password protection to this function - InteliConfig - controller configuration - others - access rules - commands. When password protection is used, login via controller front facia is required.			

⬘ **back to Logical binary inputs alphabetically**

MCB Feedback

Related FW	1.1.0	Related applications	AMF
Comm object	65		
Description			

Use this input for indication whether the mains circuit breaker is open or closed.

Image 8.24 MCB Feedback 1

Image 8.25 MCB Feedback 2

Note: InteliNano AMF 5 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: O

Oil Pressure

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	43		
Description			
Binary input for Oil Pressure indication.			

> **IMPORTANT: This binary input is also used for evaluating engine running condition.**

> **Example:** Normally close connection – when LBI is active then oil pressure is OK and is higher than starting oil pressure.

> *Note: In case that you want to use binary input Oil Pressure just for protection please create new binary input with User protection.*

⏶ **back to Logical binary inputs alphabetically**

LBI: P

LBI: R

Remote Ctrl Lock

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	4		
Description			
If the input is active, the controller will not accept any actions regarding the system control – e.g. writing of commands and setpoint changes via remote communication interfaces.			

⏶ **back to Logical binary inputs alphabetically**

Remote Start/Stop

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	38		
Description			
Use this input to start and stop the Gen-set in AUTO mode.			

Taken action in MRS application (AUTO Mode)	
Active	› Starts the Gen-set – No delay › Close GCB
Inactive	› Open GCB › Stop the Gen-set – No delay

⏶ **back to Logical binary inputs alphabetically**

LBI: S

Start Button

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	189		
Description			
Binary input has the same function as Start Button ▯ on the InteliNano AMF 5 front panel. It is evaluated in MAN mode only.			

⬤ **back to Logical binary inputs alphabetically**

Stop Button

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	190		
Description			
Binary input has the same function as Stop Button ▯ on the InteliNano AMF 5 front panel. It is evaluated in MAN Mode only.			

⬤ **back to Logical binary inputs alphabetically**

LBI: T

Time Stamp Act

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	125		
Description			
Binary input activates time stamp writing to history depending on Date/Time:Time stamp act and Time Stamp Per setpoints.			

⬤ **back to Logical binary inputs alphabetically**

8.1.5 Logical binary outputs

What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

Alphabetical groups of Logical binary outputs

For a full list of Logical binary inputs go to the chapter **Logical binary outputs alphabetically (page 333)**.

Logical binary outputs alphabetically

⬤ **back to Controller objects**

LBO: A

AIN Switch01

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1400		
Description			
This is an output from the General Analog Input 1 switch function. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch01 On (page 206)** and **AIN Switch01 Off (page 207)**. The value is measured from **AIN SWITCH 01 (PAGE 361)** analog input.			

Image 8.26 General analog input 1 switch

⏏ **back to Logical binary outputs alphabetically**

AIN Switch02

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1401		
Description			
This is an output from the General Analog Input 2 switch function. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch02 On (page 208)** and **AIN Switch02 Off (page 209)**. The value is measured from **AIN SWITCH 02 (PAGE 361)** analog input.			

Image 8.27 General analog input 2 switch

⏏ **back to Logical binary outputs alphabetically**

AL Common BOC

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	9		

Description

Output is activated when any BOC alarm appears.
 	
The output opens, if:
  ❯ No BOC alarm is active and
  ❯ Fault reset ⚠ button is pressed

🔺 **back to Logical binary outputs alphabetically**

AL Common Sd

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	4		

Description

Output is activated when any shutdown alarm appears .
 	
The output opens, if:
  ❯ No shutdown alarm is active and
  ❯ Fault reset ⚠ button is pressed

🔺 **back to Logical binary outputs alphabetically**

AL Common Wrn

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	3		

Description

Output is activated when any warning alarm appears.
 	
The output opens, if:
  ❯ No warning alarm is active and
  ❯ Fault reset ⚠ button is pressed

🔺 **back to Logical binary outputs alphabetically**

AL Mains Fail

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	197		

Description
This output is active when at least one mains frequency BOC or SD Alarm is present in alarmlist or in case of Mains undervoltage and Mains underfrequency (doesn't appear in the alarm list).

🔺 **back to Logical binary outputs alphabetically**

AL Maintenance 1

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2211		
Description			
Alarm is active when **Wrn Maintenance Timer 1 RunHours (page 373)** or **BOC Maintenance Timer 1 RunHours (page 399)** or **Wrn Maintenance Timer 1 Interval (page 373)** or **BOC Maintenance Timer 1 Interval (page 399)** is active.			

⬆ **back to Logical binary outputs alphabetically**

AL Overcurrent

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	109		
Description			
This output is active when the **BOC Short Circuit (page 399)** alarm is present in alarmlist or isn't confirm.			

⬆ **back to Logical binary outputs alphabetically**

Alarm

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2		
Description			
The output is designed to be used as external alarm indication such as a red bulb in the control room etc. The output is active when at least one unconfirmed alarm is present in the alarmlist and remains active until confirmation of alarm.			

⬆ **back to Logical binary outputs alphabetically**

ATT DEF Level Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2154		
Description			
This output is active when ATT DEF Level Lamp is active.			

⬆ **back to Logical binary outputs alphabetically**

ATT DPF Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2152		
Description			
This output is active when ATT DPF Lamp is active.			

⬆ **back to Logical binary outputs alphabetically**

ATT HEST Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1373		

Description
This output is closed if ECU send signal HEST Lamp. If ECU stop send HEST LAMP signal binary input will be opened without no matter if alarms in alarmlist are confirmed or not.

 back to Logical binary outputs alphabetically

ATT Inhibited Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2155		

Description
This output is active when ATT Inhibited Lamp is active.

 back to Logical binary outputs alphabetically

ATT Interlock Status

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2233		

Description
This output is active when ATT Interlock Status is active.

 back to Logical binary outputs alphabetically

ATT SCR Error Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2153		

Description
This output is active when ATT SCR Error Lamp is active.

 back to Logical binary outputs alphabetically

ATT Regen ACK Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2231		

Description
This LBO is active when the engine requires to confirm the start of aftertreatment regeneration.
Note: LBO is required in Yanmar engine types

 back to Logical binary outputs alphabetically

ATT PCD Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2446		
Description			
This LBO is active when the engine Particulate Control Diagnostic System detects removal of DPF, loss of DPF function or failure of PCD itself.			
Note: LBO is required in Yanmar engine types			

⏏ **back to Logical binary outputs alphabetically**

LBO: C

Choke

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	2091		
Description			

Logical binary output for choke valve control. Output CHOKE is activated every time when logical binary output STARTER (PAGE 356) is activated. Output is deactivated when one of these conditions is fulfilled:

> Choke Time is elapsed

> Generator voltage is higher than Choke Voltage

> Logical binary input Choke Inhibit is activated

Or when some of these situations during start occurs:

> Any second level alarm

> Emergency stop

> Stop command

> Cranking pause

⏏ **back to Logical binary outputs alphabetically**

Common Alarm Active Level 1

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	13		
Description			
This output is closed when there is at least one **Alarms level 1 (page 363)** in the alarmlis.			

⏏ **back to Logical binary outputs alphabetically**

Common Alarm Active Level 2

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	15		
Description			
This output is closed when there is at least one **Alarms level 2 (page 382)** in the alarmlis.			

⏏ **back to Logical binary outputs alphabetically**

Common Alarm Level 1

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	14		
Description			
This output is closed when there is at least one **unconfirmed Alarms level 1 (page 363)** in the alarmlist.			

🔺 **back to Logical binary outputs alphabetically**

Common Alarm Level 2

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	16		
Description			
This output is closed when there is at least one **unconfirmed Alarms level 2 (page 382)** in the alarmlist.			

🔺 **back to Logical binary outputs alphabetically**

LBO: E

ECU 1 Comm Fail

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1998		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 1.			

🔺 **back to Logical binary outputs alphabetically**

ECU 2 Comm Fail

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1999		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 2.			

🔺 **back to Logical binary outputs alphabetically**

ECU Comm OK

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	347		
Description			
This output is active when an ECU is configured, connected and the communication with the ECU is established.			

> *Note: When ECU POWER RELAY (PAGE 340) is not configured, output is evaluated all the time. If ECU POWER RELAY (PAGE 340) is configured, output is evaluated only when engine is not stop (ECU POWER RELAY (PAGE 340) is active).*

🔺 **back to Logical binary outputs alphabetically**

ECU Comm Error

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	114		

Description
This output is active when an ECU is configured, but the communication with the ECU is not established or has dropped out.

> *Note: When ECU POWER RELAY (PAGE 340) is not configured, output is evaluated all the time. If ECU POWER RELAY (PAGE 340) is configured, output is evaluated only when engine is not stop (ECU POWER RELAY (PAGE 340) is active).*

🔺 **back to Logical binary outputs alphabetically**

ECU Power Relay

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	116		

Description
This output is to be used for control of "keyswitch" input of an ECU. If the particular ECU does not have keyswitch or a similar input, it can be used for control of DC power for the ECU.

The output is activated together with **PRESTART (PAGE 353)** and remains active for the entire duration that the engine is running. It is deactivated at the moment that the engine comes to a stop (i.e. together with the **FUEL SOLENOID (PAGE 342)**).
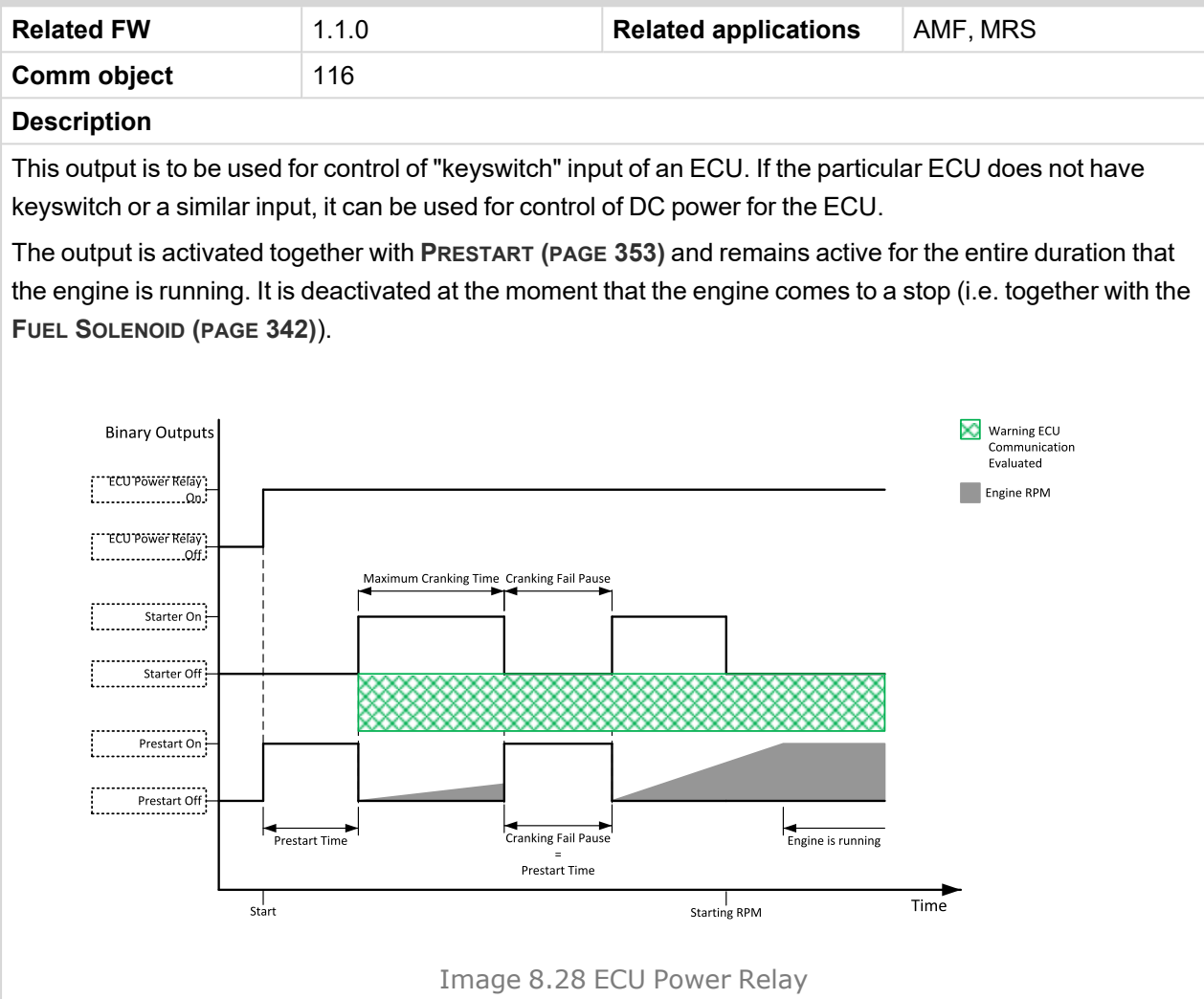

Image 8.28 ECU Power Relay

> **IMPORTANT: This LBO also affects evaluation of Sd ECU Communication Fail (page 385) or Wrn ECU Communication Fail (page 368) alarms. With configured LBO ECU Power Relay, these alarms are evaluated only when this LBO is active. Without configured LBO ECU Power Relay, these alarm are evaluated all the time.**

🔺 **back to Logical binary outputs alphabetically**

ECU Red Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	350		
Description			
This output is active when the ECU sends an active "red lamp" flag, i.e. it has detected a critical malfunction and the engine should not be operated until a service check is performed. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.			

🔺 **back to Logical binary outputs alphabetically**

ECU Run Stop

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	958		
Description			
Signal for starting and stopping of ECU.			

🔺 **back to Logical binary outputs alphabetically**

ECU Yellow Lamp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	349		
Description			
This output is active when the ECU sends an active "yellow lamp" flag, i.e. it has detected a non-critical malfunction. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.			

🔺 **back to Logical binary outputs alphabetically**

Exercise Timer 1

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1250		
Description			
This is an output from the Exercise timer 1. This output makes it easy to make periodic tests of the Gen-set and its activation depends on the setpoints in the **Subgroup: Timer 1 (page 215)** subgroup. This output is active when Timer 1 is active.			

🔺 **back to Logical binary outputs alphabetically**

LBO: F

Frequency Select

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1815		
Description			
The Frequency select output is active when Nominal Frequency (Frequency Settings) is equal to 50 Hz and is deactivated when Nominal Frequency (Frequency Settings) is equal to 60 Hz.			

🔺 **back to Logical binary outputs alphabetically**

Fuel Pump

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1253		
Description			

Output is activated when the value of Fuel Level lies under the value of setpoint **Fuel Pump On (page 184)** and is deactivated when value of **Fuel Pump Off (page 185)** is reached.

This output also can be activated by binary input FUEL PUMP ON/OFF (PAGE 326). In this case the binary output is active until the binary input FUEL PUMP ON/OFF (PAGE 326) is active or until the value of Fuel Level reaches 100 % or the time set by setpoint **Transfer Wrn Delay (page 186)** elapsed.

⏶ **back to Logical binary outputs alphabetically**

Fuel Solenoid

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	22		
Description			

This output controls the fuel solenoid valve.

Diesel:

The output is activated before binary output STARTER (PAGE 356).The lead time is adjusted by setpoint **Fuel Solenoid Lead (page 171)**.
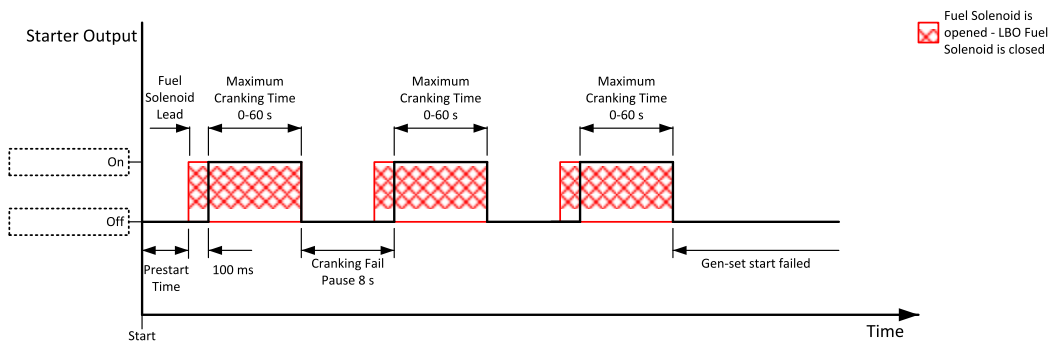
Image 8.29 Fuel Solenoid 1
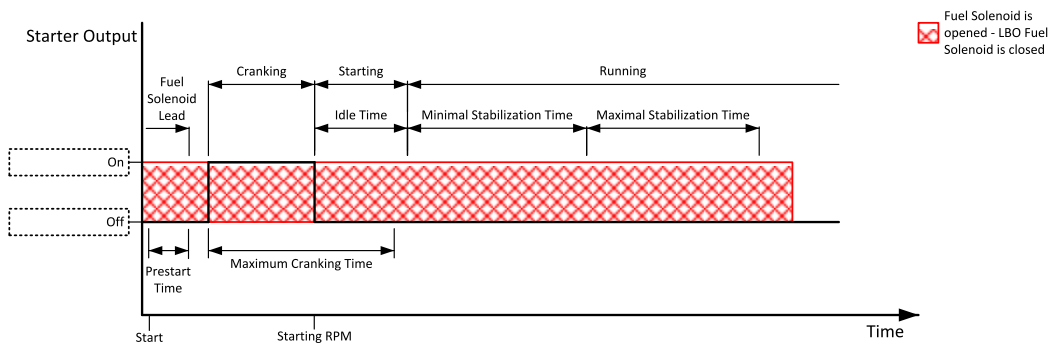
Image 8.30 Fuel Solenoid 2

The output is deactivated when:

> ❯ Emergency Stop comes

> ❯ Cooled Gen-set is stopped

> ❯ In pause between repeated starts

🔺 **back to Logical binary outputs alphabetically**

LBO: G

GCB Close/Open

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	41		
Description			

The output controls the generator circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

Note: InteliNano AMF 5 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.
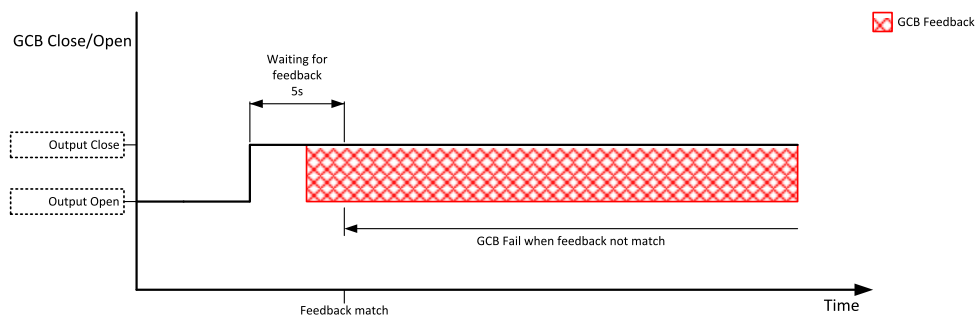
Image 8.31 GCB Close command
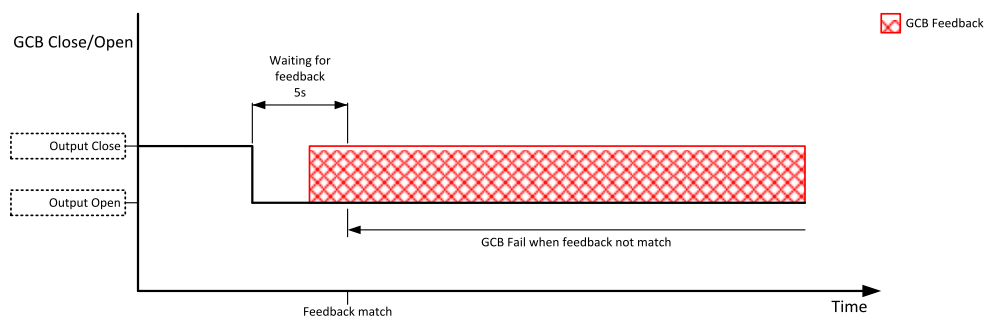
Image 8.32 GCB Open command

🔺 **back to Logical binary outputs alphabetically**

GCB OFF Coil

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	43		

Description

The output is intended for control of open coil of generator circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.
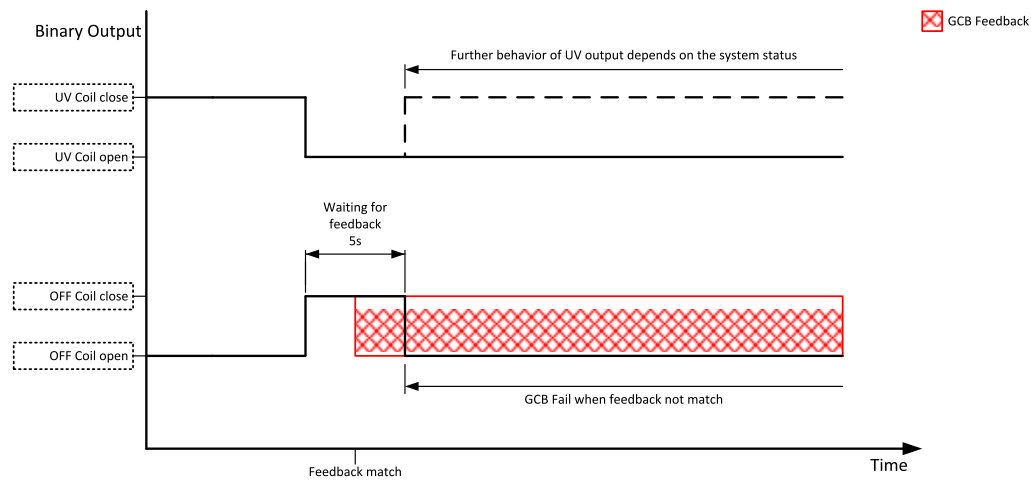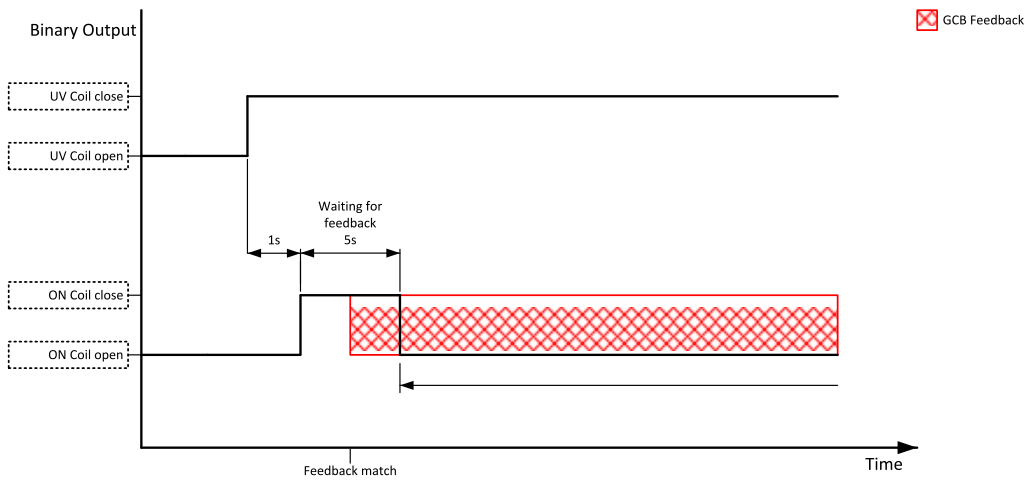
Image 8.33 GCB OFF Coil command

GCB ON Coil

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	42		
Description			
The output is intended for control of close coil of generator circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.			

Image 8.34 GCB ON Coil close command

🔺 **back to Logical binary outputs alphabetically**

GCB Status

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	84		
Description			
This output indicates the GCB position as it is internally considered by the controller.			

🔺 **back to Logical binary outputs alphabetically**

GCB UV Coil

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	44		
Description			
The output is intended for control of undervoltage coil of generator circuit breaker. The output is active the whole time when the generator is running. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.			

Binary Outputs

Waiting for
feedback 5s

GCB Close/Open On

GCB Close/Open Off

GCB On pulse

GCB ON Coil On

GCB ON Coil Off

GCB UV Coil On

GCB UV Coil Off

GCB button press

GCB Fail when feedback not match

GCB feedback

Engine is running

Time
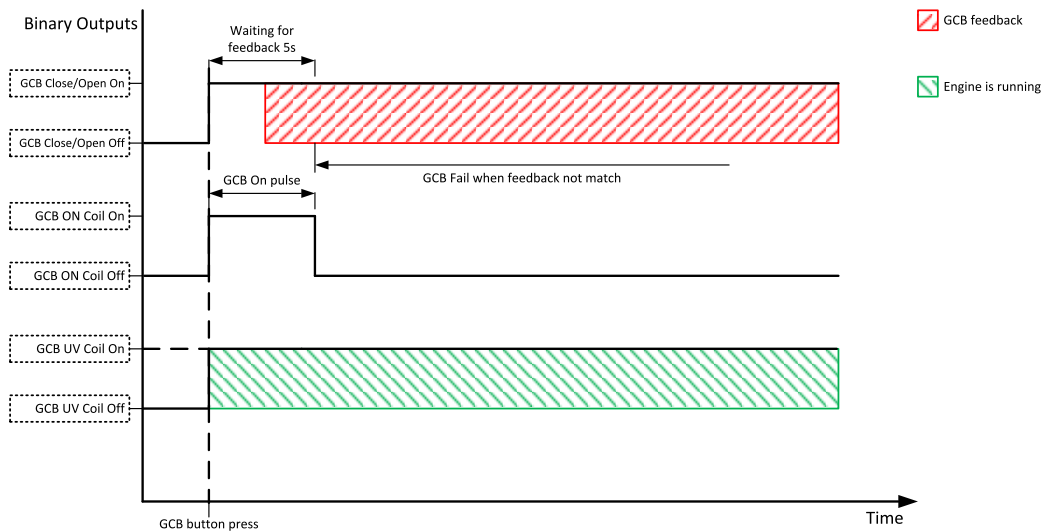
Image 8.35 GCB UV Coil close command

Binary Outputs

Waiting for
feedback 5s

GCB Close/Open On

GCB Close/Open Off

GCB OFF pulse

GCB OFF Coil On

GCB OFF Coil Off

GCB Fail when feedback not match

Further behavior of UV output depends on the system status

GCB UV Coil On

GCB UV Coil Off

GCB button press

GCB feedback

Engine is running

Time
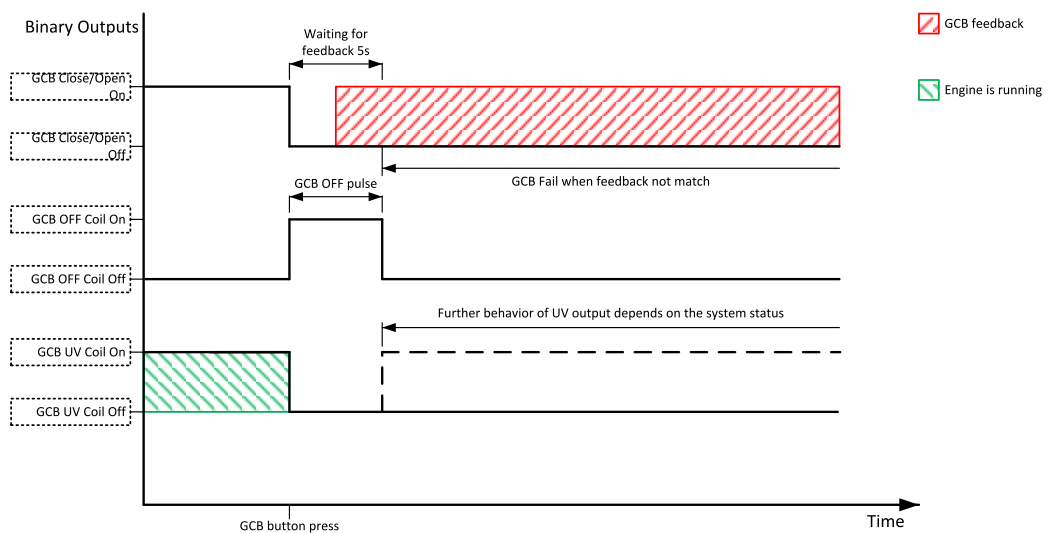
Image 8.36 GCB UV Coil open command
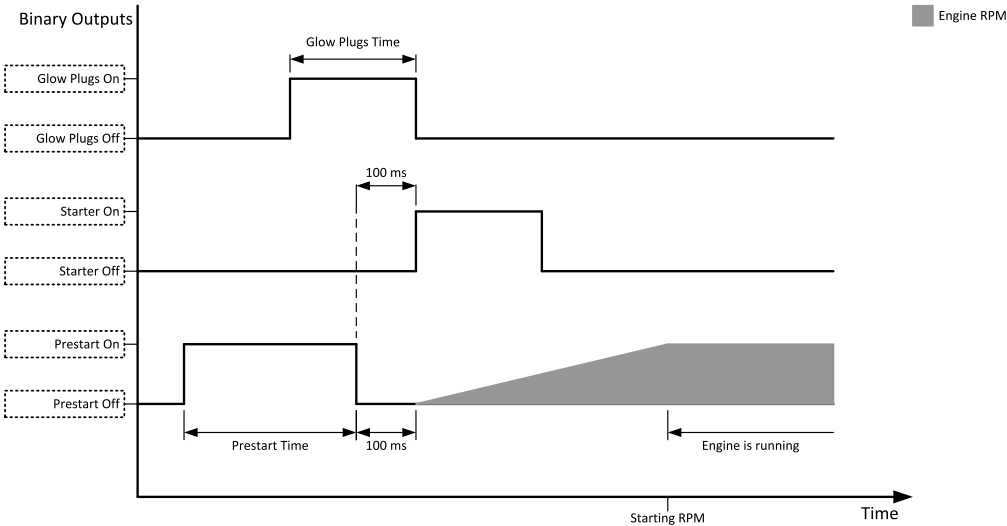
⬣ **back to Logical binary outputs alphabetically**

Generator Healthy

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	77		
Description			
This output is active when the generator voltage, frequency and voltage unbalance is within limits. It is deactivated: - immediately when the voltage/frequency/voltage unbalance gets out of limits (when GCB is not closed) or - with an appropriate delay after the voltage/frequency/voltage unbalance has got out of limits (when GCB is closed)			

⏶ **back to Logical binary outputs alphabetically**

Glow Plugs

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1252		
Description			
This output is dedicated for diesel engine only. This output will be active for exact time pre-set by setpoint **Glow Plugs Time (page 165)** before every starting attempt. The output is deactivated at the same time as the STARTER (PAGE 356) output is activated (100 ms after PRESTART (PAGE 353) output is deactivated).			

Image 8.37 Glow Plugs

When the **Glow Plugs Time (page 165)** is longer than **Cranking Fail Pause (page 272)** then the **Glow Plugs Time (page 165)** in **Cranking Fail Pause (page 272)** as long as **Cranking Fail Pause (page 272)**.
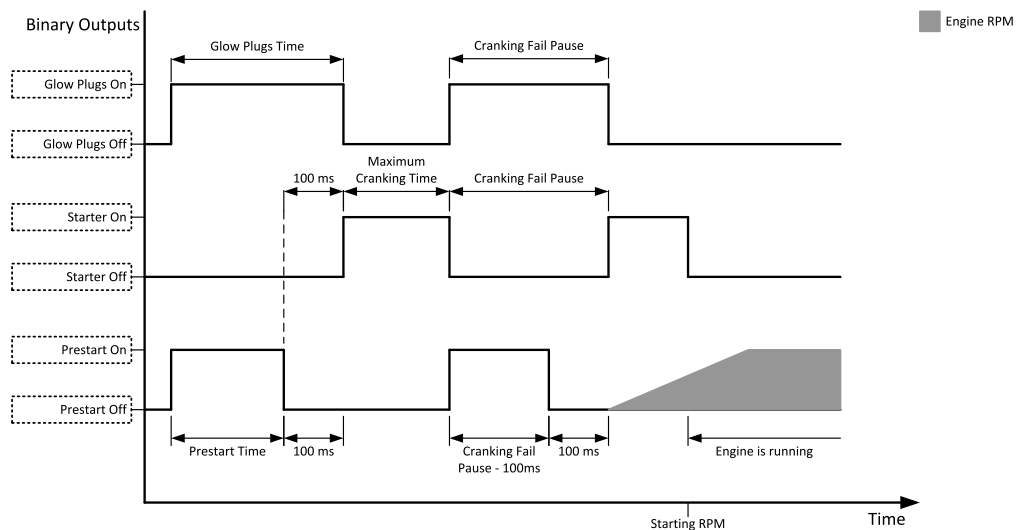
Image 8.38 Glow Plugs in Cranking Fail Pause 1

When the **Glow Plugs Time (page 165)** is shorter than **Cranking Fail Pause (page 272)** then the **Glow Plugs Time (page 165)** in **Cranking Fail Pause (page 272)** as long as the normal **Glow Plugs Time (page 165)**.
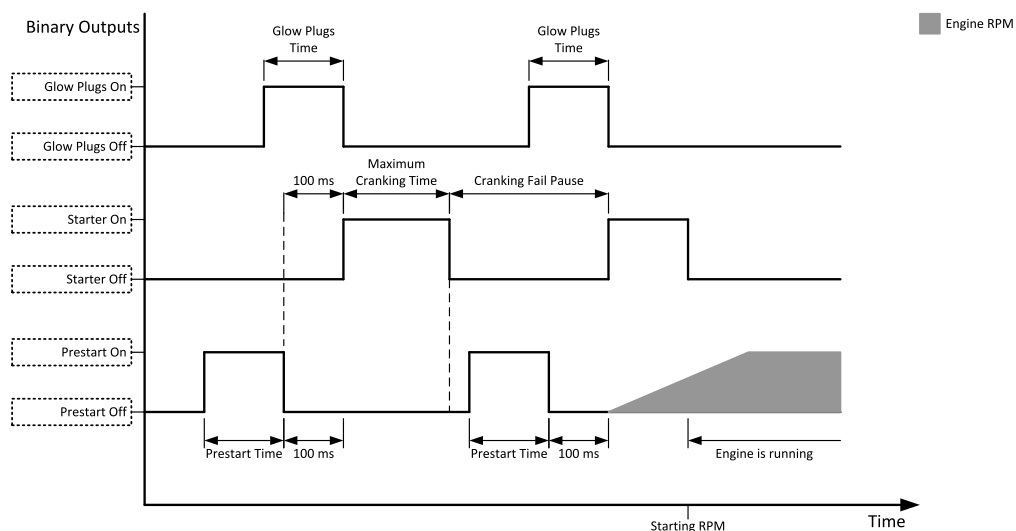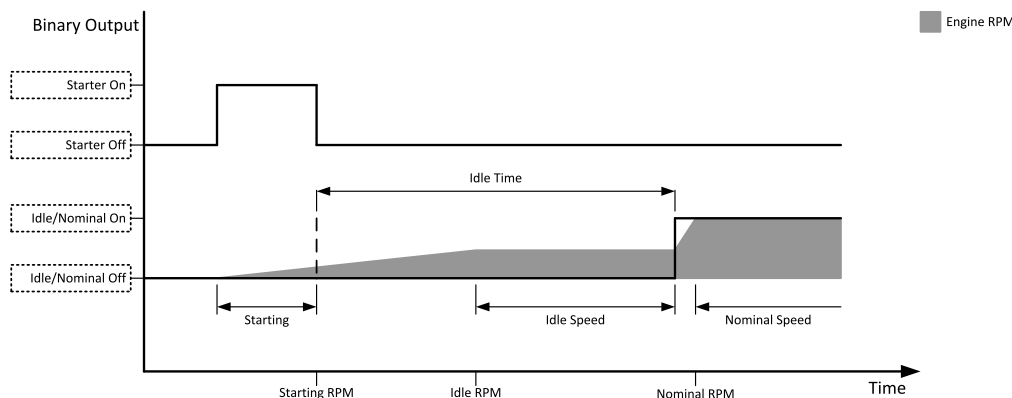
Image 8.39 Glow Plugs in Cranking Fail Pause 2

⏶ **back to Logical binary outputs alphabetically**

LBO: I

Idle/Nominal

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	39		
Description			

This output is used for switching between idle speed and nominal speed of the engine during the startup phase, if this feature (input) is available on the particular engine. In the case of some EFI engines, the idle/nominal switching is performed over the communication bus.

The output Idle/Nominal is activated after the timer **Idle Time (page 171)** elapses. The **Idle Time (page 171)** starts to countdown when **Starting RPM (page 164)** reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching **Starting RPM (page 164)**. A Start Fail protection occurs if the RPM drop below 2RPM during idle.

Image 8.40 Idle/Nominal

Note: Connect binary output Idle/Nominal to speed governor to switch the speed:
opened = Idle
closed = Nominal
(for normally open contact type)

🔺 **back to Logical binary outputs alphabetically**

LBO: M

Mains Healthy

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	78		
Description			

This output is active while mains failure is not detected and mains voltage and frequency is within limits.

> Mains Healthy is active when mains f and V are within the protection limits

> Mains Healthy deactivates when there is active mains protection level 2

> Mains Healthy cannot be activated when there is inactive not confirmed alarm **Sd Emergency Stop (page 385)** in the alarmlist

🔺 **back to Logical binary outputs alphabetically**

MCB Close/Open

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	45		
Description			

The output controls the mains circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

Note: InteliNano AMF 5 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.
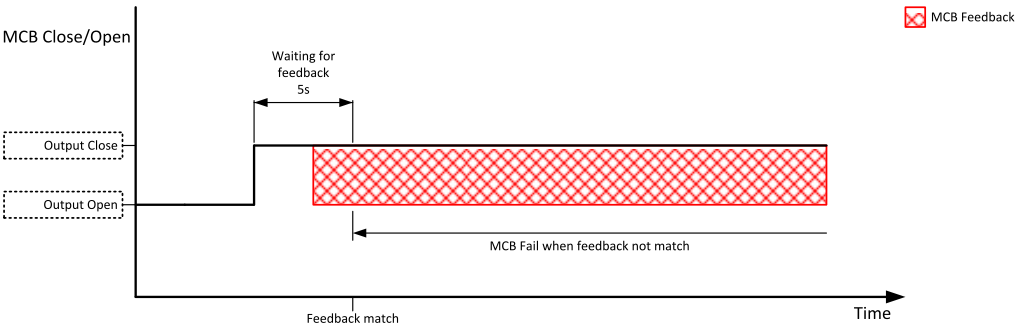
Image 8.41 MCB Close command

⬤ **back to Logical binary outputs alphabetically**

MCB OFF Coil

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	47		
Description			

The output is intended for control of open coil of mains circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.

Image 8.42 MCB OFF Coil command

⬤ **back to Logical binary outputs alphabetically**

MCB ON Coil

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	46		
Description			

The output is intended for control of close coil of mains circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.
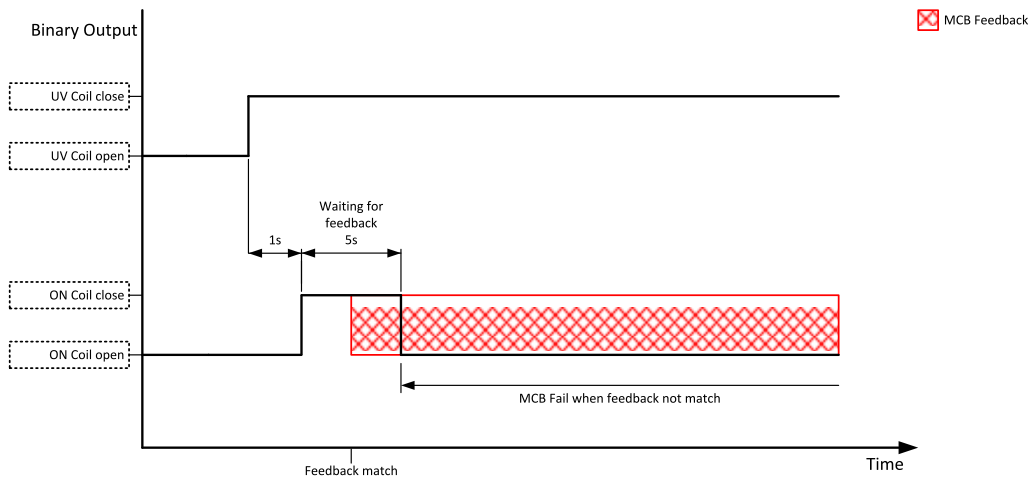
Image 8.43 MCB ON Coil close command

🔺 **back to Logical binary outputs alphabetically**

MCB UV Coil

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	48		

Description

The output is intended for control of undervoltage coil of mains circuit breaker. The output is active the whole time when the controller is switched on. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.
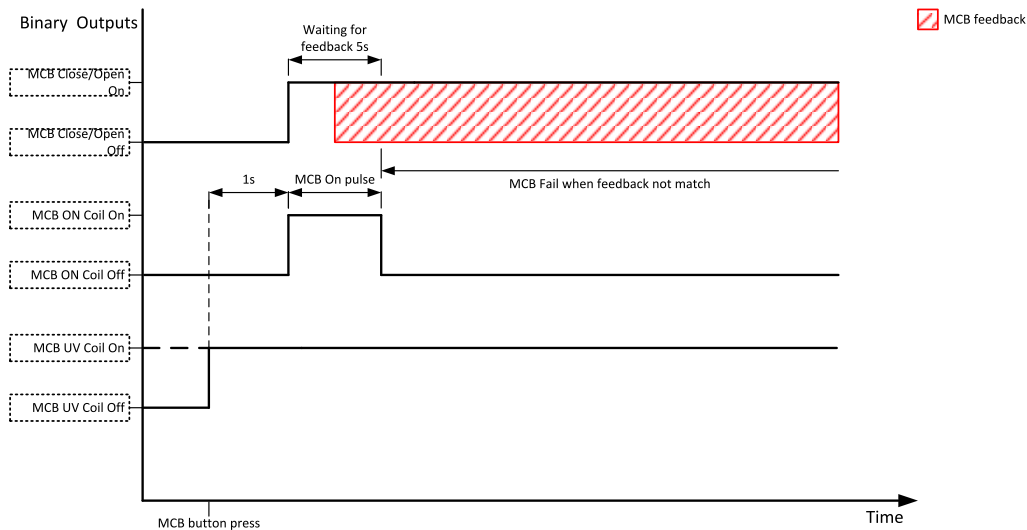
Image 8.44 MCB UV Coil close command
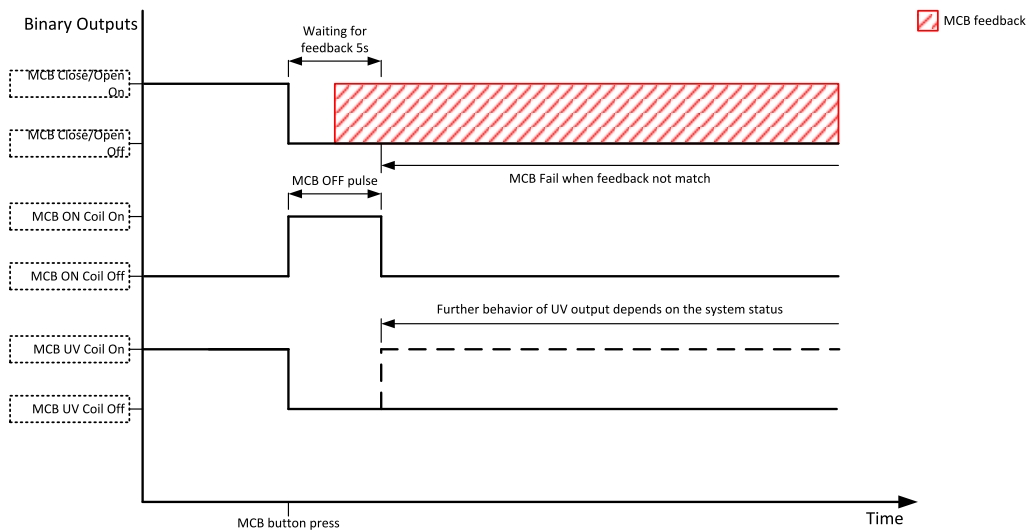
Image 8.45 MCB UV Coil open command

⬆ **back to Logical binary outputs alphabetically**

Mode AUTO

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	19		
Description			
This output is active whenever the controller is in AUTO mode.			

 back to **Logical binary outputs alphabetically**

Mode MAN

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	18		
Description			
This output is active whenever the controller is in MAN mode.			

 back to **Logical binary outputs alphabetically**

Mode OFF

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	17		
Description			
This output is active whenever the controller is in OFF mode.			

 back to **Logical binary outputs alphabetically**

LBO: N

Not Used

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	286		
Description			
Output has no function.			

 back to **Logical binary outputs alphabetically**

LBO: P

Prestart

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	36		
Description			

This output can be used for control of any device, which has to be activated just before start. the output is active for time period of **Prestart Time (page 164)**. The output is deactivated 100 ms before the Sᴛᴀʀᴛᴇʀ (ᴘᴀɢᴇ 356) output is activated.
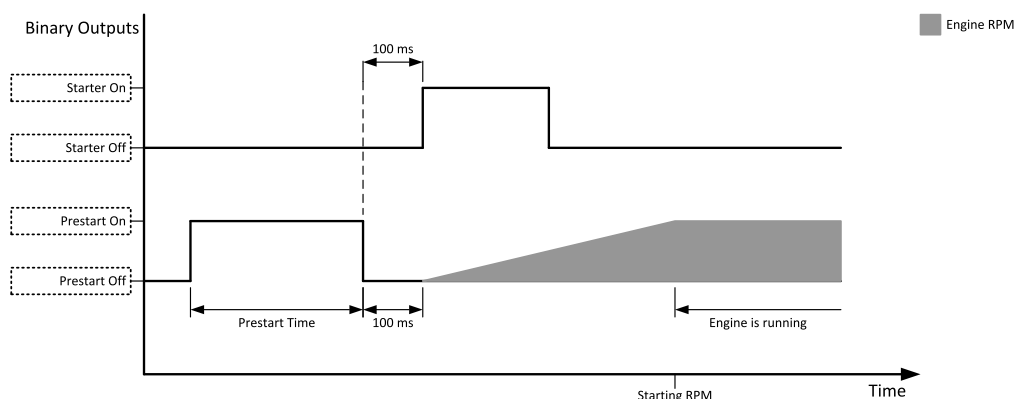
Image 8.46 Engine start

When the **Prestart Time (page 164)** is longer than **Cranking Fail Pause (page 272)** then the **Prestart Time (page 164)** in **Cranking Fail Pause (page 272)** is long as **Cranking Fail Pause (page 272)** minus 100 ms.
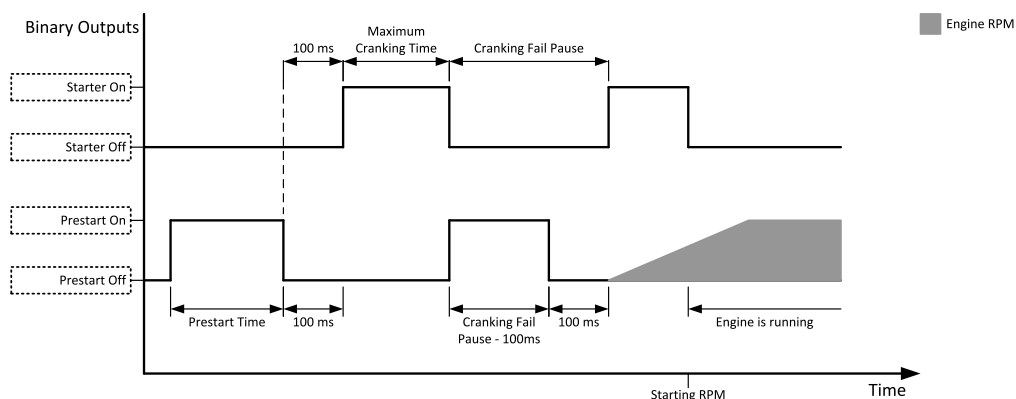
Image 8.47 Prestart in Cranking Fail Pause 1

When the **Prestart Time (page 164)** is shorter than **Cranking Fail Pause (page 272)** then the **Prestart Time (page 164)** in **Cranking Fail Pause (page 272)** is long as normal **Prestart Time (page 164)**.
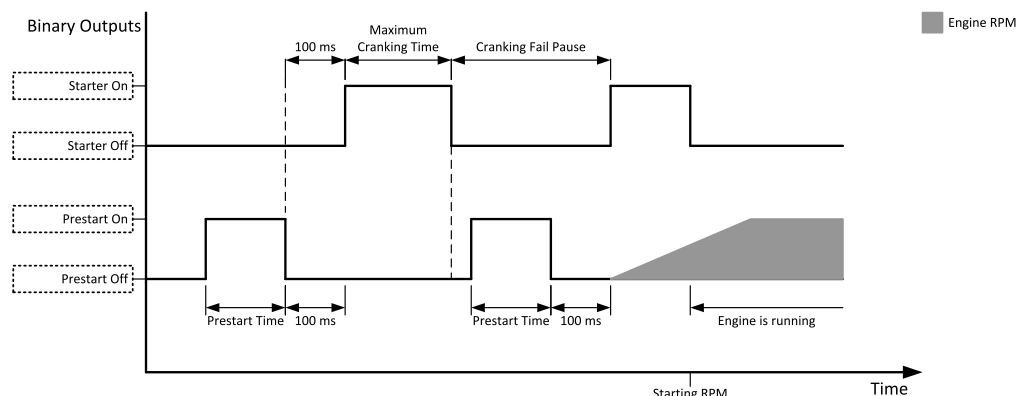
Image 8.48 Prestart in Cranking Fail Pause 2

🔺 **back to Logical binary outputs alphabetically**

LBO: R

Ready To Load

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	58		
Description			

the output is active whenever the GCB is closed or can be closed i.e. the stabilization phase is finished, the Gen-set is running and the **Minimal Stabilization Time (page 173)** timer has elapsed and the Gen-set voltage and frequency are within limits.

If GCB is open, then the Gen-set voltage and frequency must be in limits.

If GCB is closed, then the Gen-set voltage and frequency can be out of limits. Protection delay can't be count down in this case. When the Gen-set voltage and frequency returns into limits before the delay is finished, then output is still active.

🔺 **back to Logical binary outputs alphabetically**

RegenerationNeeded

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	1372		
Description			

This output is active when DPF lamp from ECU is active.

🔺 **back to Logical binary outputs alphabetically**

LBO: S

Starter

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	24		
Description			
This output is dedicated for starter motor control. The number of cranking attempts is adjusted by setpoint **Cranking Attempts (page 163)** in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause (page 272)**.			

Image 8.49 Starter

The starter output opens when:
> Starting RPM are reached

> the "firing" speed is reached

> maximum time of cranking is exceeded

> request to stop comes up

> D+ value is higher than **D+ Threshold (page 177)**

> Oil pressure value is higher than **Starting Oil Pressure (page 165)**

> Generator voltage >25 % of **Nominal Voltage Ph-N (page 148)** or **Nominal Voltage Ph-Ph (page 148)** (any phase)

⏶ **back to Logical binary outputs alphabetically**

Stop Pulse

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	25		
Description			

Output is active for 1 second after STOP SOLENOID (PAGE 357) output activation. This signal is sent to ECU in case of engine stop request.

Image 8.50 Stop Pulse

⬆ **back to Logical binary outputs alphabetically**

Stop Solenoid

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	23		
Description			

This output is dedicated to control the stop solenoid (valve). The output is activated when an engine stop command is received and is deactivated 12 s after last running engine indication went off, i.e. engine is stopped.

Image 8.51 Stop Solenoid 1
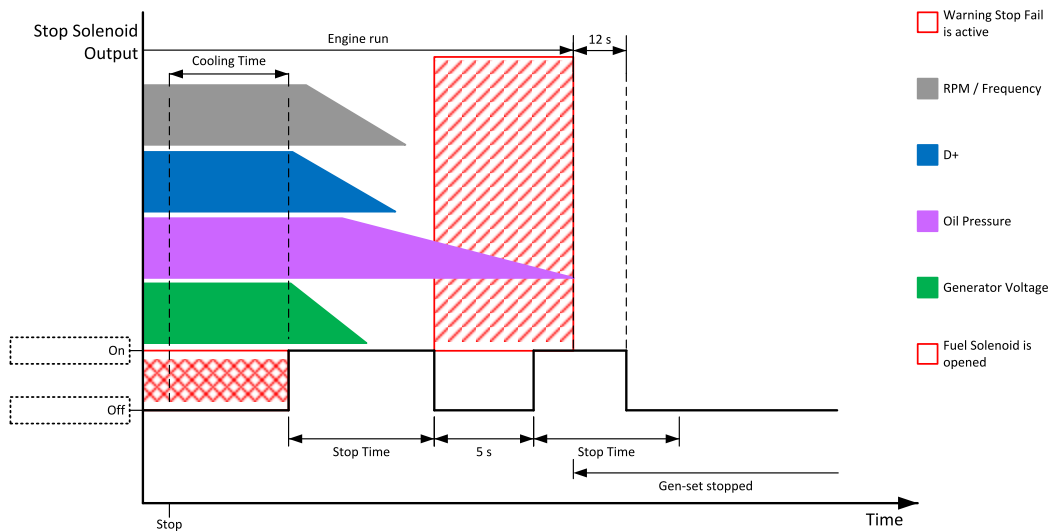
Image 8.52 Stop Solenoid 2

Note: *If **Additional running engine indications (page 67)** went off during 5 s pause than Stop Solenoid is not activated again otherwise stop solenoid is activated again.*

🔺 **back to Logical binary outputs alphabetically**

8.1.6 Logical analog inputs

What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

Alphabetical groups of Logical analog inputs

For a full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 360)**.

Logical analog inputs alphabetically

⏏ **back to Controller objects**

LAI: A

AIN Switch 01

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	209		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 39**. This analog input controls logical binary output **AIN SWITCH01 (PAGE 334)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch01 On (page 206)** and **AIN Switch01 Off (page 207)**.			
Note: This function is not suitable for tristate or binary analog sensors.			
IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.			

⬤ **back to Logical analog inputs alphabetically**

AIN Switch 02

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	210		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 39**. This analog input controls logical binary output **AIN SWITCH02 (PAGE 334)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch02 On (page 208)** and **AIN Switch02 Off (page 209)**.			
Note: This function is not suitable for tristate or binary analog sensors.			
IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.			

⬤ **back to Logical analog inputs alphabetically**

LAI: C

Coolant Temp

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	67		
Description			
Logical analog input designed for coolant temperature value received from analog sensor.			

⏶ **back to Logical analog inputs alphabetically**

LAI: E

Engine Speed

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	8		
Description			
This LAI selects the source of RPM.			

⏶ **back to Logical analog inputs alphabetically**

LAI: F

Fuel Level

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	78		
Description			
Logical analog input designed for fuel level value received from analog sensor.			

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

⏶ **back to Logical analog inputs alphabetically**

LAI: N

Not Used

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	230		
Description			
Input has no function.			

⏶ **back to Logical analog inputs alphabetically**

LAI: O

Oil Pressure

Related FW	1.1.0	Related applications	AMF, MRS
Comm object	9		
Description			
Logical analog input designed for oil pressure value received from analog sensor.			

> *Note: This analog function can by also configured on binary input as binary function. In this case choose OIL PRESSURE (PAGE 330) binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.*

⬤ **back to Logical analog inputs alphabetically**

8.2 Alarms

What alarms are:

The controller evaluates two levels of alarms. For more information **see Alarm management on page 96**.

8.2.1 Alarm levels in the controller

8.2.2 Alarms level 1

What alarms level 1 are:

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level.

List of alarms level 1

⏺ **back to Alarms**

AL Fuel Transfer Failed

Alarm Type	ALI
Alarmlist message	Fuel Transfer Failed
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when Fuel Level, received from ECU or LAI, does not increase during time **Transfer Wrn Delay (page 186)**.

⬆ **back to List of alarms level 1**

Wrn Module(slotA) - false module

Alarm Type	WRN
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that false module is inserted in slot.

⬆ **back to List of alarms level 1**

Wrn Module(slotA) - unknown module

Alarm Type	WRN
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that unknown module is inserted in slot.

⬆ **back to List of alarms level 1**

Wrn Module(slotA) - unattended

Alarm Type	WRN
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

⬆ **back to List of alarms level 1**

Wrn Module(slotA) - comm. outage

Alarm Type	WRN
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

⬆ **back to List of alarms level 1**

Wrn Module(slotA) - unexpected

Alarm Type	WRN
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

⬤ back to List of alarms level 1

Wrn Event Email 1 Fail

Alarm Type	WRN
Alarmlist message	Event Email 1 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 1 (page 255)** and email wasn't send.

⬤ back to List of alarms level 1

Wrn Event Email 2 Fail

Alarm Type	WRN
Alarmlist message	Event Email 2 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 2 (page 255)** and email wasn't send.

⬤ back to List of alarms level 1

Wrn Event SMS 1 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 1 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 245)** and SMS wasn't send.

⬤ back to List of alarms level 1

Wrn Event SMS 2 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 2 Fail

Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 246)** and SMS wasn't send.

⬤ back to List of alarms level 1

Wrn Alarm Email 1 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 1 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 1 (page 255)** and email wasn't send.

⬤ back to List of alarms level 1

Wrn Alarm Email 2 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 2 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 2 (page 255)** and email wasn't send.

⬤ back to List of alarms level 1

Wrn Alarm SMS 1 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 1 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 245)** and SMS wasn't sent.

⬤ back to List of alarms level 1

Wrn Alarm SMS 2 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 2 Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 246)** and

	SMS wasn't sent.

⬤ **back to List of alarms level 1**

Wrn ECUDiagBlocked

Alarm Type	ALI
Alarmlist message	ECUDiagBlocked
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	LBO ALARM (PAGE 336) is not activated, after deactivation of lamp, alarm automatically disappears.

⬤ **back to List of alarms level 1**

Wrn ECU Communication Fail

Alarm Type	WRN
Alarmlist message	ECU Communication Fail
Alarm evaluated	With configured LBO ECU POWER RELAY (PAGE 340) – only when this LBO is active Without configured LBO ECU POWER RELAY (PAGE 340) – all the time
Related applications	AMF, MRS
Description	This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out.

⬤ **back to List of alarms level 1**

Wrn ECU 1 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 1 Comm Fail
Alarm evaluated	ECU 1 is configured
Related applications	AMF, MRS
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 1.

⬤ **back to List of alarms level 1**

Wrn ECU 2 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 2 Comm Fail
Alarm evaluated	ECU 2 is configured
Related applications	AMF, MRS
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 2.

⬤ **back to List of alarms level 1**

Wrn Default Password

Alarm Type	WRN

Alarmlist message	Default Password
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is issued if the factory default password and/or access code are used and engine is running. Factory default password and access code are "0".

🔺 back to List of alarms level 1

Wrn PasswEnterBlock

Alarm Type	WRN
Alarmlist message	PasswEnterBlock
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued to indicate that user will not be able to type in password for set amount of time. *Note: This is cause by too many invalid attempts.*

🔺 back to List of alarms level 1

Wrn ECU Yellow Lamp

Alarm Type	AHI
Alarmlist message	Wrn ECU Yellow Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU Yellow lamp is activated. LBO ALARM (PAGE 336) is not activated, after deactivation of lamp, alarm automatically disappears.

🔺 back to List of alarms level 1

Wrn ECU Red Lamp

Alarm Type	AHI
Alarmlist message	Wrn ECU Red Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU Red lamp is activated. LBO ALARM (PAGE 336) is not activated, after deactivation of lamp, alarm automatically disappears. *Note: This lamp can be ignored during prestart phase. Use InteliConfig to enable this function.*

🔺 back to List of alarms level 1

Wrn ECU Wait To Start

Alarm Type	AHI
Alarmlist message	Wrn ECU Wait To Start

Alarm evaluated	Only when ECU is connected
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU Wait To Start lamp is activated. LBO **ALARM (PAGE 336)** is not activated, after deactivation of lamp, alarm automatically disappears.

⬤ **back to List of alarms level 1**

Wrn ATT DPF Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT Filter Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT DPF Lamp is activated. LBO **ALARM (PAGE 336)** is not activated, after deactivation of lamp, alarm automatically disappears.

⬤ **back to List of alarms level 1**

Wrn ATT HEST Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT HEST Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT Hest Lamp is activated. LBO **ALARM (PAGE 336)** is not activated, after deactivation of lamp, alarm automatically disappears.

⬤ **back to List of alarms level 1**

Wrn ATT SCR Error Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT SCR Error Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT SCR Error Lamp is activated. LBO **ALARM (PAGE 336)** is not activated, after deactivation of lamp, alarm automatically disappears.

⬤ **back to List of alarms level 1**

Wrn ATT DEF Level Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT DEF Level Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when ECU send information that ECU ATT DEF Level

Lamp is activated. LBO **ALARM (PAGE 336)** is not activated, after deactivation of lamp, alarm automatically disappears.

Wrn ATT Inhibited Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT Inhibited Lamp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued to indicate Inhibited Lamp. This alarm is activated when ECU send information that ECU ATT Inhibited Lamp is activated. LBO **ALARM (PAGE 336)** is not activated, after deactivation of lamp, alarm automatically disappears.

AL Transferring Fuel

Alarm Type	ALI
Alarmlist message	Transferring Fuel
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if **FUEL PUMP (PAGE 342)** is active.

Wrn Coolant Temp

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Coolant Temp
Related applications	AMF, MRS
Description	Warning alarm for Coolant Temp user protection.

Wrn Coolant Temp Low

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Coolant Temp Low
Related applications	AMF, MRS
Description	Warning alarm for Coolant Temp Low user protection.

Wrn Fuel Level

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Fuel Level

Related applications	AMF, MRS
Description	Warning alarm for Coolant Temp Low user protection.

Wrn Fuel Transfer Failed

Alarm Type	Warning
Alarmlist message	Wrn Fuel Transfer Failed
Alarm evaluated	When FUEL PUMP (PAGE 342) is active
Related applications	AMF, MRS
Description	This alarm will occur when there is no increase of fuel level when FUEL PUMP (PAGE 342) is active.
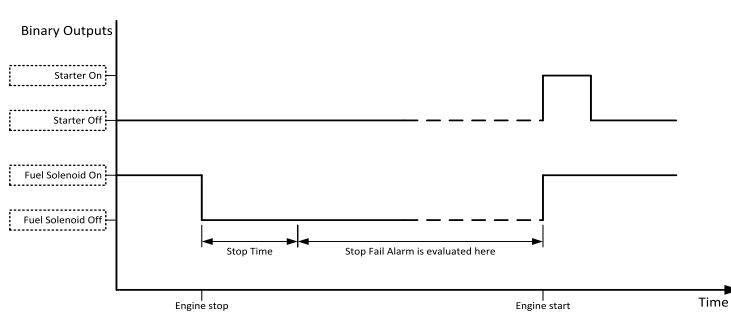
Wrn Charging Alternator Fail

Alarm Type	SD
Alarmlist message	Sd Charging Alternator Fail
Alarm evaluated	Engine running only
Related applications	AMF, MRS
Description	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than **D+ Threshold (page 177)** 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.

Wrn Stop Fail

Alarm Type	WRN
Alarmlist message	Wrn Stop Fail
Alarm evaluated	While the engine shall be stopped
Related applications	AMF, MRS
Description	This alarm occurs if the Gen-set shall be stopped, but some symptom indicates that it is not stopped. The period when the Gen-set shall be stopped begins after the FUEL SOLENOID (PAGE 342) has been switched off and time delay **Stop Time (page 175)** has elapsed and lasts for the entire time the FUEL SOLENOID (PAGE 342) or STARTER (PAGE 356) are off.

Image 8.53 Stop Fail

	Note: Gen-set cannot be started until this alarm is inactive and reset.

⬢ **back to List of alarms level 1**

Wrn Maintenance Timer 1 RunHours

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 1 RunHours
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 293)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 RunHours (page 189)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 1 Protection (page 190)** has to be set to: Warning

⬢ **back to List of alarms level 1**

Wrn Maintenance Timer 1 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 1 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 Interval (page 293)** Interval reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 Interval (page 189)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 1 Protection (page 190)** has to be set to: Warning

⬢ **back to List of alarms level 1**

Wrn MCB Fail

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm will occur when the **MCB FEEDBACK (PAGE 329)** input does not match the expected position given by the **MCB CLOSE/OPEN (PAGE 350)** output. It stays active until the mismatch between the output and feedback disappears. ❯ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. ❯ Self-opening of the breaker is not considered a fault and if all mains values are within limits, the command to reclose the breaker is issued after delay given by the setpoint **Mains Return Delay (page 199)** has elapsed. ❯ The alarm will be also issued, if the breaker does not respond to the close

| | command within 5 seconds. After this period has elapsed the output MCB Close/Open is deactivated again and the next attempt to close the breaker will occur first after the alarm is reset. |
| | > The alarm will be also issued if the breaker does not respond to the open command within 5 seconds. The output MCB Close/Open will stay deactivated. Closing of GCB is blocked until this alarm becomes inactive. |

Wrn MCB Fail To Close

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail To Close
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is activated when there is a problem with circuit breaker position while closing. > LBO **MCB CLOSE/OPEN (PAGE 350)** closed but LBI **MCB FEEDBACK (PAGE 329)** did not closed in 5 seconds. > **Self-closing of breaker with mains parameters with limits** – not considered as fault

Wrn MCB Fail To Open

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail To Open
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is activated when there is a problem with circuit breaker position while opening. > LBO **MCB CLOSE/OPEN (PAGE 350)** opened but LBI **MCB FEEDBACK (PAGE 329)** did not opened in 5 seconds. > **Self-opening of breaker with mains parameters without limits** – not considered as fault, MCB open command is issued according to the setpoint **MCB Opens On (page 205)**.

Wrn Generator L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: > **Generator Overvoltage Wrn (page 194)** > **Generator <> Voltage Delay (page 196)**

Wrn Generator L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: ❯ **Generator Overvoltage Wrn (page 194)** ❯ **Generator <> Voltage Delay (page 196)**

Wrn Generator L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: ❯ **Generator Overvoltage Wrn (page 194)** ❯ **Generator <> Voltage Delay (page 196)**

Wrn Generator L1L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: ❯ **Generator Overvoltage Wrn (page 194)** ❯ **Generator <> Voltage Delay (page 196)**

Wrn Generator L2L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: ❯ **Generator Overvoltage Wrn (page 194)**

> **Generator <> Voltage Delay (page 196)**

Wrn Generator L3L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: > **Generator Overvoltage Wrn (page 194)** > **Generator <> Voltage Delay (page 196)**

Wrn Generator L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: > **Generator Undervoltage Wrn (page 195)** > **Generator <> Voltage Delay (page 196)**

Wrn Generator L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: > **Generator Undervoltage Wrn (page 195)** > **Generator <> Voltage Delay (page 196)**

Wrn Generator L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it:

	> **Generator Undervoltage Wrn (page 195)**
	> **Generator <> Voltage Delay (page 196)**

⏶ **back to List of alarms level 1**

Wrn Generator L1L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: > **Generator Undervoltage Wrn (page 195)** > **Generator <> Voltage Delay (page 196)**

⏶ **back to List of alarms level 1**

Wrn Generator L2L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: > **Generator Undervoltage Wrn (page 195)** > **Generator <> Voltage Delay (page 196)**

⏶ **back to List of alarms level 1**

Wrn Generator L3L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: > **Generator Undervoltage Wrn (page 195)** > **Generator <> Voltage Delay (page 196)**

⏶ **back to List of alarms level 1**

Wrn Overload

Alarm Type	WRN
Alarmlist message	Overload
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is issued when the Gen-set power is over the limit for time period longer than the delay. The following setpoints are related to it: ❯ **Overload Wrn (page 191)** adjusts the overload limit. ❯ **Overload BOC (page 191)** Overload Del adjusts the delay.

🔺 **back to List of alarms level 1**

Wrn Battery Overvoltage

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Battery > Voltage
Related applications	AMF, MRS
Description	This alarm informs the operator that the controller supply voltage is too high. The following setpoints are related to it: ❯ **Battery Overvoltage (page 187)** ❯ **Battery <> Voltage Delay (page 187)**

🔺 **back to List of alarms level 1**

Wrn Battery Undervoltage

Alarm Type	WRN
Alarmlist message	Wrn Battery < Voltage
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm informs the operator that the controller supply voltage is too low. The following setpoints are related to it: ❯ **Battery Undervoltage (page 186)** ❯ **Battery <> Voltage Delay (page 187)**

🔺 **back to List of alarms level 1**

Wrn Production Mode

Alarm Type	WRN
Alarmlist message	Wrn Production Mode
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Alarm is active when the controller has turned on Productiom mode. In turned on Production mode the user has the highest level 3 access without performing log in.

🔺 **back to List of alarms level 1**

Wrn Brute Force Protection Active

Alarm Type	WRN
Alarmlist message	Wrn Brute Force Protection Active
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when account break protection detects possible attack and at least one account is blocked according to **Account break protection (page 115)** rules.

⬤ **back to List of alarms level 1**

ALI Gen Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L1 Inverted
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if generator phase L1 is inverted.

⬤ **back to List of alarms level 1**

ALI Gen Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L2 Inverted
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if generator phase L2 is inverted.

⬤ **back to List of alarms level 1**

ALI Gen Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L3 Inverted
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if generator phase L3 is inverted.

⬤ **back to List of alarms level 1**

ALI Gen Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Gen Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if generator phases are wired in wrong order.

⬤ **back to List of alarms level 1**

ALI Mains Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L1 Inverted
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is issued if mains phase L1 is inverted.

⏏ **back to List of alarms level 1**

ALI Mains Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L2 Inverted
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is issued if mains phase L2 is inverted.

⏏ **back to List of alarms level 1**

ALI Mains Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L3 Inverted
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is issued if mains phase L3 is inverted.

⏏ **back to List of alarms level 1**

ALI Mains Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Mains Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is issued if mains phases are wired in wrong order.

⏏ **back to List of alarms level 1**

Mains Overfrequency

Alarm Type	MP
Alarmlist message	Mains Overfrequency
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is active when Mains frequency is above the setpoint **Mains Overfrequency (page 203)** for the period longer than **Mains < > Frequency Delay (page 203)**.

⏏ **back to List of alarms level 1**

Mains Underfrequency

Alarm Type	MP
Alarmlist message	Mains Underfrequency
Alarm evaluated	All the time
Related applications	AMF
Description	This alarm is active when Mains frequency is bellow the setpoint **Mains Underfrequency (page 203)** for the period longer than **Mains < > Frequency Delay (page 203)**.

⬆ **back to List of alarms level 1**

Wrn Mains Voltage Detected

Alarm Type	WRN
Alarmlist message	Wrn Mains Voltage Detected
Alarm evaluated	Gen-set is running
Related applications	MRS
Description	This alarm occurs when setpoint **Default Application Select (page 154)** is adjusted to MRS and voltage is detected on mains.

⬆ **back to List of alarms level 1**

Wrn Oil Pressure

Alarm Type	Warning
Alarmlist message	Wrn Oil Pressure
Alarm evaluated	Gen-set is running
Related applications	AMF, MRS
Description	This alarm indicates that the oil pressure is lower than the pressure set in the setpoint.

⬆ **back to List of alarms level 1**

Wrn Wrong GCB Control Mode

Alarm Type	WRN
Alarmlist message	Wrn Wrong GCB Control Mode
Alarm evaluated	all the time
Related applications	AMF
Description	This alarm is issued when GCB Control Mode is selected to option No Button and simultaneously the controller is in AMF mode.

⬆ **back to List of alarms level 1**

EGR Valve Padm Faulty

Alarm Type	AL
Alarmlist message	AL EGR Valve Padm Faulty
Alarm evaluated	When LBI **EGR Valve Padm Status (page 325)** is configured
Related applications	AMF, MRS
Description	This alarm is activated when value **EGR Valve Padm Status (page 279)** is not

	1.

⏶ **back to List of alarms level 1**

8.2.3 Alarms level 2

What alarms level 2 are:

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

	1.

⏶ **back to List of alarms level 1**

List of alarms level 2

 ⏶ **back to Alarms**

Sd Module(slotA) - false module

Alarm Type	SD
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that false module is inserted in slot.

⬤ back to List of alarms level 2

Sd Module(slotA) - unknown module

Alarm Type	SD
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that unknown module is inserted in slot.

⬤ back to List of alarms level 2

Sd Module(slotA) - unattended

Alarm Type	SD
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

⬤ back to List of alarms level 2

Sd Module(slotA) - comm. outage

Alarm Type	SD
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

⬤ back to List of alarms level 2

Sd Module(slotA) - unexpected

Alarm Type	SD
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

⬤ back to List of alarms level 2

Sd ECU Communication Fail

Alarm Type	SD
Alarmlist message	ECU Communication Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is issued if ECU is configured but the communication with ECU is not established or has dropped out.

🔺 **back to List of alarms level 2**

Sd ECU 1 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 1 Communication Fail
Alarm evaluated	With configured LBO **ECU POWER RELAY (PAGE 340)** – only when this LBO is active Without configured LBO **ECU POWER RELAY (PAGE 340)** – all the time
Related applications	AMF, MRS
Description	This alarm occurs when an ECU 1 is configured, but the communication with the ECU 1 is not established or has dropped out.

🔺 **back to List of alarms level 2**

Sd ECU 2 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 2 Communication Fail
Alarm evaluated	With configured LBO **ECU POWER RELAY (PAGE 340)** – only when this LBO is active Without configured LBO **ECU POWER RELAY (PAGE 340)** – all the time
Related applications	AMF, MRS
Description	This alarm occurs when an ECU 2 is configured, but the communication with the ECU 2 is not established or has dropped out.

🔺 **back to List of alarms level 2**

Sd Emergency Stop

Alarm Type	SD
Alarmlist message	Sd Emergency Stop
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Alarm is activated when binary input **EMERGENCY STOP (PAGE 326)** is activated. The Gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed. *Note: Use red emergency button placed on the switchboard door and connect it to a binary input of the controller. Then configure the function Emergency Stop to this binary input. It is recommended to use NC contact of the button.*

Sd E-Stop

Alarm Type	SD
Alarmlist message	Sd E-Stop
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Alarm is activated when dedicated E-Stop input is activated. The Gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed.

Sd Charging Alternator Fail

Alarm Type	SD
Alarmlist message	Wrn Charging Alternator Fail
Alarm evaluated	Engine running only
Related applications	AMF, MRS
Description	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than 80%**D+ Threshold (page 177)** 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.

Sd Overspeed

Alarm Type	SD
Alarmlist message	Sd Overspeed
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm occurs immediately when the engine speed has exceeded the limit. The behavior of the overspeed alarm is adjusted by the following setpoints: ❯ **Overspeed Sd (page 178)** adjust the overspeed limit

Sd Underspeed

Alarm Type	SD
Alarmlist message	Sd Underspeed
Alarm evaluated	Engine running only
Related applications	AMF, MRS
Description	This alarm will be issued when the Gen-set is running and then stops by itself, i.e. the RPM drops under the value of setpoint **Underspeed Sd (page 272)**. 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.

Sd RPM Measurement Fail

Alarm Type	SD
Alarmlist message	Sd RPM Measurement Fail
Alarm evaluated	During cranking
Related applications	AMF, MRS
Description	The alarm is issued if the engine speed has not exceeded the **Starting RPM (page 164)** within the **Maximum Cranking Time (page 163)**, although some of additional running engine indication sources indicate that the engine has started.

⏏ **back to List of alarms level 2**

Sd Battery Flat

Alarm Type	SD
Alarmlist message	Sd Battery Flat
Alarm evaluated	During cranking
Related applications	AMF, MRS
Description	This alarm will be issued if the controller was reset during cranking of the gen-set. If this situation occurs, the controller supposes the starting battery is so exhausted that its voltage drops so low when starter motor is energized that it causes controller reset.

⏏ **back to List of alarms level 2**

Sd Start Fail

Alarm Type	SD
Alarmlist message	Sd Start Fail
Alarm evaluated	When the gen-set is being started
Related applications	AMF, MRS
Description	This alarm will be issued after all attempts to start the gen-set have run out but the Gen-set did not start. The following setpoints are related to this alarm: ❯ **Cranking Attempts (page 163)** adjust the number of attempts

⏏ **back to List of alarms level 2**

Sd GCB Fail

Alarm Type	SD
Alarmlist message	SD GCB Fail
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm will occur when the **GCB FEEDBACK (PAGE 327)** input does not match the expected position given by the **GCB CLOSE/OPEN (PAGE 343)** output. It stays active until the mismatch between the output and feedback persists. ❯ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. ❯ The alarm will be also issued if the breaker does not respond to an open

	or close command within 5 seconds.

🔺 **back to List of alarms level 2**

Sd GCB Fail To Close

Alarm Type	SD
Alarmlist message	Sd GCB Fail To Close
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when there is a problem with circuit breaker position while closing. ❯ LBO **GCB CLOSE/OPEN (PAGE 343)** opened but LBI **GCB FEEDBACK (PAGE 327)** did not closed in 5 seconds.

🔺 **back to List of alarms level 2**

Sd GCB Fail To Open

Alarm Type	SD
Alarmlist message	Sd GCB Fail To Open
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm is activated when there is a problem with circuit breaker position while opening. ❯ LBO **GCB CLOSE/OPEN (PAGE 343)** opened but LBI **GCB FEEDBACK (PAGE 327)** did not opened in 5 seconds.

🔺 **back to List of alarms level 2**

Sd Generator L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: ❯ **Generator Overvoltage Sd (page 194)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

Sd Generator L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:

> **Generator Overvoltage Sd (page 194)**

> **Generator <> Voltage Delay (page 196)**

⊙ **back to List of alarms level 2**

Sd Generator L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: > **Generator Overvoltage Sd (page 194)** > **Generator <> Voltage Delay (page 196)**

⊙ **back to List of alarms level 2**

Sd Generator L1L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: > **Generator Overvoltage Sd (page 194)** > **Generator <> Voltage Delay (page 196)**

⊙ **back to List of alarms level 2**

Sd Generator L2L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: > **Generator Overvoltage Sd (page 194)** > **Generator <> Voltage Delay (page 196)**

⊙ **back to List of alarms level 2**

Sd Generator L3L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS

Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Overvoltage Sd (page 194)** › **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 195)** › **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 195)** › **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 195)** › **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L1L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1L2 < Voltage

Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: > **Generator Undervoltage BOC (page 195)** > **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L2L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: > **Generator Undervoltage BOC (page 195)** > **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L3L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: > **Generator Undervoltage BOC (page 195)** > **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator Overfrequency

Alarm Type	BOC
Alarmlist message	Sd Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: > **Generator Overfrequency BOC (page 196)** > **Generator <> Frequency Delay (page 197)**

🔺 **back to List of alarms level 2**

Generator Underfrequency

Alarm Type	BOC
Alarmlist message	Sd Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: ❯ **Generator Underfrequency BOC (page 197)** ❯ **Generator <> Frequency Delay (page 197)**

⬤ **back to List of alarms level 2**

Sd Overload

Alarm Type	SD
Alarmlist message	Sd Overload
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is issued when the Gen-setmains power is over the limit for time period longer than the delay. The behavior of the overload alarm is adjusted by the following setpoints: ❯ **Overload BOC (page 191)** adjusts the overload limit. ❯ **Overload Delay (page 192)** adjusts the delay.

⬤ **back to List of alarms level 2**

Sd Oil Pressure

Alarm Type	BOCSD
Alarmlist message	Sd Oil Pressure
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Shutdown alarm for Oil Pressure user protection.

⬤ **back to List of alarms level 2**

BOC Coolant Temp

Alarm Type	BOC
Alarmlist message	BOC Coolant Temp
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Breaker Open and Stop alarm for Coolant Temp user protection.

⬤ **back to List of alarms level 2**

BOC Fuel Level

Alarm Type	BOC
Alarmlist message	BOC Fuel Level

Alarm evaluated	All the time
Related applications	AMF, MRS
Description	Breaker Open and Stop alarm for Fuel Level user protection.

🔺 back to List of alarms level 2

BOC Generator L1 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it: ❯ **Generator Undervoltage BOC (page 195)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 back to List of alarms level 2

BOC Generator L2 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it: ❯ **Generator Undervoltage BOC (page 195)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 back to List of alarms level 2

BOC Generator L3 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: ❯ **Generator Undervoltage BOC (page 195)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 back to List of alarms level 2

BOC Generator L1L2 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L1L2 < Voltage
Alarm evaluated	Generator excited only

Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: ❯ **Generator Undervoltage BOC (page 195)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L2L3 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: ❯ **Generator Undervoltage BOC (page 195)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator L3L1 Undervoltage

Alarm Type	BOC
Alarmlist message	BOC Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: ❯ **Generator Undervoltage BOC (page 195)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

BOC Generator Overfrequency

Alarm Type	BOC
Alarmlist message	BOC Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: ❯ **Generator Overfrequency BOC (page 196)** ❯ **Generator <> Frequency Delay (page 197)**

🔺 **back to List of alarms level 2**

BOC Generator Underfrequency

Alarm Type	BOC

Alarmlist message	BOC Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	AMF, MRS
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: ❯ **Generator Underfrequency BOC (page 197)** ❯ **Generator <> Voltage Delay (page 196)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L1 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: ❯ **Mains Overvoltage (page 201)** ❯ **Mains Overvoltage Delay (page 202)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L1 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: ❯ **Mains Undervoltage (page 202)** ❯ **Mains Undervoltage Delay (page 202)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L2 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: ❯ **Mains Overvoltage (page 201)** ❯ **Mains Overvoltage Delay (page 202)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L2 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: ❯ **Mains Undervoltage (page 202)** ❯ **Mains Undervoltage Delay (page 202)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: ❯ **Mains Overvoltage (page 201)** ❯ **Mains Overvoltage Delay (page 202)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: ❯ **Mains Undervoltage (page 202)** ❯ **Mains Undervoltage Delay (page 202)**

🔺 **back to List of alarms level 2**

MP Mains/Bus L1L2 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases L1 and L2. The following setpoints are related to it: ❯ **Mains Overvoltage (page 201)** ❯ **Mains Overvoltage Delay (page 202)**

MP Mains/Bus L1L2 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases L1 and L2. The following setpoints are related to it: ❯ **Mains Undervoltage (page 202)** ❯ **Mains Undervoltage Delay (page 202)**

MP Mains/Bus L2L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases L2 and L3. The following setpoints are related to it: ❯ **Mains Overvoltage (page 201)** ❯ **Mains Overvoltage Delay (page 202)**

MP Mains/Bus L2L3 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases L2 and L3. The following setpoints are related to it: ❯ **Mains Undervoltage (page 202)** ❯ **Mains Undervoltage Delay (page 202)**

MP Mains/Bus L3L1 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases L3 and L1. The following setpoints are related to it: ❯ **Mains Overvoltage (page 201)**

| | > **Mains Overvoltage Delay (page 202)** |

MP Mains/Bus L3L1 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases L3 and L1. The following setpoints are related to it: > **Mains Undervoltage (page 202)** > **Mains Undervoltage Delay (page 202)**

MP Mains/Bus Overfrequency

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases 1. The following setpoints are related to it: > **Mains Overfrequency (page 203)** > **Mains < > Frequency Delay (page 203)**

MP Mains/Bus Underfrequency

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This alarm evaluates the Mains/Bus phase voltage in phases 1. The following setpoints are related to it: > **Mains Underfrequency (page 203)** > **Mains < > Frequency Delay (page 203)**

BOC Overload

Alarm Type	BOC
Alarmlist message	BOC Overload
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is issued when the gen-set power is over the limit for time period longer than the delay. The behavior of the overload alarm is adjusted by the

following setpoints:

> **Overload BOC (page 191)** adjusts the overload limit.
> **Overload Delay (page 192)** adjusts the delay

⏏ **back to List of alarms level 2**

BOC Short Circuit

Alarm Type	BOC
Alarmlist message	BOC Short Circuit
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	This is a fast overcurrent protection. The following setpoints are related to this alarm: > **Short Circuit BOC (page 192)** adjusts the short current limit > **Short Circuit BOC Delay (page 192)** adjusts the delay in fine steps

⏏ **back to List of alarms level 2**

BOC Maintenance Timer 1 RunHours

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 1 RunHours
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 293)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 RunHours (page 189)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 1 Protection (page 190)** has to be set to: BOC

⏏ **back to List of alarms level 2**

BOC Maintenance Timer 1 Interval

Alarm Type	BOC
Alarmlist message	BOC Maintenance Timer 1 Interval
Alarm evaluated	All the time
Related applications	AMF, MRS
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 293)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 Interval (page 189)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 1 Protection (page 190)** has to be set to: Warning

⏏ **back to List of alarms level 2**

8.3 Modules

8.3.1 Plug-in modules

The available communication plug-in modules are:

> CM-RS232-485 – communication module for monitoring via RS232 or RS485 line

> CM2-4G-GPS – communication module for monitoring via 4G

> CM3-Ethernet – communication module for internet monitoring via Ethernet

Note: Controller has one plug-in module slots.

Communication modules

CM-RS232-485

CM-RS232-485 is optional plug-in card to enable InteliNano AMF 5 the RS232 and RS485 communication. This is required for computer or Modbus connection. The CM-RS232-485 is a dual port module with RS232 and RS485 interfaces at independent COM channels. The RS232 is connected to COM1 and RS485 to COM2.
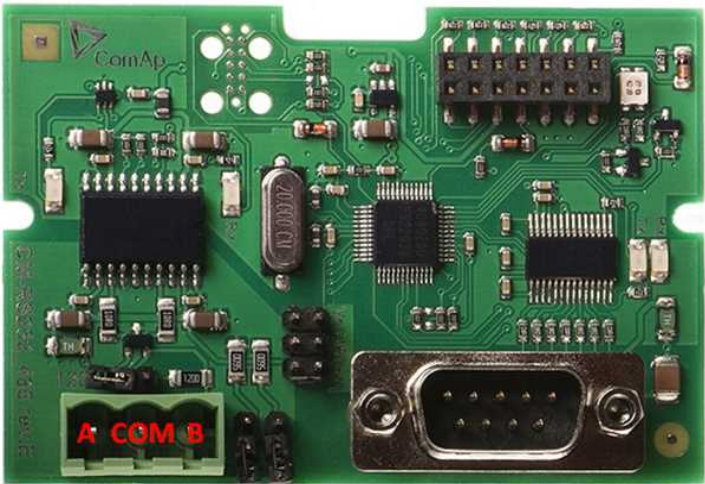

Image 8.54 CM-RS232-485 interface

> **IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**
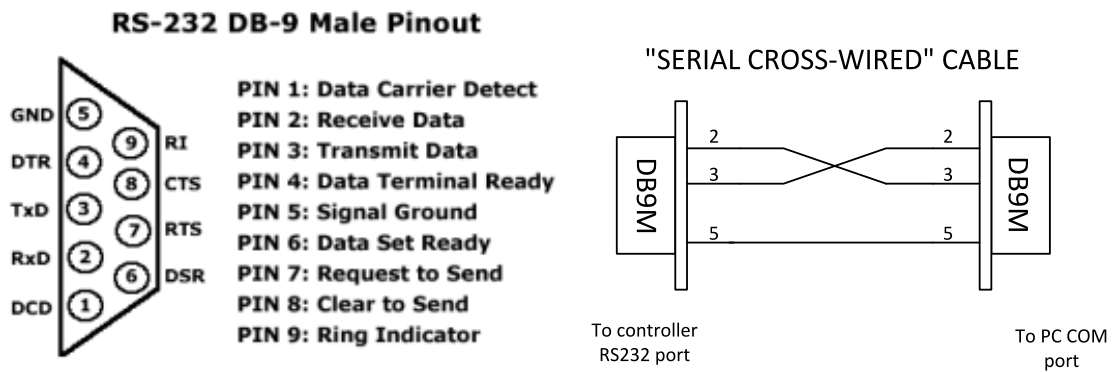
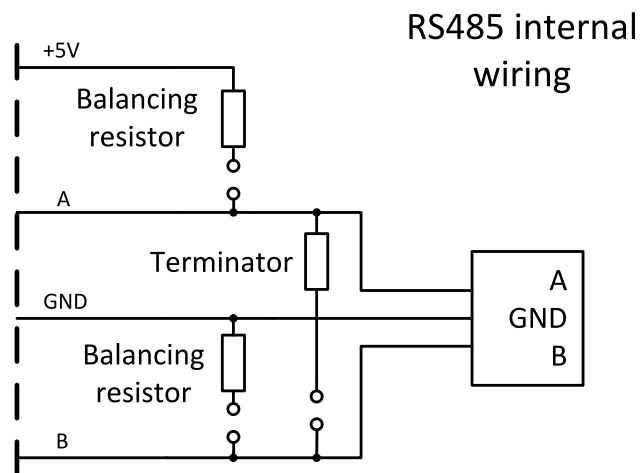Image 8.55 Pinout of RS232 line

Image 8.56 Pinout of RS485 line

Image 8.57 Jumpers description

Note: Balancing resistors should both be closed at only one device in the whole RS485 network.

Maximal distance of line is 10 m for RS232 line and 1200 m for RS485 line.

Terminator 120 Ω

Balancing resistor +5 V

Technical data

Power consumption	40 mA / 8 VDC
	26 mA / 12 VDC
	14 mA / 24 VDC
	10 mA / 36 VDC
Isolation	Galvanic separation

Firmware upgrade

> Download the newest FW of module from ComAp website (in form of PSI file or installation package)

> Install package to computer or open PSI to install it into InteliConfig

> Plug the module into the controller and power the controller on.

> Open a connection with controller via InteliConfig

> Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).

> Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

CM3-Ethernet

CM3-Ethernet is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. It provides an interface for connecting a PC through ethernet/internet network.
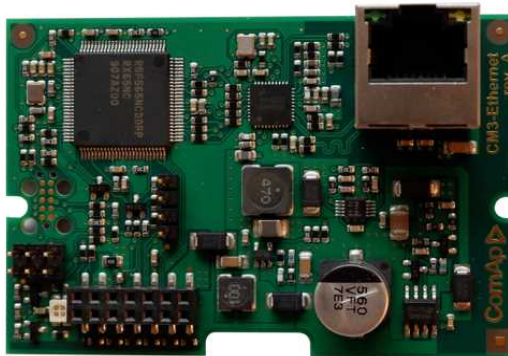

Image 8.58 CM3-Ethernet interface

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

Use an Ethernet UTP cable with a RJ45 connector for linking the module with your Ethernet network. The module can also be connected directly to a PC using cross-wired UTP cable.
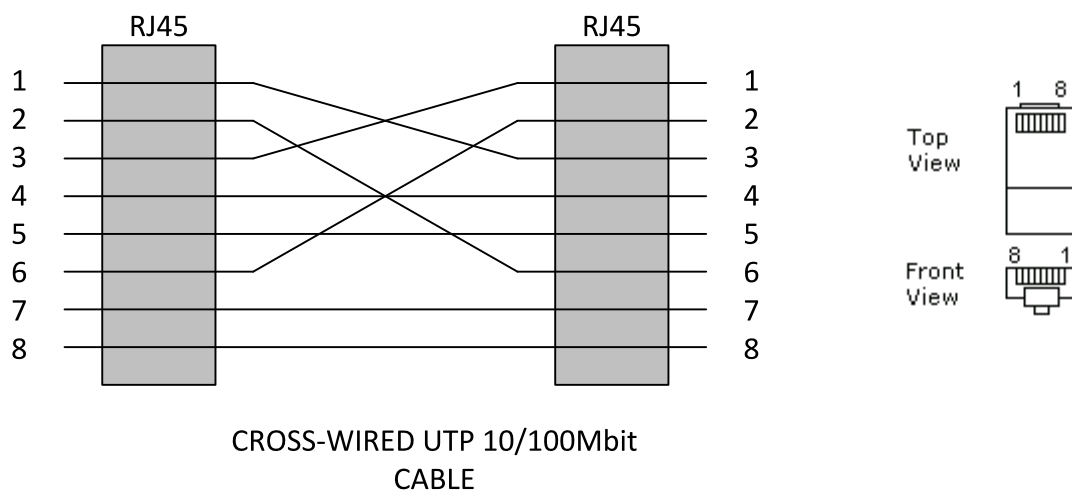
CROSS-WIRED UTP 10/100Mbit
CABLE

Image 8.59 Cross-wired cable

Technical data

General

Width × Height × Depth	73.8 × 50.3 × 21
Weight	~30 g
Power supply	8-36 V DC
Power consumption	1 W
Peak power consumption	2 W
Operating temperature	-40 ˚C to +70 ˚C
Storage temperature	-40 ˚C to +80 ˚C

Ethernet port

100 Mbit/s, full duplex
RJ45 socket

Module setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint **Group: CM-Ethernet (page 247)**.

All actual operational values like actual IP address etc. are available in controller values in a specific group as well.

Status LED

Blinking frequency	Color
1 Hz	Green – everything is OK Red – some of following errors occurred: ❯ unplugged Ethernet cable ❯ module cannot connect to AirGate ❯ module can not obtain IP address from DHCP
10 Hz	Green – firmware is currently being programmed Red – no firmware present in the module

Firmware upgrade

> Download the newest FW of module from ComAp website (in form of PSI file or installation package)

> Install package to computer or open PSI to install it into InteliConfig

> Plug the module into the controller and power the controller on.

> Open a connection with controller via InteliConfig

> Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).

> Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

CM2-4G-GPS

CM2-4G-GPS plug-in module containing a GPS receiver and GSM/WCDMA/LTE modem which can work in two modes of operation based on the settings in the setpoint **Internet Connection (page 233)**.
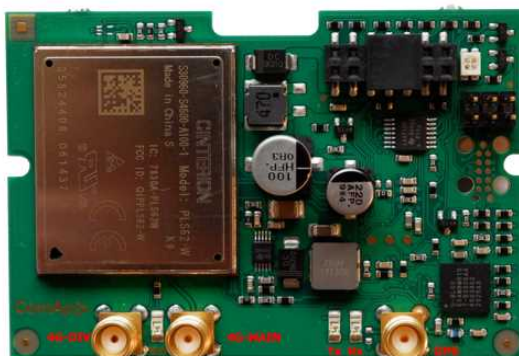
Image 8.60 CM2-4G-GPS module

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

> **IMPORTANT: Operating temperature of module is from -30 °C to +75 °C.**

Note: Cellular data service must be enabled in your SIM card by your mobile operator for successful operation.

CM2-4G-GPS module works with:

> WebSupervisor – internet-based remote monitoring solution

> AirGate – powerful connection technology to make internet access as simple as possible

CM2-4G-GPS module also works like GPS locator. Geo-fencing function can be used with this module.

4G module types

> If the anthenna is CELLULAR only and has 1 cable (OT1A4GXXMCX), it is connected to the 4G-MAIN connector.

> If the anthenna is CELLULAR only and has 2 cables, cables are connected to the 4G-MAIN or 4G-DIV connectors (does not matter which cable to which connector).

> If the anthenna is a combination of CELLULAR/GPS and has 2 cables (OT1A4GGPSCX), then cable "4G/LTE" needs to be connected to the 4G-MAIN connector and "GPS" cable to the GPS connector.

> If the anthenna is a combination of CELLULAR/GPS and has 3 cables (OT2A4GGPSCX), then cables "4G/LTE" need to be connected to the 4G-MAIN and 4G-DIV connectors (does not matter which cable to which connector) and "GPS" cable to the GPS connector.

Note: Type of the cable is labeled on its side.

Technical data

General

Width × Height × Depth	73.8 × 50.3 × 15
Weight	~35 g
Power supply	8-36 V DC
Power consumption	1.7 W
Peak power consumption	10 W
Operating temperature	-30 ˚C to +70 ˚C
Storage temperature	-40 ˚C to +80 ˚C

GNSS

Antenna interface	SMA female, 2.8 V / 20 mA
Antenna type	Active

Cellular

Supported networks and frequency bands	> 2G (GSM/GPRS/EDGE) Quad band, 850/900/1800/1900 MHz > 3G (UMTS/HSPA+) Seven band, 800 (BdXIX) / 850 (BdV) / 900 (BdVIII) / AWS (BdIV) / 1800 (BdIX) / 1900 (BdII) / 2100MHz (BdI) > 4G (LTE) Twelve band, 700 (Bd12 <MFBI

	Bd17>, Bd28) 800 (Bd18, Bd19, Bd20) 850 (Bd5) / 900 (Bd8) / AWS (Bd4) / 1800 (Bd3) / 1900 (Bd2) / 2100 (Bd1) / 2600MHz (Bd7)
Antenna interface	2x SMA female (Main and Diversity)

SIM card settings

SIM card must be adjusted as follows:

> SMS service enabled

> Packet data (Internet access) enabled (when required for the selected mode of operation)

> PIN code security disabled

How to start using CM2-4G-GPS module

> You will need a controller, CM2-4G-GPS module, antenna and SIM card with SMS and packet data service.

Note: Make sure that your SIM supports the packet data network type you want to use. – i.e. if you want to use the module in LTE (4G) network you have to confirm with the operator that the particular SIM card supports 4G network.

> Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

Example: APN Name = "internet", UserName = [blank], Password = [blank].

> Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.

> Place the SIM card into slot on CM2-4G-GPS card

> Connect the antenna to Cellular module antenna connector.

> If you want to use the built-in GPS receiver, also connect an **active** GPS antenna to the GPS antenna connector.

> Switch off the controller.

> Insert CM2-4G-GPS module into controller

> Power up the controller.

> Select the mode of CM2-4G-GPS module by adjusting setpoint **Internet Connection (page 233)**.

> Activate CM2-4G-GPS module by switching the setpoint **Internet Connection (page 233)** to enabled

> Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-4G-GPS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by InteliConfig.

> Enter correct **Access Point Name** (this information is provided by Mobile Operator). Setpoint can be set on controller's front panel or by InteliConfig.

> Switch the controller off and on.

> Wait for approx 2 – 4 minutes for first connection of the system to AirGate. AirGate will automatically generate the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

Image 8.61 Main screen of CM2-4G-GPS module

Image 8.62 Screen of AirGate

GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network

20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can´t read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can´t detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

Modem Status

Code	Description
OK	Module successfully initialized and connected to the cellular network
E01	Unsuccessful restore to the factory settings
E02	Modem configuration error
E SIM	SIM not inserted or locked by PIN. ❯ Use another device (e.g. mobile phone) to disable the option for SIM to be locked by PIN
E04	It is not possible to set manually chosen network mode 2G/3G/4G/Automatic
E registration	It is not possible to register into cellular network. Possible reasons: ❯ No signal (no coverage, broken or unconnected antenna) ❯ Manually chosen network mode 2G/3G/4G is not available
E context	It is not possible to set PDP (Packet Data Protocol) context for defined APN (Access Point Name). Possible reasons:

	› Setpoint Access Point Name is not correctly set (format)
	› Wrong PDP context number
E connect	It is not possible to connect to cellular network (ATD*99***context) Possible reasons:
	› Setpoint Access Point Name is not correctly set (wrong text)
E08	Modem configuration error
E09	It is not possible to get signal strength
E10	It is not possible to get operator name
E11	Loss of registration into cellular network was detected
E12	Data error
E13	Data error
E14	Modem was restarted
E SMS send	It is not possible to send SMS. Possible reasons:
	› Wrong number
	› SIM doesn't support SMS
E18	Modem hardware configuration error
E conn lost	Loss of connection with cellular network
E19	Modem configuration error
Restart-config	Modem was restarted due to the change of controller setpoint
Restart-app	Modem was restarted due to the performed cellular connection check

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

AirGate Status

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable
Susp AGkeyEmpty	AirGate is not set in the controller

Firmware upgrade

> Download the newest FW of module from ComAp website (in form of PSI file or installation package)

> Install package to computer or open PSI to install it into InteliConfig

> Plug the module into the controller and power the controller on.

> Open a connection with controller via InteliConfig

> Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).

> Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

🔺 **back to Appendix**