

InteliMains 510

Mains supervision controller

SW version 1.0.0

1 Document information	5
2 System overview	13
3 Applications overview	27
4 Installation and wiring	31
5 Controller setup	58
6 Communication	209
7 Technical data	227
8 Appendix	229

Table of contents

1 Document information	5	2.8.1 CM3-Ethernet	20
1.1 Declaration of Conformity	5	2.8.2 CM2-4G-GPS	21
1.2 Clarification of Notation	5	2.8.3 CM-RS232-485	21
1.3 About this Global Guide	6	2.8.4 EM-BIO8-EFCP	21
1.4 Legal notice	6	2.9 CAN Extension Modules	22
1.5 General warnings	9	2.9.1 Intel AIN8	22
1.5.1 Remote control and programming	9	2.9.2 Intel IO8/8	23
1.5.2 SW and HW versions compatibility	9	2.9.3 IGL-RA15	23
1.5.3 Dangerous voltage	9	2.9.4 IGS-PTM	24
1.5.4 Adjust the setpoints	9	2.9.5 Intel AIO9/1	24
1.6 Functions and protections	10	2.9.6 Intel AIN8TC	25
1.7 Certifications and standards	10	2.9.7 I-AOUT8	25
1.8 Document history	10	2.9.8 IS-AIN8	25
1.9 Symbols in this manual	11	2.9.9 IS-BIN16/8	26
2 System overview	13	3 Applications overview	27
2.1 General description	13	3.1 MCB	27
2.1.1 The key features of IntelMains 510	14	3.1.1 MCB application with one mains incomer	27
2.2 Getting Started	15	3.1.2 MCB application with multiple mains incomers	28
2.3 Measurement methods	15	3.2 MGCB	29
2.3.1 True RMS measurement	16	3.2.1 MGCB application with one mains incomer	29
2.4 AC measurement	16	4 Installation and wiring	31
2.4.1 AC measurement settings	16	4.1 Package content	31
2.4.2 Frequency measurement accuracy and resolution	16	4.2 Controller installation	32
2.4.3 PF measurement and evaluation	16	4.2.1 Dimensions	32
2.5 Communication peripherals	17	4.2.2 Mounting	32
2.6 Configurability and monitoring	17	4.3 Terminal Diagram	33
2.6.1 Supported configuration and monitoring tools	17	4.4 Recommended wiring	35
2.6.2 Configuration parts	18	4.4.1 General	36
2.7 PC tools	19	4.4.2 Grounding	36
2.7.1 IntelConfig	19	4.4.3 Power supply	37
2.7.2 WebSupervisor	19	4.4.4 Measurement wiring	38
2.7.3 WinScope 1000	20	4.4.5 Binary Inputs	49
2.7.4 IntelISCADA	20	4.4.6 Binary Outputs	49
2.8 Plug-in modules	20		

4.4.7 CAN bus and RS485 wiring	50	5.4.12 Forced Value	131
4.4.8 USB	54	5.4.13 I/O Configuration	132
4.4.9 USB HOST	54	5.4.14 Load Shedding	134
4.4.10 Ethernet	54	5.4.15 Mains Decoupling Protections	137
4.5 Plug-in module installation	55	5.4.16 Mains Import Measurement	138
4.5.1 Installation	55	5.4.17 Multi soft start	139
4.6 Maintenance	56	5.4.18 Operating Modes	139
4.6.1 Backup battery replacement	56	5.4.19 Output Control – Frequency/Load ..	141
5 Controller setup	58	5.4.20 Output Control - Voltage/PF	143
5.1 Default configuration	58	5.4.21 Parallel To Mains Operation	144
5.1.1 BinaryBinary inputs	58	5.4.22 Peak shaving	152
5.1.2 Binary outputs	58	5.4.23 PLC - Programmable Logic Controller	152
5.2 Controller configuration and PC tools connection	58	5.4.24 Power Formats And Units	164
5.2.1 USB	59	5.4.25 Power Management	165
5.2.2 Ethernet	60	5.4.26 Protections	185
5.3 Operator Guide	65	5.4.27 Pulse Counters	194
5.3.1 Status LED Indication	67	5.4.28 Regulation Loops	195
5.3.2 Metering screens	76	5.4.29 Sensor Curves	196
5.3.3 Alarmlist	77	5.4.30 Soft unload	198
5.3.4 Setpoints	78	5.4.31 System Start/Stop	199
5.3.5 History	81	5.4.32 User Buttons	199
5.3.6 Trends	83	5.4.33 User management and data access control	201
5.3.7 Values	85	5.4.34 User Setpoints	206
5.3.8 Administration	85	5.4.35 Voltage Phase Sequence Detection	208
5.3.9 Quick help	94		
5.4 General Functions	99	6 Communication	209
5.4.1 Alarm Management	100	6.1 PC	209
5.4.2 AMF Function	102	6.1.1 Direct communication	209
5.4.3 Breaker Control	104	6.1.2 Remote communication	211
5.4.4 Connecting To Load	107	6.2 Connection to 3rd party systems	213
5.4.5 Control Groups	112	6.2.1 SNMP	213
5.4.6 Crash Dump	113	6.2.2 Modbus-RTU, Modbus/TCP	214
5.4.7 Distributed Power Management Signals	114		
5.4.8 Electric state machine	119	7 Technical data	227
5.4.9 Event History	121		
5.4.10 Exercise Timers	123	8 Appendix	229
5.4.11 Firewall	130	8.1 Controller objects	229
		8.1.1 List of controller objects types	229
		8.1.2 Setpoints	230

8.1.3 Values	434
8.1.4 Logical binary inputs	534
8.1.5 Logical binary outputs	564
8.1.6 Logical analog inputs	593
8.1.7 Application Curves	599
8.1.8 Fixed Protection States	600
8.1.9 User Protection States	604
8.1.10 PLC	607
8.2 Alarms	633
8.2.1 Alarm levels in the controller	633
8.2.2 Alarms level 1	633
8.2.3 Alarms level 2	677
8.3 Modules	688
8.3.1 CAN modules	688

 **back to Table of contents**

1 Document information

1.1 Declaration of Conformity	5
1.2 Clarification of Notation	5
1.3 About this Global Guide	6
1.4 Legal notice	6
1.5 General warnings	9
1.6 Functions and protections	10
1.7 Certifications and standards	10
1.8 Document history	10
1.9 Symbols in this manual	11

🔍 back to Table of contents

1.1 Declaration of Conformity

Supplier's Declaration of Conformity 47 CFR § 2.1077 Compliance Information
Unique identifier: OrderCode
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.

1.2 Clarification of Notation

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

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

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

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

1.3 About this Global Guide

This manual contains important instructions for IntelliMains 510 controllers family that shall be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate IntelliMains 510 controllers.

This manual is dedicated for:

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

1.4 Legal notice

This End User's Guide/Manual as part of the Documentation is an inseparable part of ComAp's Product and may be used exclusively according to the conditions defined in the "END USER or Distributor LICENSE AGREEMENT CONDITIONS – COMAP CONTROL SYSTEMS SOFTWARE" (License Agreement) and/or in the "ComAp a.s. Global terms and conditions for sale of Products and provision of Services" (Terms) and/or in the "Standardní podmínky projektů komplexního řešení ke smlouvě o dílo, Standard Conditions for Supply of Complete Solutions" (Conditions) as applicable.

ComAp's License Agreement is governed by the Czech Civil Code 89/2012 Col., by the Authorship Act 121/2000 Col., by international treaties and by other relevant legal documents regulating protection of the intellectual properties (TRIPS).

The End User and/or ComAp's Distributor shall only be permitted to use this End User's Guide/Manual with ComAp Control System Registered Products. The Documentation is not intended and applicable for any other purpose.

Official version of the ComAp's End User's Guide/Manual is the version published in English. ComAp reserves the right to update this End User's Guide/Manual at any time. ComAp does not assume any responsibility for its use outside of the scope of the Terms or the Conditions and the License Agreement.

Licensed End User is entitled to make only necessary number of copies of the End User's Guide/Manual. Any translation of this End User's Guide/Manual without the prior written consent of ComAp is expressly prohibited!

Even if the prior written consent from ComAp is acquired, ComAp does not take any responsibility for the content, trustworthiness and quality of any such translation. ComAp will deem a translation equal to this End User's Guide/Manual only if it agrees to verify such translation. The terms and conditions of such verification must be agreed in the written form and in advance.

For more details relating to the Ownership, Extent of Permitted Reproductions Term of Use of the Documentation and to the Confidentiality rules please review and comply with the ComAp's License Agreement, Terms and Conditions available on www.comap-control.com.

Security Risk Disclaimer

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

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

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

General security recommendations and set of measures

1. 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. IntelliConfig) unattended while a user, especially administrator, is logged in.

3. AirGate Key

- Change the AirGate Key BEFORE the device is connected to the network.
- Use a secure AirGate Key – preferably a random string of 8 characters containing lowercase, uppercase letters and digits.
- Use a different AirGate Key for each device.

4. MODBUS/TCP

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

5. SNMP

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

IMPORTANT: Controller issues **Wrn Default Password (page 639)** alarm, if the factory default password is used. It is necessary to change the factory default settings of password to be able to clear the alarm.

Used open source software:

Name of software	Modified	Type	License condition web address	
CMSIS FreeRTOS	✓	MIT	license	Copyright (C) 2020 Amazon.com, Inc. or its affiliates. All Rights Reserved.

FreeRTOS	✓	MIT	license	Copyright (C) Amazon Web Services, Inc. or its affiliates. All rights reserved.
Mbed TLS	✓	Apache 2.0	license	Copyright (C) 2006-2015, ARM Limited, All Rights Reserved
lwIP	✓	BSD 3	license	Copyright (c) 2001-2004 Swedish Institute of Computer Science. All rights reserved.
MD5	–	Free ad-hoc license	license	Copyright (C) 1991-2, RSA Data Security, Inc. Created 1991. All rights reserved RSA Data Security, Inc. MD5 Message-Digest Algorithm
Embedded Template Library	✓	MIT	license	Copyright (c) 2016 jwellbelove www.etlcpp.com
STM32Cube_FW_H7	✓	BSD 3	license	
FatFs	✓	Modify BSD	license	Copyright (C) 20xx, ChaN, all right reserved. This software is provided by the copyright holder and contributors "AS IS" and any warranties related to this software are DISCLAIMED. The copyright owner or contributors be NOT LIABLE for any damages caused by use of this software.
Tiny Mersenne Twister	–	BSD 3	license	Copyright (c) 2011, 2013 Mutsuo Saito, Makoto Matsumoto, Hiroshima University and The University of Tokyo All rights reserved.
USB	✓	SLA0044	license	Copyright (c) 2018 STMicroelectronics International N.V. All rights reserved THIS SOFTWARE IS PROVIDED BY STMICROELECTRONICS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS, IMPLIED OR STATUTORY WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS ARE DISCLAIMED TO THE FULLEST EXTENT PERMITTED BY LAW. IN NO EVENT SHALL STMICROELECTRONICS OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
heatshrink	–	ISC	license	Copyright (c) 2013-2015, Scott Vokes < vokes.s@gmail.com > All rights reserved Permission to use, copy, modify, and/or distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.

GNU General Public License v3	–	Copyleft	license Copyright © 2007 Free Software Foundation, Inc. <vokes.s@gmail.com> All rights reserved THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION. GCC Runtime Library Exception - GNU Project - Free Software Foundation Copyright © 2009 Free Software Foundation, Inc. https://fsf.org/
-------------------------------	---	----------	--

1.5 General warnings

1.5.1 Remote control and programming

The controller can be controlled remotely. In the event that maintenance of the site has to be done, or the controller has to be programmed, check the following points to ensure that any part of the site will not react unpredictably (unwanted/random start of the System or any other part of the system).

To be sure:

- > Disconnect remote control
- > Disconnect binary outputs

1.5.2 SW and HW versions compatibility

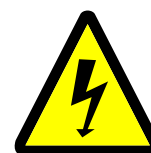
Be aware to use the proper combination of SW and HW versions.

1.5.3 Dangerous voltage

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

Always connect grounding terminals!

In no case do not disconnect controller CT terminals!



1.5.4 Adjust the setpoints

All parameters are adjusted to their typical values. However, the setpoints have to be checked and adjusted to their real values before the first .

IMPORTANT: Wrong adjustment of setpoints can destroy any part of the system.

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

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

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





1.6 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	Temperature monitoring	49T
Multi-function device	11	Overcurrent	50/50TD
Speed and frequency matching device	15	Overcurrent IDMT	51
Data communications device	16ECFM+16SC	AC circuit breaker	52
Synchronizing-check	25	Power factor	55
Thermal relay	26	Overvoltage	59
Undervoltage	27	Pressure switch	63
Annunciator	30	Liquid level switch	71
Overload	32	Alarm relay *	74
Load shedding	32P	Vector shift	78
Master sequence device	34	Reclosing relay	79
Undercurrent	37	Overfrequency	81H
Unit sequence starting	44	Underfrequency	81U
Current unbalance	46	ROCOF	81R
Voltage unbalance	47	Auto selective control/transfer	83
Incomplete sequence relay	48	Regulating device	90

* extension module IGL-RA15 required




























































1.7 Certifications and standards

<ul style="list-style-type: none"> > EN 61000-6-2 > EN 61000-6-4 > EN 61010-1 > EN 60255-1 > EN 60529 (IP20) 	<ul style="list-style-type: none"> > EN 60068-2-1 (-40 °C/16 h) > EN 60068-2-2 (70 °C/16 h) > EN 60068-2-6 (2÷25 Hz / ±1,6 mm; 25÷100 Hz / 4,0 g) > EN 60068-2-27 (a=500 m/s²; T=6 ms) > EN 60068-2-30 (25/55 °C, RH 95%, 48 h) 	<ul style="list-style-type: none"> > UL6200 > UKCA 	   
--	--	--	--

1.8 Document history

Revision number	Related sw. version	Date	Author
1	1.0.0	17.2.2023	Jan Liptak

1.9 Symbols in this manual

	3 x Phases		Coil		Fuel solenoid		Passive current sensor
	Active current sensor		Connector - female		Fuse		Pick - up
	AirGate		Connector - male		Fuse switch		Relay coil
	Alternating current		Contact		Generator		Relay coil of slow-operating
	Analog modem		Contactor		Generator schematic		Renewables
	Battery		Controller simplified		Grounding		Resistor
	Battery Energy Storage System		Module simplified		GSM		Resistor adjustable
	Binary output		Current measuring		GSM modem		Resistive sensor RPTC
	Breaker contact		Current measuring		IG-AVRi		RS 232 male
	Breaker contact		Danger		IG-AVRi TRANS		RS 232 female
	Breaker		Danger - Electric Hazard		Jumper		Starter
	Breaker		DC to AC Inverter		Load		Switch - manually operated
	Breaker		Diode		Mains		Transformer
	Capacitor		Ethernet male		Mains		USB type B male
			Ethernet female		Mobile provider		USB type B female



Voltage
measuring



Wifi / WAN /
LAN

 **back to Document
information**

2 System overview

2.1 General description	13
2.2 Getting Started	15
2.3 Measurement methods	15
2.4 AC measurement	16
2.5 Communication peripherals	17
2.6 Configurability and monitoring	17
2.7 PC tools	19
2.8 Plug-in modules	20
2.9 CAN Extension Modules	22

[!\[\]\(c507f772dba2b921f86777f01218e570_img.jpg\) back to Table of contents](#)

2.1 General description

InteliMains 510 controller is comprehensive mains supervision controller for multiple generating sets operating in parallel to the Mains. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications. Controllers are equipped with a powerful graphic display showing icons, symbols and bar-graphs for intuitive operation, which sets, together with high functionality, new standards in Mains controls.

The controller automatically connects the group of Controllers to the Mains. It features mains failure detection using integrated Mains protections, MCB and MGCB synchronization, configuration level switches based on Mains import or object consumption.

The controller provides easy-to-use operation and installation. Predefined configurations for typical applications are available as well as user-defined configurations for special applications.

2.1.1 The key features of IntelliMains 510

- Support for installations with the option for cooperation with up to 32 Gen-sets/mains/tie controllers
- Built-in PLC interpreter with the use of ComAp's free – PLC Editor for easy configuration
- AirGate 2.0 for easy connection to your equipment remotely, without worrying about your asset's IP address
- Remote control and monitoring of your site operations with WebSupervisor, our cloud-based fleet management tool
- Compatible load/Var sharing and power management with other ComAp solutions
- A wide range of plug-in modules allowing you to easily extend the functionality of the controller
- One hardware for more applications, enabling an easy switch between MCB, MGCB and BTB applications
- Keeping your business and data as safe as possible, meeting the ISA 62443 level 2 - level 3 security requirements
- Clear visualization and overview of all important information on the built-in colour display
- Faster and cost-effective operations with signal sharing over a CAN bus across a group of control units
- User-defined protections and setpoints on top of default protection
- Controller redundancy minimizing solution downtime and ensuring the power isn't compromised
- Dynamic spinning reserve preventing supply drops in hybrid installations with PVs
- Secure user management
- Possibility to have a mains application in a Gen-set controller

2.2 Getting Started

Congratulations to your new IntelliMains 510 ComAp Controller controller. Follow these steps bellow for first run of your controller.

Note: For a better experience with our controller, do not forget to see the [InteliConfig manual](#) before starting the configuration.

1. Connect controller to power supply

- Controller requires power supply between 8-36 V DC. Plug **+BAT** to the terminal no. 03 and **GND** to the terminal no. 01.
- See **Terminal Diagram (page 33)** for more information

2. Connect your computer to the controller

- We suggest you to use USB or ETH 1 - Trusted Interface for the first connection to your new controller. Plug the USB/ETH cable to USB type B/Ethernet 1 terminal on the controller. Open InteliConfig and select "Connect to controller". Now you can use "Detected controllers" feature, which should offer you the controller.

3. Authorizing as Administrator

- The alarmlist should show **Wrn Default Password (page 639)**. If this alarm is not present, this procedure bellow will not work. You will need to use your changed password. If you see the warning, use function "Enter password" which is located in tab "Control".

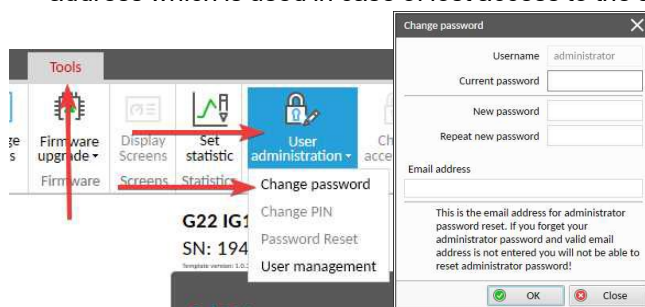
- Username = administrator
- Password = serial number of your controller

Serial number is located at the front of your controller or you can see it in left top corner of InteliConfig when connected to the controller.

You can verify that you have been successfully logged in by seeing opened lock with number "3". This means that you verified on the highest level - administrator and you have all possible rights.

4. Changing Administrator Password

- You should change the default password as soon as possible via InteliConfig. In the InteliConfig select tab "Tools", function "User administration" and "Change password". Do not forget to add your email address which is used in case of lost access to the account.



5. Adding another users

- If you are logged in as any account with permissions level 3, you can add another user.

6. Connecting external display

- See more information about using the display in the chapter **Operator Guide (page 65)**.

2.3 Measurement methods

2.3.1 True RMS measurement

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

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

2.4 AC measurement

With IntelliMains 510 it is possible to easily set the parameters for measuring.

2.4.1 AC measurement settings

AC Voltage measurement settings

The value of the AC voltage measured on the terminals of the controller can be adapted according to the used meas voltage. For measuring AC voltage use setpoint **Mains VT Ratio** (page 264).

AC Current measurement settings

The value of the AC current measured on the terminals of the controller can be adapted phase application with neutral according to the used meas current. For measuring AC current use setpoints **Mains CT Ratio Prim** (page 259) and **Mains CT Ratio Sec** (page 259).

2.4.2 Frequency measurement accuracy and resolution

The resolution of the measurement is in mHz within a 45–75 Hz range.

2.4.3 PF measurement and evaluation

Power factor is measured with a resolution of 0.01.

Setpoints used for setting the Power factor regulation are **Import Power Factor** (page 247) with a 0.001 resolution and **#System Power Factor** (page 245) with a 0.01 resolution.

Values for the Power factor are:

- **Mains Load Character** (page 441)
- **Mains Load Character L1** (page 442)
- **Mains Load Character L2** (page 443)
- **Mains Load Character L3** (page 443)
- **Load PF** (page 450), **Load Character** (page 450)
- **Total Running Power Factor** (page 462), **Total Running Load Character** (page 462)

2.5 Communication peripherals

InteliMains 510 contains 1x Ethernet terminals, 2x CAN terminals, 1x RS485 terminal and 1x USB type B terminal. Each terminal functions are slightly different, which depends on the purpose of usage.

IMPORTANT: Use correct terminal according to your purpose of usage for correct function.

Peripherals	Description	Relevant links
CAN1	This terminal is used for connecting of external modules and Electronic Control Units. See the chapters Supported combinations of modules (page 689) .	CAN bus wiring (page 50)
CAN2	This terminal is used for CAN intercontroller communication.	
RS485	This terminal is used for Modbus-RTU, Modbus/TCP (page 214) communication.	RS485 wiring (page 51)
USB Type A	USB host – FW upgrade, download/upload configuration.	
USB Type B	This terminal is used for UART communication eg. IntelliConfig, WinScope1000, etc.	Controller configuration and PC tools connection (page 58)
Ethernet		Ethernet (page 54)

You can see layout of the peripherals in the chapter **Terminal Diagram (page 33)**.

2.6 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.

2.6.1 Supported configuration and monitoring tools

- IntelliConfig - complete configuration and single/multi controller monitoring
- WebSupervisor - web-based system for monitoring and controlling
 - WebSupervisor mobile - supporting application for smart-phones
- WinScope 1000 - special graphical monitoring software
- IntelliSCADA - customizable SCADA diagram for monitoring

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

2.6.2 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
- Mapping of logical analog inputs (functions) to physical analog input terminals, assigning sensor characteristics (curves) or assigning alarms to analog inputs
- Mapping of values to physical analog outputs, assigning output HW type with conversion characteristic
- Selection of peripheral modules, which are connected to the controller, and doing the same (as mentioned above) for them
- Selection of ECU (electronic control unit) type
- Changing the language of the controller interface

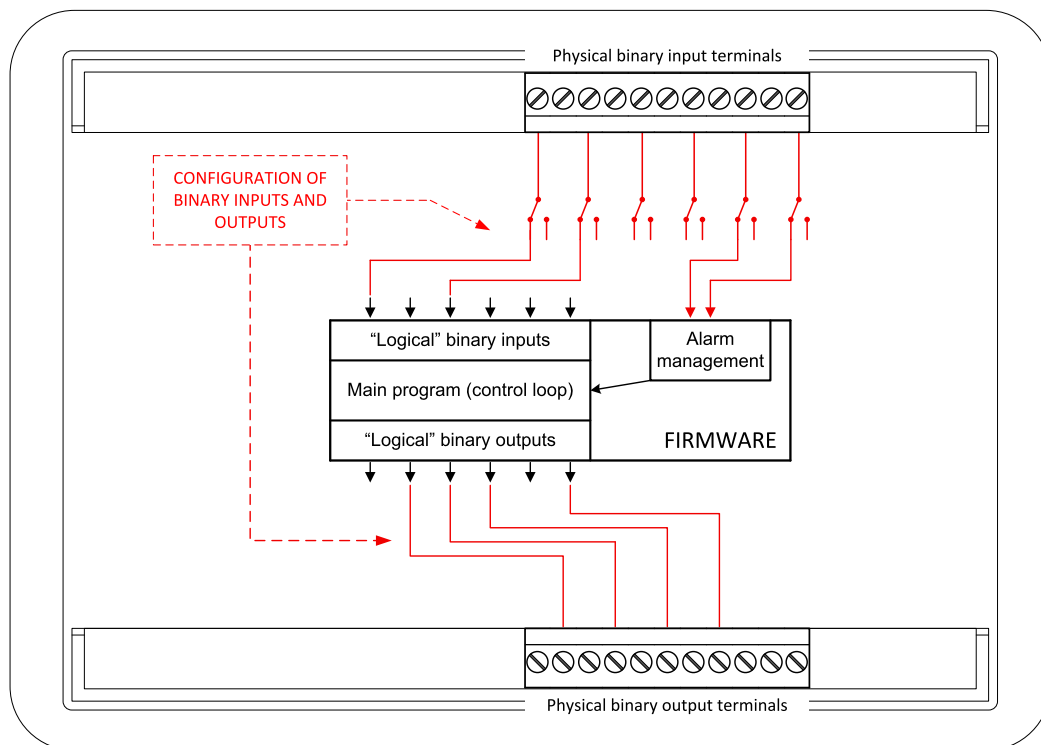


Image 2.1 Principle of inputs and outputs configuration

The controller is shipped with a **Default configuration (page 58)**, which should be suitable for most standard applications. This configuration can be changed only by using a PC with the IntelliConfig software. See IntelliConfig documentation for details.

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

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

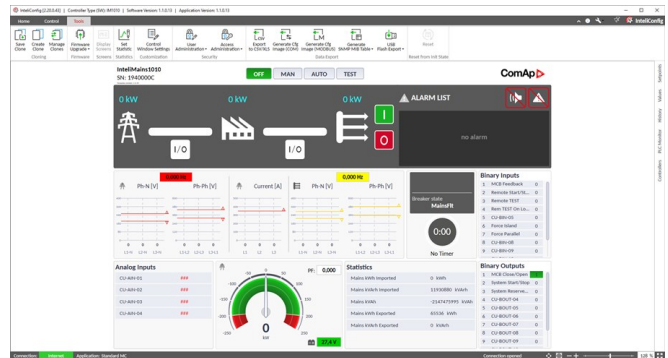
2.7 PC tools

2.7.1 IntelliConfig

PC Tool for configuration and monitoring of controllers. See more in the [IntelliConfig Global Guide](#).

This tool provides the following functions:

- Direct or remote internet communication with the controller
- Offline or online controller configuration
- Controller and module configuration, programming and cloning
- Remote display programming
- Reading/writing/adjustment of setpoints
- Reading of measured values
- Controllers and ECU Alarm monitoring + complete real time history
- Exporting data into a XLS file
- Controller language translation
- Power format and ECU unit selection
- Embedded manuals and F1 helps
- Auto-hiding of unused setpoints and values

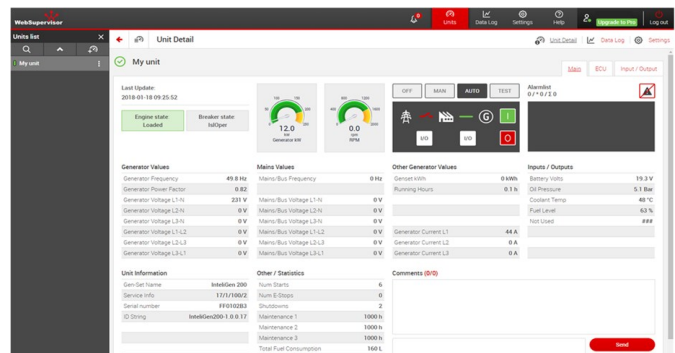


2.7.2 WebSupervisor

Cloud-based system designed for monitoring and management of ComAp and 3rd party devices via the internet. See more in the [WebSupervisor Global Guide](#).

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:

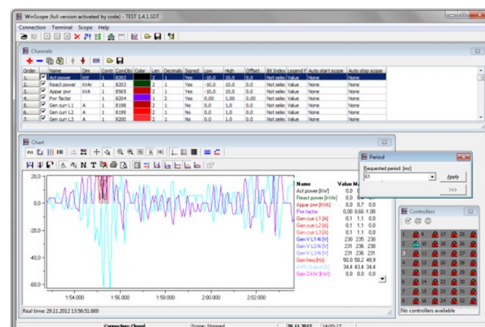
- Login: comaptest
- Password: ComAp123

2.7.3 WinScope 1000

Special graphical controller monitoring software used mainly for commissioning and System troubleshooting. See more in the [WinScope 1000 Global Guide](#).

This tool provides the following functions:

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

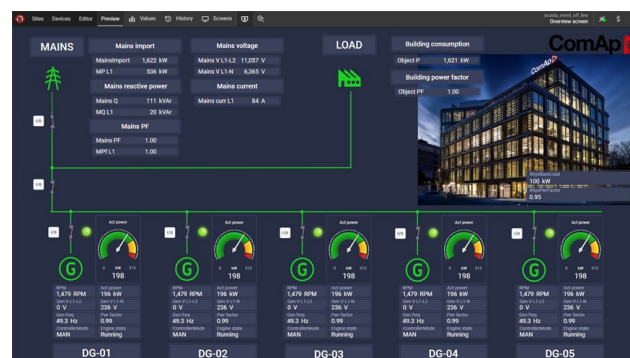


2.7.4 IntelISCADA

IntelISCA is a Windows based software for monitoring of multiple controllers. See more in the [IntelISCA Global Guide](#).

This tool provides the following functions:

- Basic (auto-generated) SCADA in a few minutes
- Broad range of instruments with easy and fast configuration
- Fully customizable SCADA diagram
- Browsing of all measured and computed values
- Browsing of controllers' history records

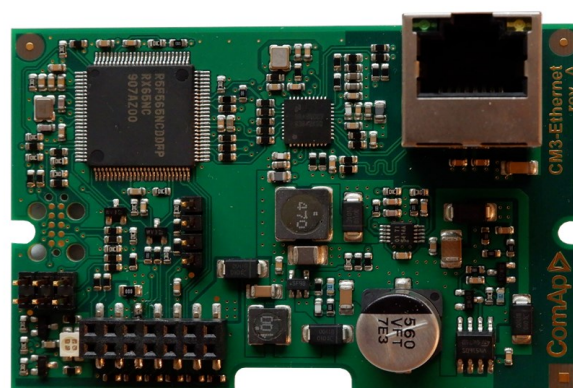


2.8 Plug-in modules

2.8.1 CM3-Ethernet

Internet/Ethernet module including web server.

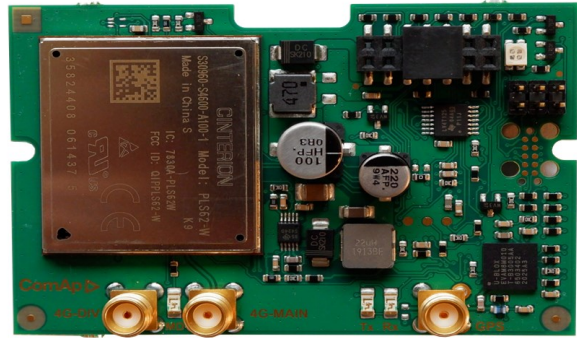
- > 10/100 Mbit interface over RJ45 socket
- > Remote control and monitoring of the controller via IntelConfig, WebSupervisor
- > Modbus TCP support
- > Full SNMP support including traps (v1 & v2c)
- > Active e-mail sending
- > AirGate 2.0 technology support for easy connection – no need of public and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



2.8.2 CM2-4G-GPS

GSM/4G module

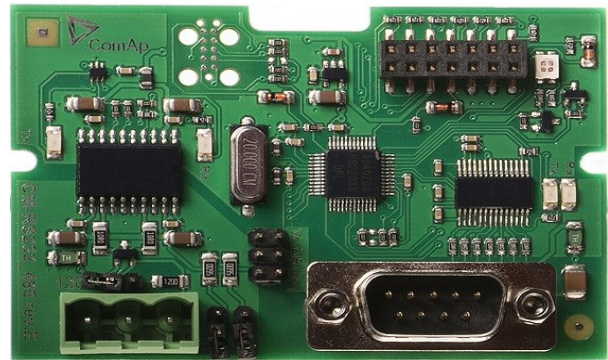
- GSM/4G Internet module and GPS locator
- Global 4G (LTE) module with 3G/2G backup
- Remote control and monitoring of the controller via IntelliConfig, WebSupervisor
- Active e-mail and SMS support
- AirGate 2 technology support for easy connection – no need of public and static IP address
- Tracking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



2.8.3 CM-RS232-485

Communication module with two communication ports.

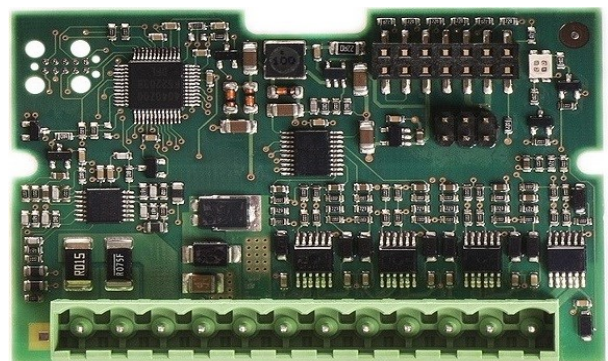
- RS232 and RS485 interface
- MODBUS
- Serial connection to IntelliConfig



2.8.4 EM-BIO8-EFCP

Input and binary input/output extension module.

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



2.9 CAN Extension Modules

2.9.1 Intel AIN8

The module allows users to expand the amount of analog inputs for sensors and add Impulse/RPM input that can be attached to a controller. Up to 8 configurable inputs (sensors) can be attached to the module. See more information on web page [Intel AIN8](#).

Supported sensors:

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

Impulse/RPM sensor:

- > RPM measuring pulses with frequency 4Hz – 10kHz
- > Impulse
 - >> Possibility to measure pulses from electrometer, flowmeter, etc.



IMPORTANT: Impulse input is not supported by the controller.

🔍 back to CAN Extension Modules

2.9.2 IntelI IO8/8

The module to expand the amount of binary inputs and outputs for ComAp controllers. It is possible to configure the unit to have 8 binary inputs, 8 binary outputs, and 2 analog outputs, or 16 binary inputs, 0 binary outputs and 2 analog outputs via switches inside the controller. See more information on web page [IntelI IO8/8](#).

Configuration 8/8

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

Configuration 16/0

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

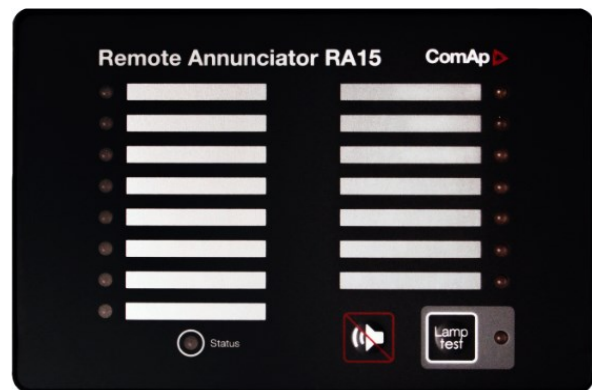
🔍 back to CAN Extension Modules



2.9.3 IGL-RA15

Remote annunciator. See more information on web page [IGL-RA15](#).

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



IMPORTANT: This module is not compatible with different than 250 kbps communication speed. If the ECU module with 125 kbps communication speed is connected the whole system will automatically switch to the 125 kbps, and IGL-RA15 module will stop communicating.

🔍 back to CAN Extension Modules

2.9.4 IGS-PTM

The module expands the amount of binary/analog inputs and outputs for ComAp controllers. It is possible to configure the unit to have 8 binary inputs, 8 binary outputs, 4 analog inputs and 1 analog output. See more information on web page [IGS-PTM](#).

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



🔍 back to CAN Extension Modules

2.9.5 Intel AIO9/1

The module is suitable for measurement and control of analog inputs and output through CAN interface. It is possible to configure the unit to have 9 analog inputs and 1 analog output. See more information on web page [Inteli AIO9/1](#).

- 4x differential voltage inputs for measurement in range of ± 65 V DC
- 4x shielded, galvanic separated sensors: thermocouples J,K,L, ± 75 mV inputs
- Resistance analog input (sensors: 0-2400 Ω , PT1000 or NI1000)
- Analog output with options : 0-20mA, 0-10V or PWMt



🔍 back to CAN Extension Modules

2.9.6 IntelI AIN8TC

The module allows customers to configure up to 8 analog input channels for measuring temperature by thermocouples. The IntelI AIN8TC is useful in situations where extremely accurate temperature readings is required. See more information on web page [IntelI AIN8TC](#).

Supported sensors:

- J, K or L thermocouples
- Thermocouples with and without cold junction compensation are supported



⬅ back to CAN Extension Modules

2.9.7 I-AOUT8

The module allows customers to configure up to 8 analog outputs. AGND terminals are on the same potential. See more information on web page [I-AOUT8](#).

Each analog output can be switched to

- 0 to 10 V DC
- 0/4 to 20 mA DC
- 1,2 kHz PWM (Pulse With Modulation)



⬅ back to CAN Extension Modules

2.9.8 IS-AIN8

The module is equipped with 8 analog inputs. This module is compatible with MTU ECU-7 at communication speed 125 kbps when uploaded with firmware 1.2.0 and higher. See more information on web page [IS-AIN8](#).

- Precision of inputs is 1%
- 2/3 wire resistive, current, voltage sensors
- Predefined sensors (Pt100, Pt1000, Ni100, Ni1000, thermocouple type J/K/L)
- Current and voltage inputs 0-20mA and 0-10V



⬅ back to CAN Extension Modules

2.9.9 IS-BIN16/8

The module allows users to expand the amount of binary inputs and outputs, and add 2 impulse inputs. It is possible to configure the unit to have 16 binary inputs (galvanic separated) and 8 binary outputs (galvanic separated), 2 pulse inputs (frequency measurement or pulse counting). See more information on web page [IS-BIN16/8](#).

To operate external modules:

- Configurable 16 galvanically separated inputs
- Configurable 8 outputs
- 2 pulse inputs (frequency measurement or pulse counting)
- LEDs indicate the state of binary inputs and outputs



Note: CAN address 0 disables corresponding CAN message (Group data are not send).

IMPORTANT: Impulse inputs are not supported by the controller.

⬅ back to CAN Extension Modules

⬅ back to System overview

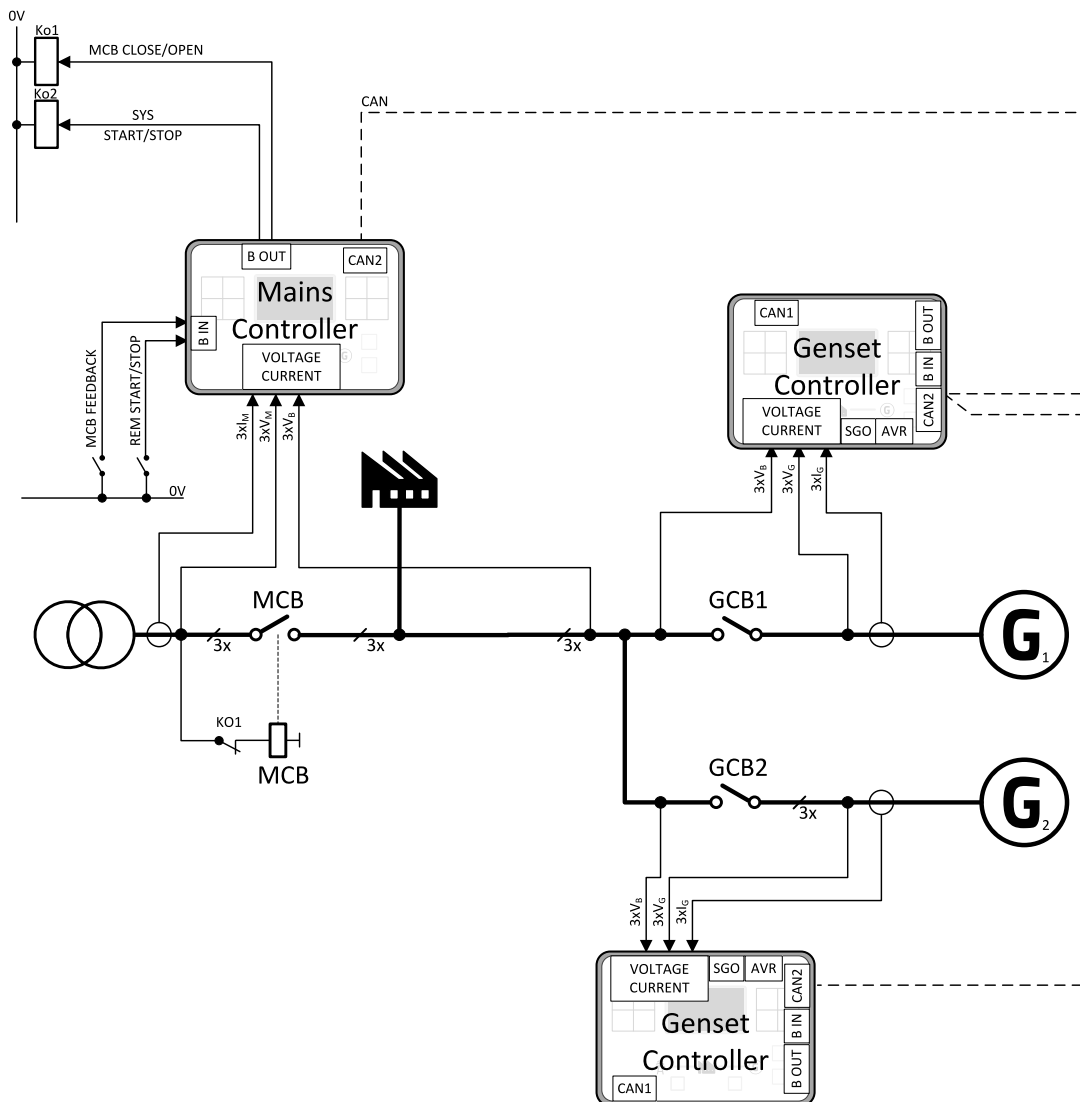
3 Applications overview

3.1 MCB	27
3.2 MGCB	29

🔍 back to Table of contents

3.1 MCB

3.1.1 MCB application with one mains incomer



InteliMains 510 directly controls only the MCB. Frequency/Power and Voltage/Power Factor of the system is controlled via load sharing and var sharing outputs (**#System Load Control PTM (page 239)** = Load Shar and **#System PF Control PTM (page 244)** = Var Shar) using **CAN2 (page 17)** and/or **Communication peripherals (page 17)** communication.

The controller senses the mains parameters and in case of **Mains failure detection (page 103)** automatically activates **AMF Function (page 102)**. In this case signal **SYSTEM START/STOP (PAGE 591)** is activated, MCB is opened based on setting of **MCB Opens On (page 290)**. After **Healthy mains detection (page 103)** and countdown of **MCB Close Delay (page 288)** is MCB synchronized. With closing of MCB load

starts to be transferred according to setpoints in **Subgroup: Load Transfer (page 339)**. Once the gen-sets are unloaded, signal **SYSTEM START/STOP (PAGE 591)** is deactivated.

In **Controller mode (page 267)** AUTO start signal could be activated with extra dedicated LBIs (e.g. **REMOTE START/STOP (PAGE 560)**, **FORCE PARALLEL (PAGE 538)**, **FORCE ISLAND (PAGE 537)**, **REM TEST ON LOAD (PAGE 561)**...)

REMOTE START/STOP (PAGE 560) signal is shared via intecontroller CAN, if it is activated all Gen-sets in the same control group without configured **REMOTE START/STOP (PAGE 560)** will be started. Each Gen-set with configured **REMOTE START/STOP (PAGE 560)** must be started separately (for example by **SYSTEM START/STOP (PAGE 591)** wired to the **REMOTE START/STOP (PAGE 560)**).

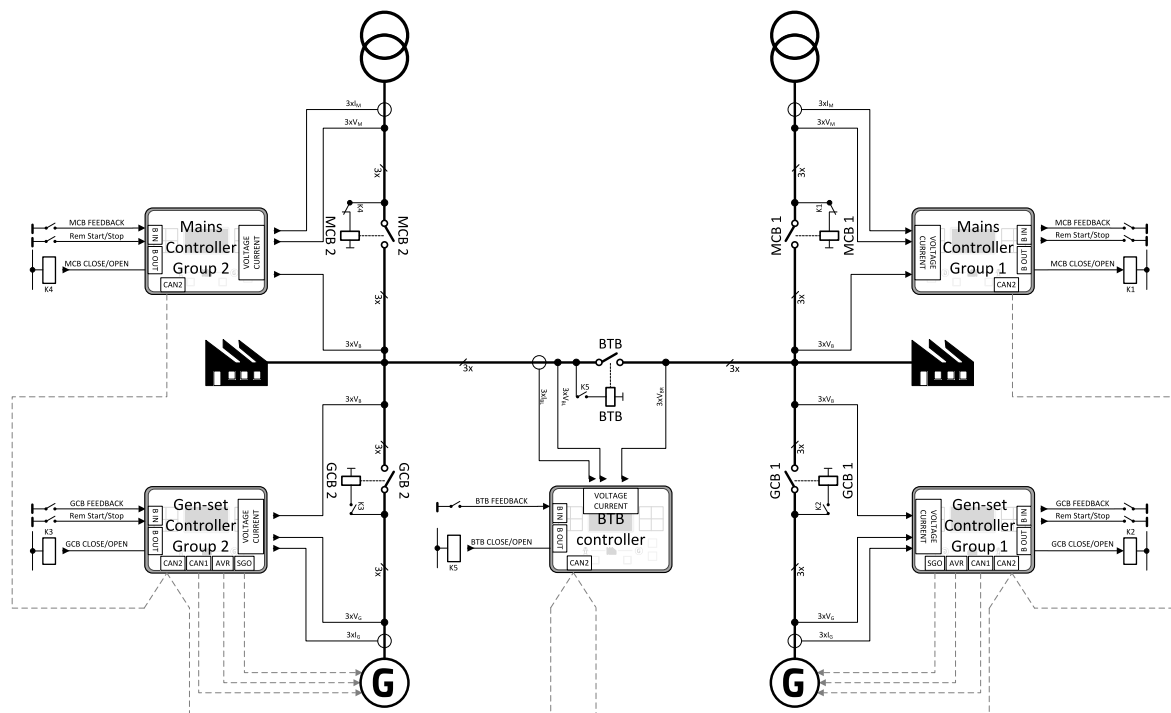
Peak shaving (page 152) mode activates the start signal based on the adjusted requested mains import value.

Different types of load transfers from Mains to Gen and from Gen to Mains can be used.

- Open
- Close Only
- Close Prim
- SoftTransf

In **Controller mode (page 267)** MAN could be start signal activated with start-stop buttons. When mode is switched to MAN controller follows the previous internal states. MCB can be closed/opened with MCB Button but the control is conditioned by setting of **CB Control In MAN Mode (page 248)**.

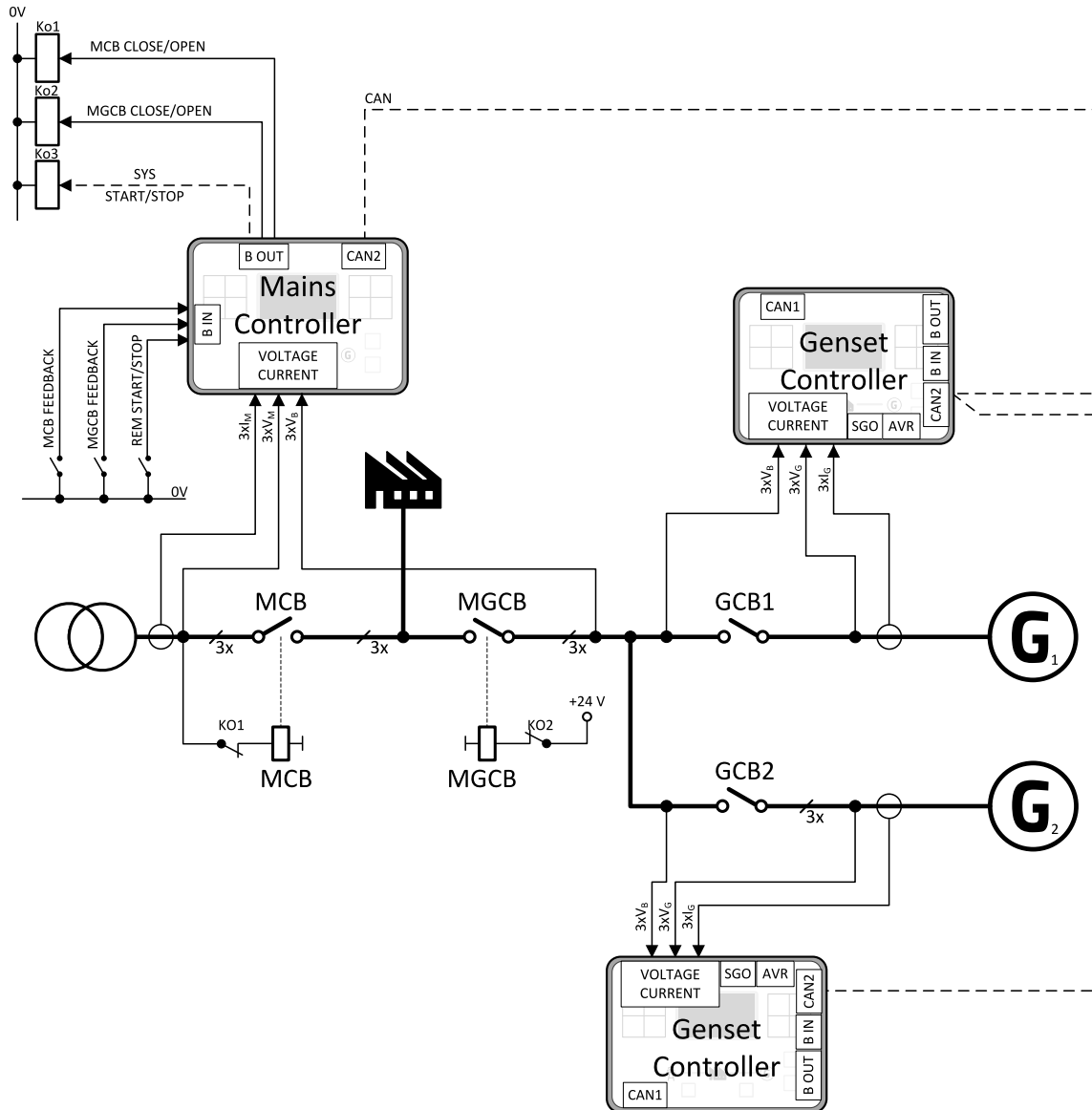
3.1.2 MCB application with multiple mains incomers



It is possible to use IntelliMains 510 with multiple mains incomers. In this case it is necessary to also use BTB controller to split site into 2 groups. For more information please see IntelliMains 510 BTB Global Guide.

3.2 MGCB

3.2.1 MGCB application with one mains incomer



Note: For applications containing only controllers IG1000, IM1010, IG500, IG200 and IM210 **SYSTEM START/STOP (PAGE 591)** does not need to be physically wired. It is shared via CAN intercontroller communication.

InteliMains 510 controls the MCB and MGCB. Power and Power Factor is controlled via load sharing and Var sharing (**#System Load Control PTM (page 239)** = Load Shar and **#System PF Control PTM (page 244)** = Var Shar) using **CAN2 (page 17)** and/or **Communication peripherals (page 17)**.

The controller senses the mains parameters and in case of **Mains failure detection (page 103)** automatically activates **AMF Function (page 102)**. In this case is activated signal **SYSTEM START/STOP (PAGE 591)**, MCB is opened based on setting of **MCB Opens On (page 290)**. MGCB breaker is closed only in case the sufficient power is available (**SYSTEM RESERVE OK (PAGE 591)** is active). After **Healthy mains detection (page 103)** and countdown of **MCB Close Delay (page 288)** is MCB synchronized. With closing of MCB load starts to be transferred according to setpoints in **Subgroup: Load Transfer (page 339)**. Once the gen-sets are unloaded, signal **SYSTEM START/STOP (PAGE 591)** is deactivated.

In **Controller Mode (page 472)** = AUTO could be start signal activated with extra dedicated LBIs (e.g. **REMOTE START/STOP (PAGE 560)**, **FORCE PARALLEL (PAGE 538)**, **FORCE ISLAND (PAGE 537)**, **REM TEST ON LOAD (PAGE 561)**...)


REMOTE START/STOP (PAGE 560) signal is shared via intecontroller CAN, if it is activated all Gen-sets in the same control group without configured **REMOTE START/STOP (PAGE 560)** will be started. Each Gen-set with configured **REMOTE START/STOP (PAGE 560)** must be started separately (for example by **SYSTEM START/STOP (PAGE 591)** wired to the **REMOTE START/STOP (PAGE 560)**).

Peak shaving (page 152) mode activates the start signal based on the adjusted requested mains import value.

Different types of load transfers from Mains to Gen and from Gen to Mains can be used.

- > Open
- > Close Only
- > Close Prim
- > SoftTransf

In **Controller mode (page 267)** = MAN could be start signal activated with start-stop buttons. When mode is switched to MAN controller follows the previous internal states. MCB and MGCB can be closed/opened with MCB and MGCB Button but the control is conditioned by setting of CB Control In MAN Mode.

IMPORTANT: Control of MGCB is affected by SYSTEM START/STOP (PAGE 591) even in Controller mode (page 267) = MAN. SYSTEM START/STOP (PAGE 591) has to be active or the Bus must be healthy before MGCB can be closed. You can activate SYSTEM START/STOP (PAGE 591) for example by pressing the  Start Button.

 [back to Applications overview](#)

4 Installation and wiring

4.1 Package content	31
4.2 Controller installation	32
4.3 Terminal Diagram	33
4.4 Recommended wiring	35
4.5 Plug-in module installation	55
4.6 Maintenance	56

 [back to Table of contents](#)

4.1 Package content

The package contains:

- > Controller IntelliMains 510
- > Terminal blocks

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

4.2 Controller installation

4.2.1 Dimensions

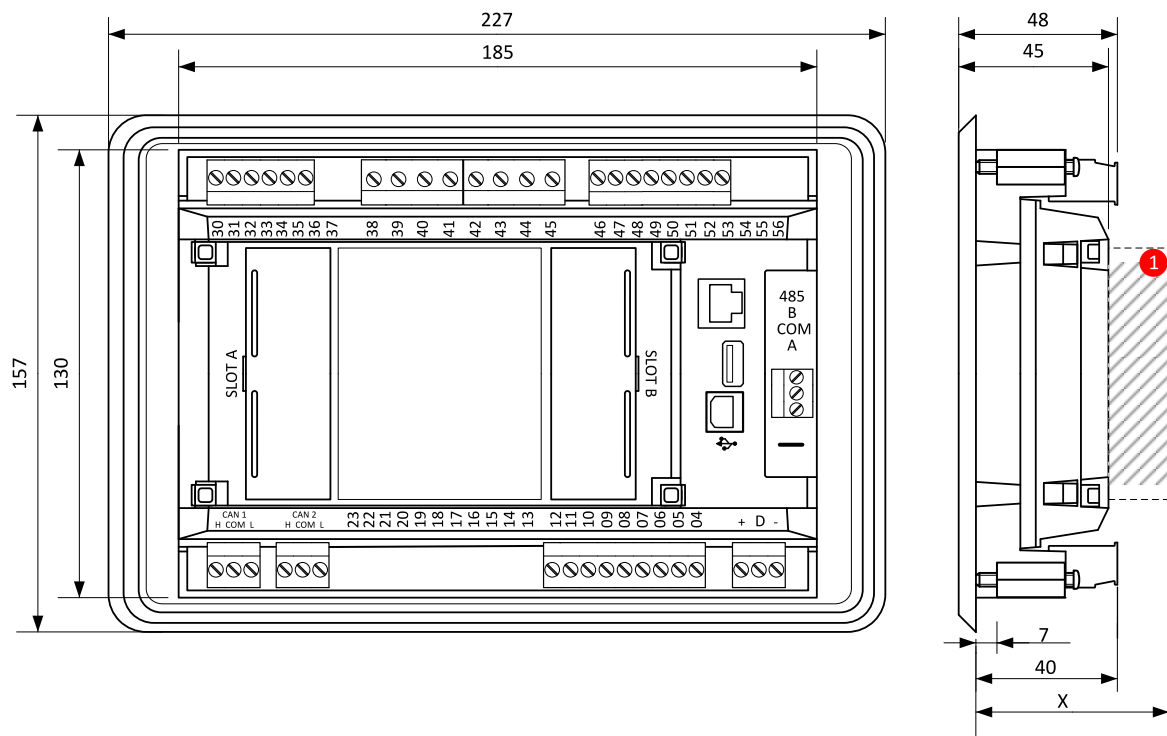


Image 4.1 Controller dimensions

1 Plug-in module

Note: Dimension "x" depends on a plug-in module

Note: Dimensions are in millimeters.

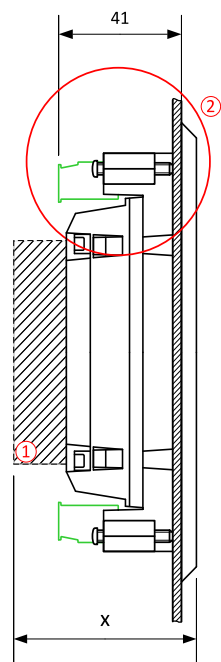
Note: The final depth of the controller depends on the selected plug-in module – it can vary between 47 mm and "x" mm. Mind also the size of connectors and cables (e.g. in case of RS232 connector, add about 60 mm more for standard RS232 connector and cable).

Note: The controller is mounted into panel doors as a standalone unit using provided holders. The requested cutout size is 187 × 132 mm. Use the screw holders delivered with the controller to fix the controller into the door.

4.2.2 Mounting

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

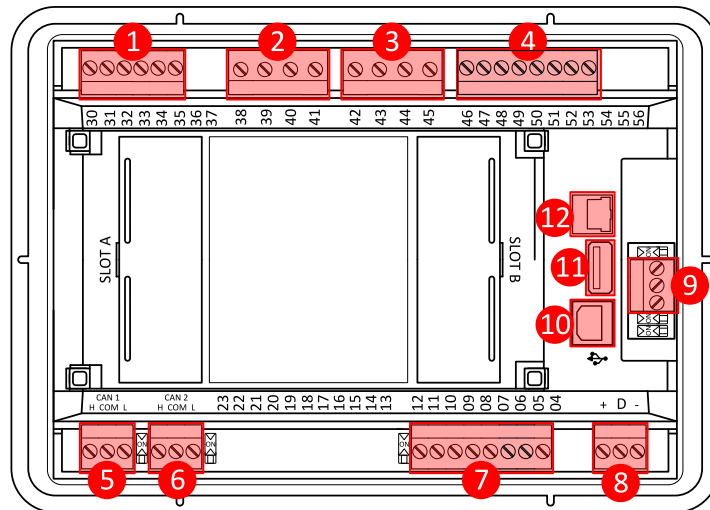
Panel door mounting



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

4.3 Terminal Diagram

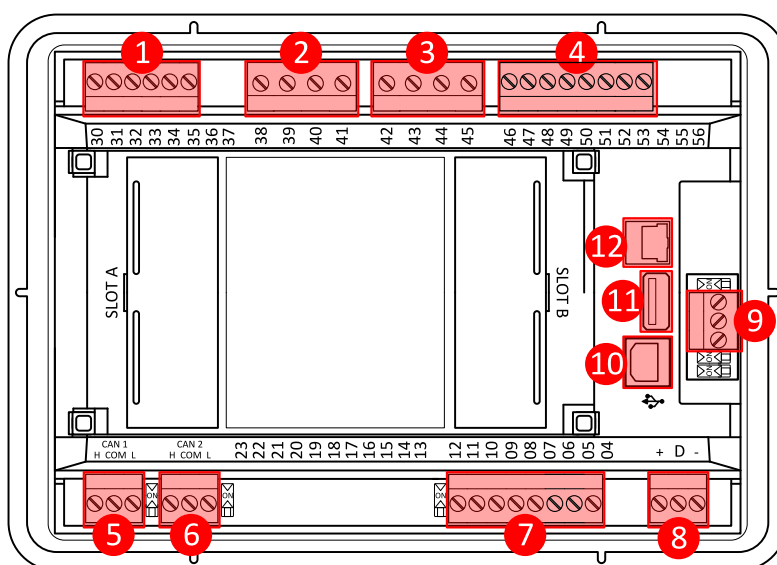
① CURRENT MEASUREMENT		② MAINS VOLTAGE		③ BUS VOLTAGE		④ BINARY INPUTS	
T30	COM	T38	N	T42	N	T46	BIN1
T31	L1	T39	L1	T43	L1	T47	BIN2
T32	L2	T40	L2	T44	L2	T48	BIN3
T33	L3	T41	L3	T45	L3	T49	BIN4
T34	COM					T50	BIN5
T35	L1					T51	BIN6
						T52	BIN7
						T53	BIN8



5 CAN1		7 BINARY OUTPUTS		8 POWER SUPPLY, D+		10 USB	
T26	L	T05	BOUT1	T01	BATT -	11 USB HOST	
T27	COM	T06	BOUT2	T02	D+	12 ETHERNET	
T28	H	T07	BOUT3	T03	BATT +		
6 CAN2		T08	BOUT4	9 RS485			
T23	L	T09	BOUT5	T56	B		
T24	COM	T10	BOUT6	T57	COM		
T25	H	T11	BOUT7	T58	A		
		T12	BOUT8				

4.4 Recommended wiring

4.4.1 General	36
4.4.2 Grounding	36
4.4.3 Power supply	37
4.4.4 Measurement wiring	38
4.4.5 Binary Inputs	49
4.4.6 Binary Outputs	49
4.4.7 CAN bus and RS485 wiring	50
4.4.8 USB	54
4.4.9 USB HOST	54
4.4.10 Ethernet	54



1	Current inputs	30 - 35	Current measurement wiring (page 38)
2	Mains/Bus Voltage inputs	38 - 41	Voltage measurement wiring (page 42)
3	Mains/Bus Voltage inputs	42 - 45	Voltage measurement wiring (page 42)
4	Binary inputs	46-53	Binary Inputs (page 49)
5	CAN1	26 - 28	CAN bus and RS485 wiring (page 50)
6	CAN2	23 - 25	CAN bus and RS485 wiring (page 50)
7	Binary outputs	05 - 12	Binary Outputs (page 49)
8	Power supply	01 - 03	Power supply (page 37)
9	RS485	A, COM, B	CAN bus and RS485 wiring (page 50)

10	USB	USB B	USB (page 54)
11	USB HOST	USB A	USB HOST (page 54)
12	Ethernet	ETH	Ethernet (page 54)

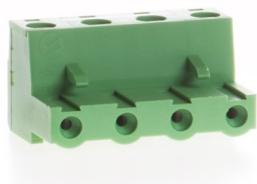
4.4.1 General

To ensure proper function:

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

Tightening torque, allowable wire size and type, for the Field-Wiring Terminals:

For Mains Voltage, Generator Voltage and Current terminals



Specified tightening torque is 0.56 Nm (5.0 In-lbs)

use only diameter 0.5 - 2.0 mm (12 - 26 AWG) conductor, rated for 90 °C minimum.

For other controller field wiring terminals



Specified tightening torque 0.79 nm (7.0 In-lb)

Use only diameter 0.5 - 2.0 mm (12 - 26 AWG) conductor, rated for 75 °C minimum.



Use copper conductors only

4.4.2 Grounding

The shortest possible length of wire should be used for controller grounding. Use cable min 2.5 mm².

The negative " - " battery terminal used as power supply for CU must be properly grounded.

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

4.4.3 Power supply

To ensure proper function:

- Use power supply cable min. 1.5 mm²

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

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

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

For the connections with 12 V DC power supply, the controller includes internal capacitors that allow the controller to continue in operation during cranking if the battery voltage dip occurs. If the voltage dip goes to 0 V during cranking and after 50 ms it recovers to 8 V, the controller continues operating. This cycle can repeat several times. During this voltage dip the controller screen backlight can turn off.

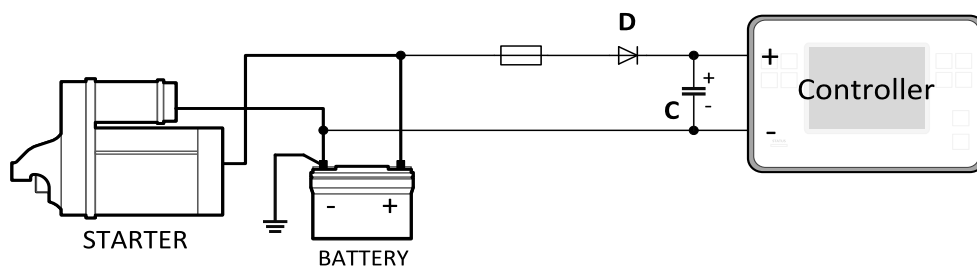


Image 4.2 Controllers power supply with external capacitor, separating diode and fusing

Note: Recommended fusing is 5 A fuse.

Note: In case of the dip to 0 V the high-side binary outputs will be temporarily switched off and after recovering to 8 V back on.

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

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

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

Power supply fusing

It is strongly recommended to use 4 A fuse in-line with the battery positive terminal to the controller and modules. These electronics should never be connected directly to the starting battery. Fuse value and type depends on number of connected devices and wire length. It is recommended to use slow blow fuse T4 A. The fast blow fuse is inappropriate due to internal capacitors charging during power up.

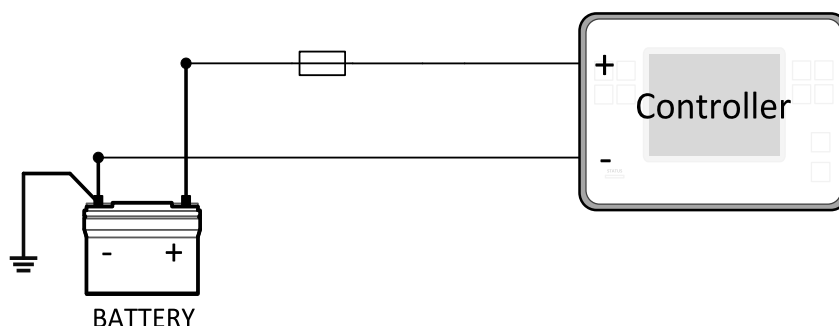


Image 4.3 Controllers power supply fusing

IMPORTANT: 5 A / 6×0.5 A BOUT fuse is calculated without BOUT consumption nor extension modules. Real value of fuse depends on consumption of binary outputs and modules.

4.4.4 Measurement wiring

Use 1.5 mm² cables for voltage connection and 2.5 mm² for current transformers connection. Adjust **Connection type** (page 261), **MainsAC Shore Nominal Voltage Ph-N** (page 263), **Mains/Bus Nominal Voltage Ph-Ph**, **Mains Nominal Voltage Ph-Ph** (page 264), **Gen AC Bus Nominal Voltage Ph-N** (page 263), **Gen Nominal Voltage Ph-Ph** (page 263) and **Nominal Current** (page 258) by appropriate setpoints in the Basic Settings group.



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

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

Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type** (page 261) [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph].

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

To ensure proper function:

- > Use cables of 2.5 mm²
- > Use transformers to 5 A
- > Connect CT according to following drawings:

3 phase application

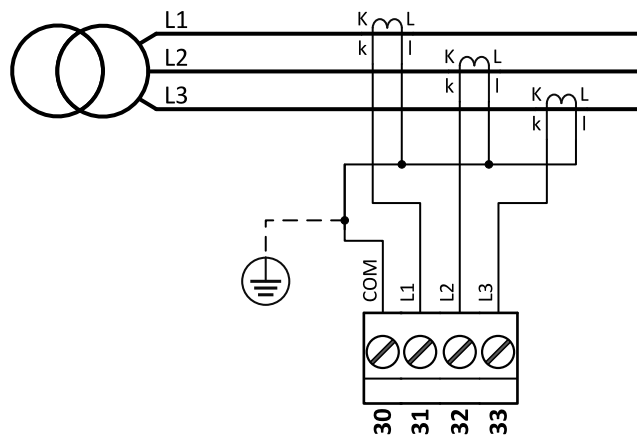


Image 4.4 3 phase application

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

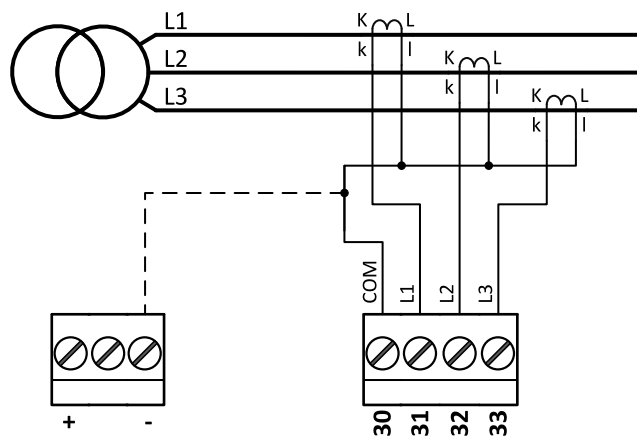


Image 4.5 3 phase application

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.

SpIPhL1L2 application

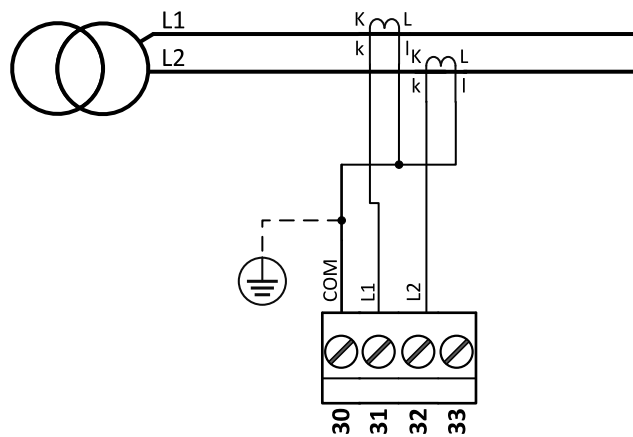


Image 4.6 SpIPhL1L2 application

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

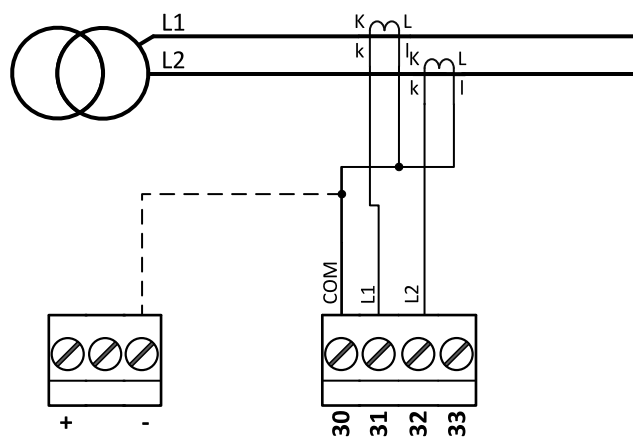


Image 4.7 SpIPhL1L2 application

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.

SpIPhL1L3 application

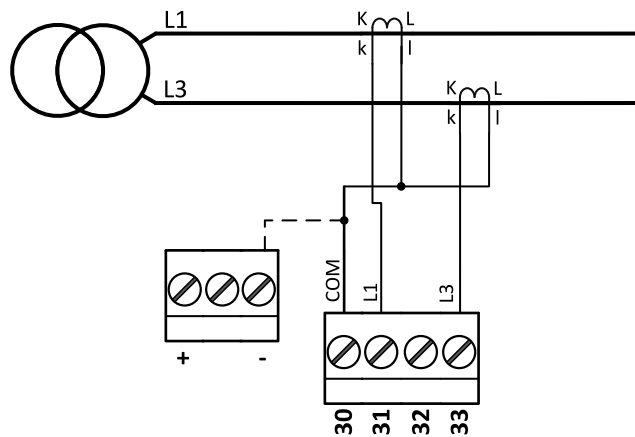


Image 4.8 SpIPhL1L3 application

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

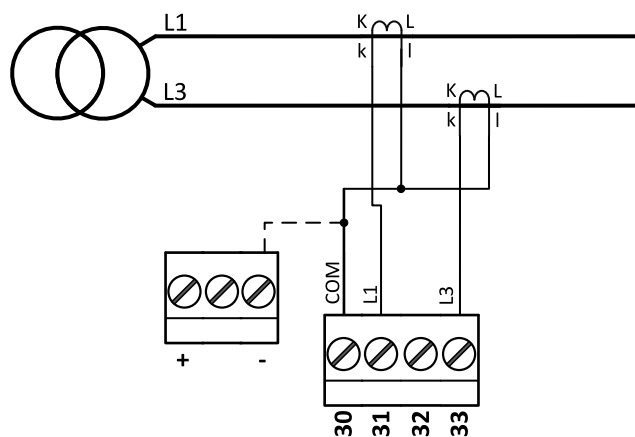


Image 4.9 SpIPhL1L3 application

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

Note: This wiring is recommended for Indian market.

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

Mono phase application

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

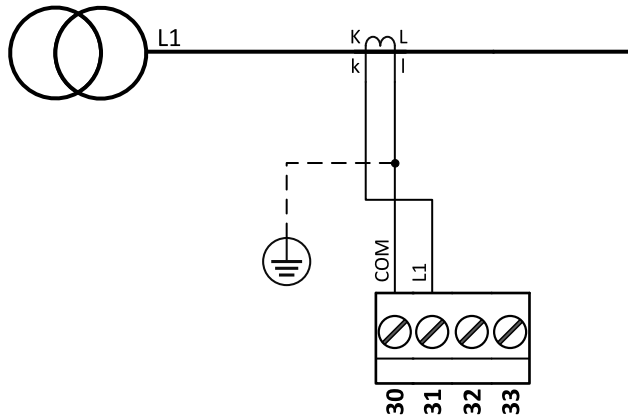


Image 4.10 Mono phase application

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

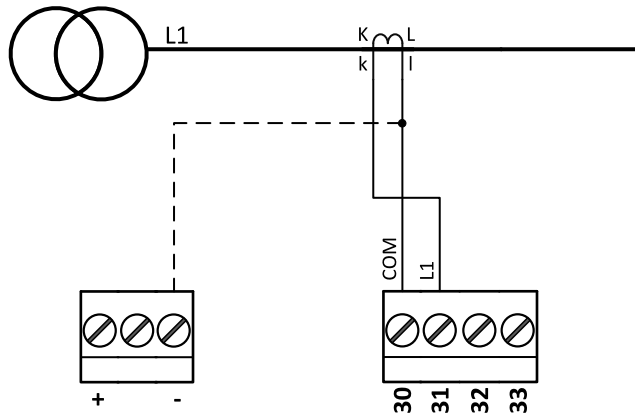


Image 4.11 Mono phase application

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

Note: This wiring is recommended for Indian market.

Voltage measurement wiring

The Mains and Bus protections are evaluated from different voltages based on **Connection type (page 261)** setting:

- > 3Ph4Wire – Ph-Ph voltage, Ph-N voltage
- > High Leg D – Ph-N voltage, Ph-N voltage
- > 3Ph3Wire – Ph-Ph voltage
- > SplPhL1L2 – Ph-N voltage
- > SplPhL1L3 – Ph-N voltage
- > MonoPhase – Ph-N voltage

ConnectionType: 3 Phase 4 Wires

Connection type (page 261) = 3Ph4Wire

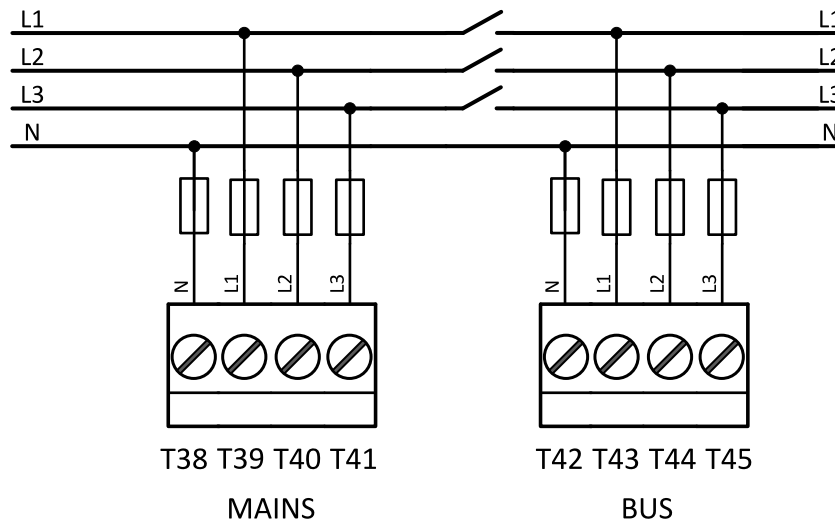


Image 4.12 Controller wiring for voltage measurement of 3 phase application with neutral

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

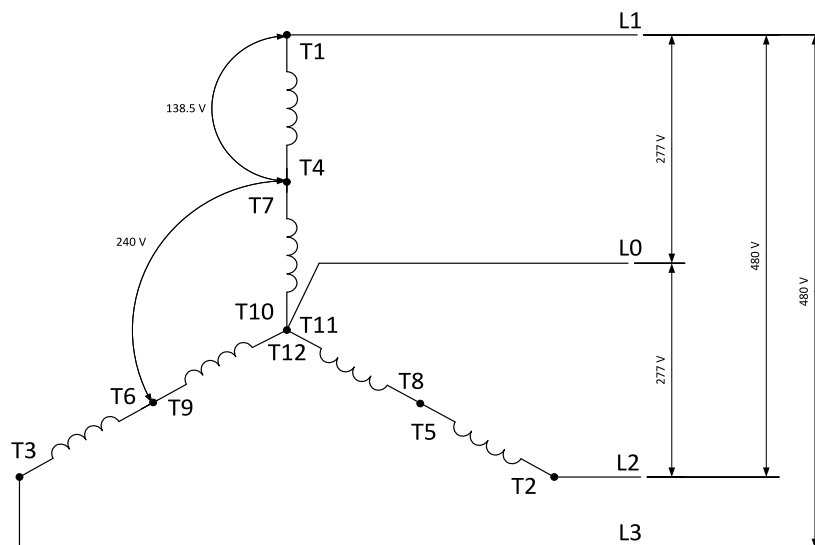


Image 4.13 Typical Mains wiring of 3 phase application with neutral

Note: Terminals marked by Tx in the picture above are Mains's terminals. These markers are not the same as markers for the controller wiring.

ConnectionType: High Leg D

Connection type (page 261) = High Leg D

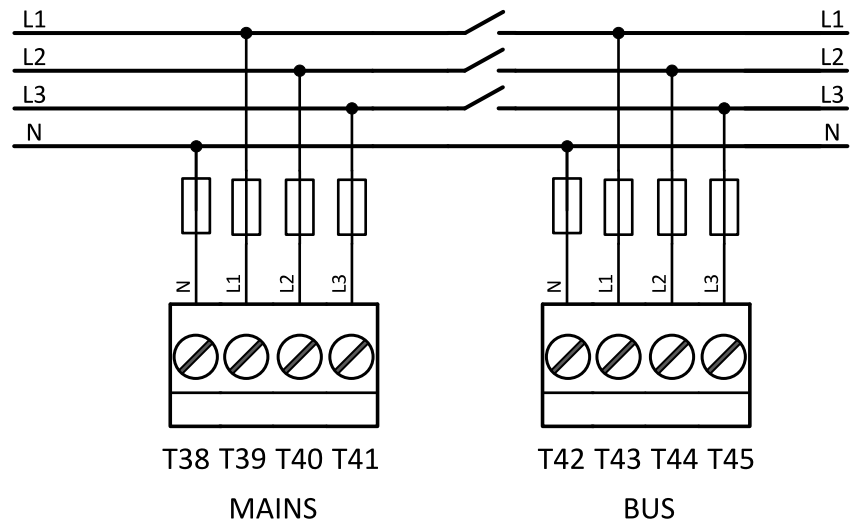


Image 4.14 Controller wiring for voltage measurement of High Leg Delta application

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

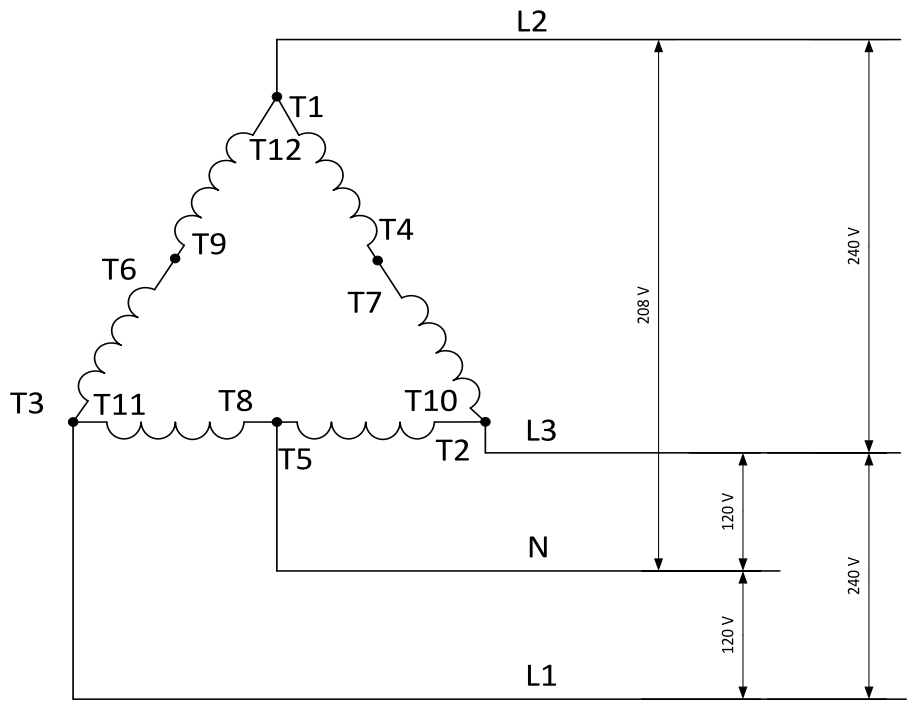


Table 4.1 Typical Mains wiring of High Leg Delta application

Note: Terminals marked by Tx in the picture above are Mains's terminals. These markers are not the same as markers for the controller wiring.

ConnectionType: 3 Phase 3 Wires

Connection type (page 261) = 3Ph3Wire

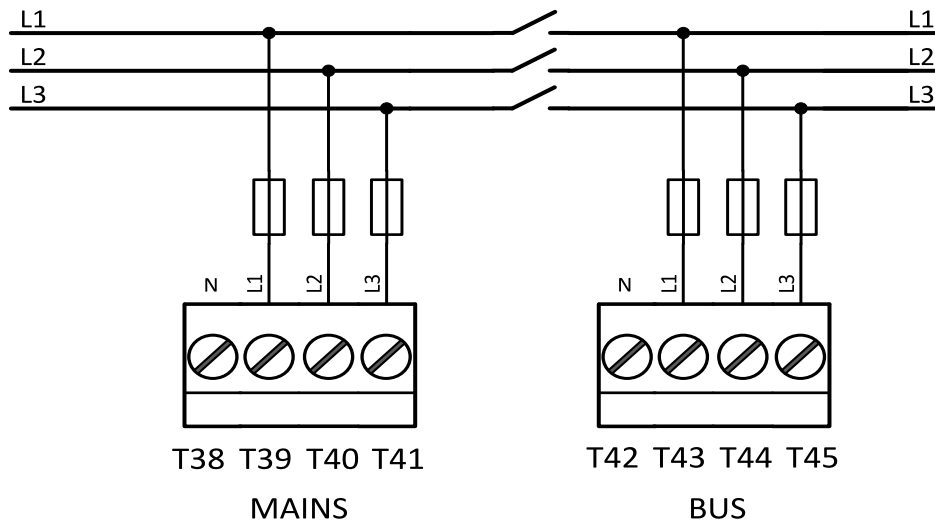


Image 4.15 3 Controller wiring for voltage measurement of 3 phase application without neutral

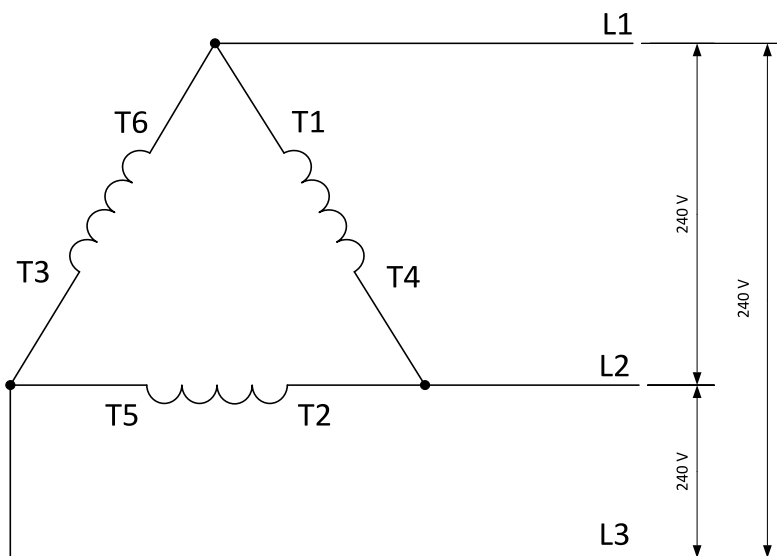


Image 4.16 Typical Mains wiring of 3 phase application without neutral

Note: Terminals marked by Tx in the picture above are Mains's terminals. These markers are not the same as markers for the controller wiring.

ConnectionType: SpIPhL1L3

Connection type (page 261) = SpIPhL1L3

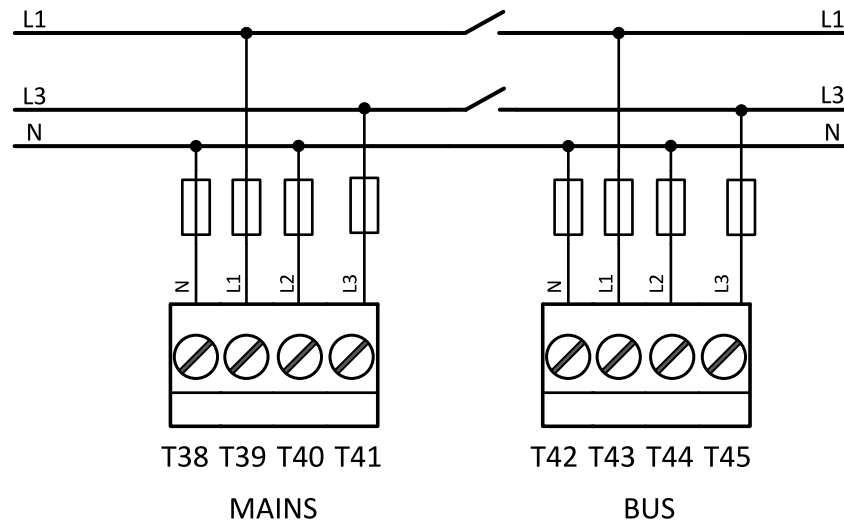


Image 4.17 Controller wiring for voltage measurement of SpIPhL1L3 application

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

ConnectionType: SpIPhL1L2

Connection type (page 261) = SpIPhL1L2

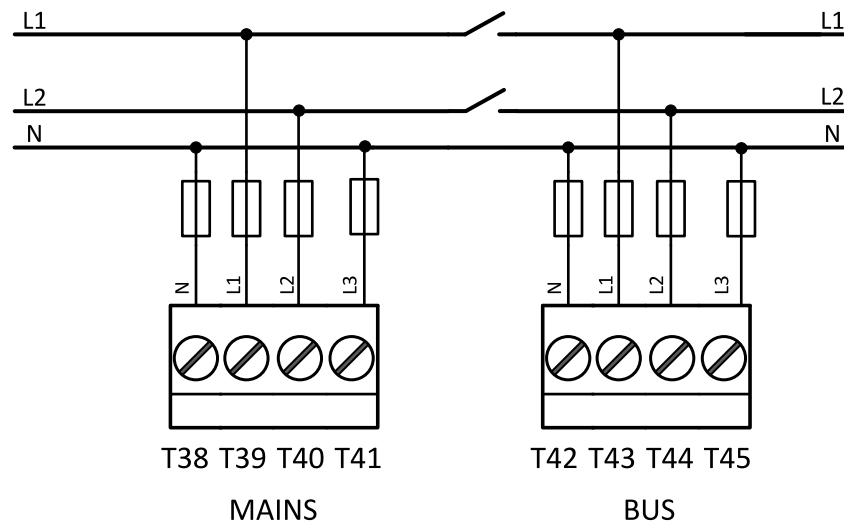
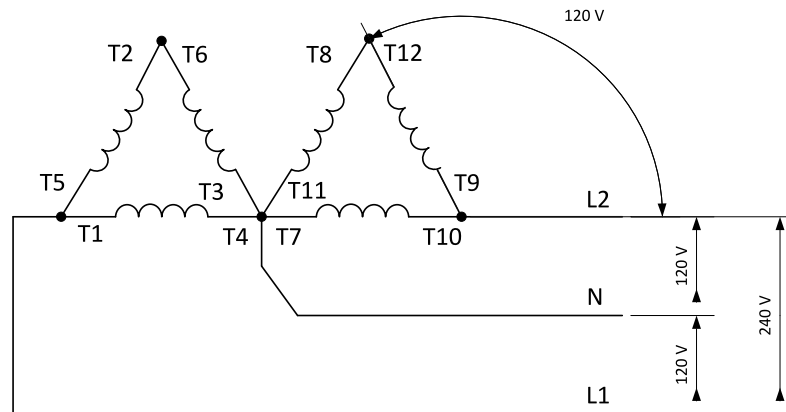


Image 4.18 Controller wiring for voltage measurement of SpIPhL1L2 application

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

DOUBLE DELTA Connection



ZIG ZAG (DOG LEG) Connection

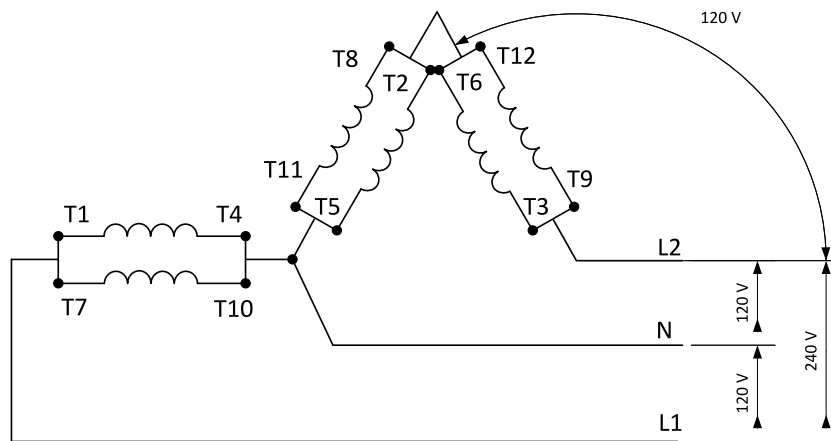


Image 4.19 Typical Mains wiring of SplitPhase application

Note: Terminals marked by Tx in the pictures above are Mains's terminals. These markers are not the same as markers for the controller wiring.

ConnectionType: Mono Phase

Connection type (page 261) = MonoPhase

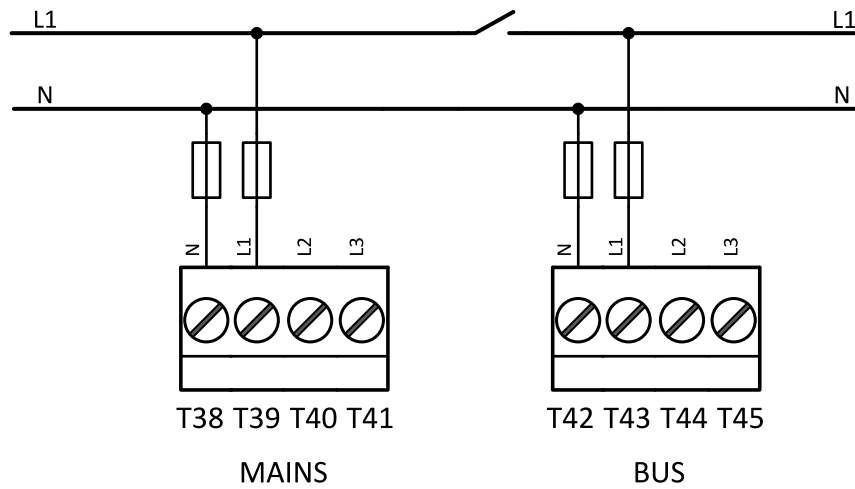


Image 4.20 Controller wiring for voltage measurement of MonoPhase application

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

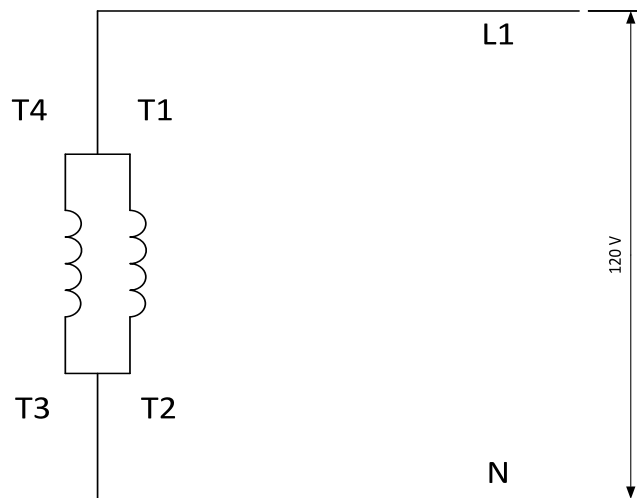


Image 4.21 Typical Mains wiring of MonoPhase application

Note: Terminals marked by Tx in the picture above are Mains's terminals. These markers are not the same as markers for the controller wiring.

4.4.5 Binary Inputs

Use minimally 1 mm² cables for wiring of Binary inputs.

InteliMains 510 offers switchable types of inputs. You can select from **Pull Up** and **Pull Down** settings. Use minimally 1 mm² cables for wiring of Binary inputs. It is recommended to separate inputs by diodes when two or more binary inputs are connected in parallel to avoid wrong input activation when one controller is switched off.

See the chapter **Binary inputs (page 690)** for more information about Pull Up and Pull Down settings.

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

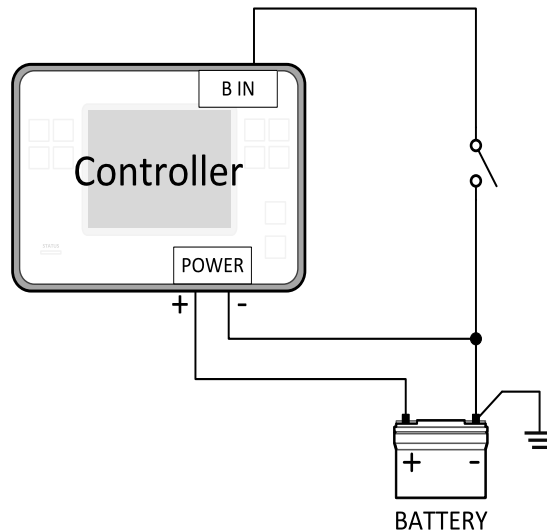


Image 4.22 Wiring binary inputs - Pull Up

4.4.6 Binary Outputs

Use min. 1 mm² 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.).

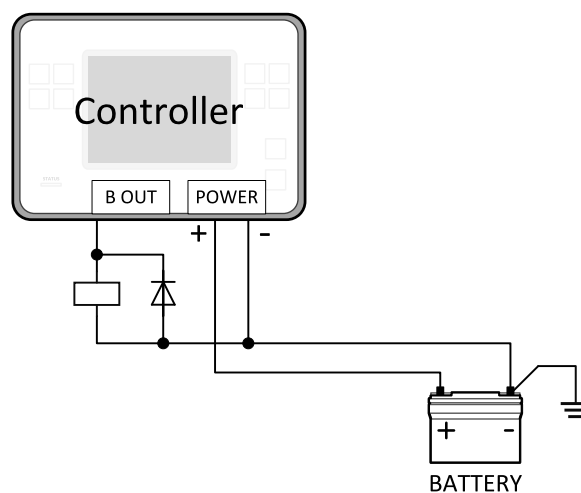


Image 4.23 Binary outputs wiring

4.4.7 CAN bus and RS485 wiring

CAN bus wiring

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

- The maximum length of the CAN bus depends on the communication speed. For a speed of 250 kbps, which is used on the **CAN1 (page 17)** bus (extension modules, ECU) and **CAN2 (page 17)** (**Communication peripherals (page 17)**) bus, the maximum length is 200 m.
- The bus must be wired in linear form with termination resistors at both ends. No nodes are allowed except on the controller terminals.
- Shielded cable¹ has to be used, shielding has to be connected to the terminal T01 (Grounding).
- External units can be connected on the CAN bus line in any order, but keeping line arrangement (no tails, no star) is necessary.
- The CAN bus has to be terminated by 120 Ohm resistors at both ends use a cable with following parameters:

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

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

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

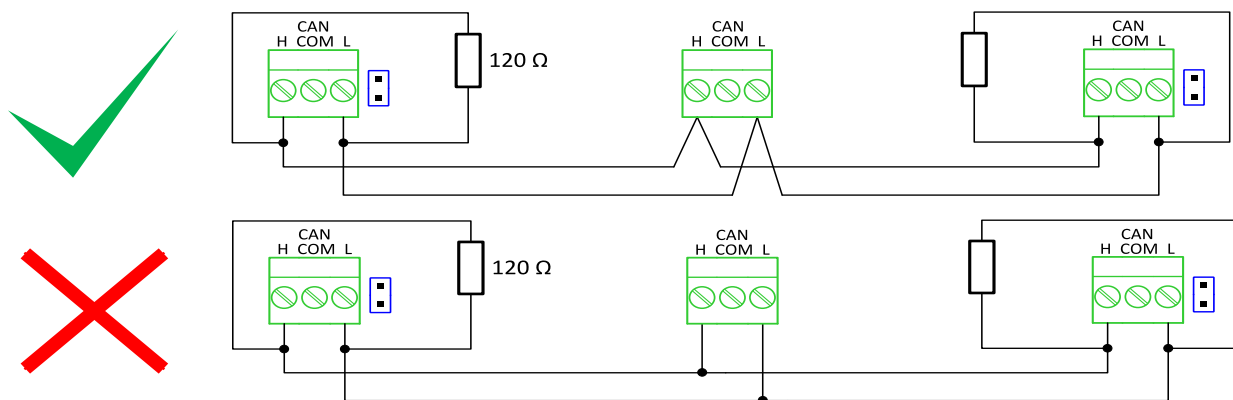


Image 4.24 CAN bus topology

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

- For shorter distances (connection within one building)

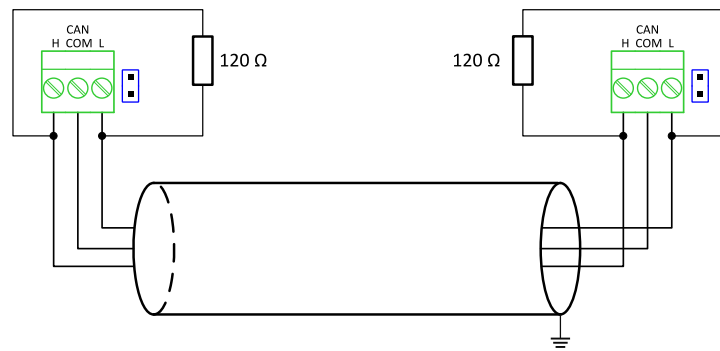


Image 4.25 CAN bus wiring for shorter distances

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.)

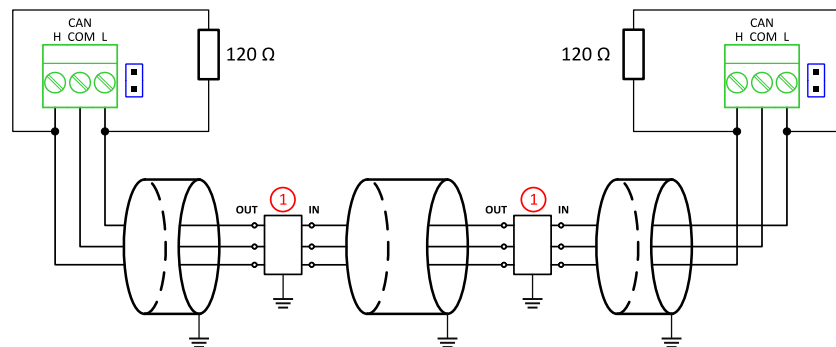


Image 4.26 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST¹

RS485 wiring

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

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

- Standard maximum bus length is 1000 m.
- Shielded cable² has to be used, shielding has to be connected to the terminal T00 (Grounding).
- External units can be connected on the RS485 line in any order, but keeping line arrangement (no tails, no star) is necessary.
- The line has to be terminated by 120 Ohm resistors at both ends.

¹Protections 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

²Recommended data cables: BELDEN (<http://www.belden.com>) - for shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors); for longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

- For shorter distances (connection within one building).

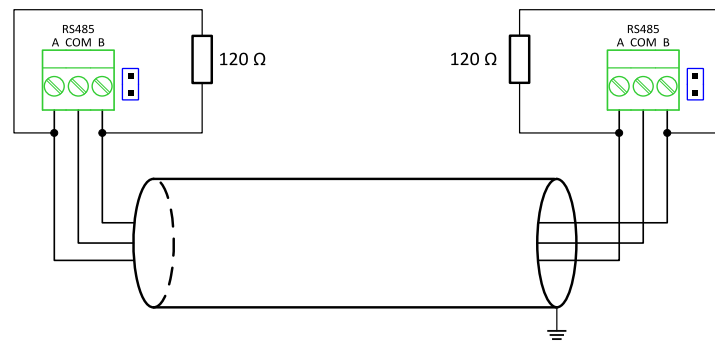


Image 4.27 RS485 wiring for shorter distances

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

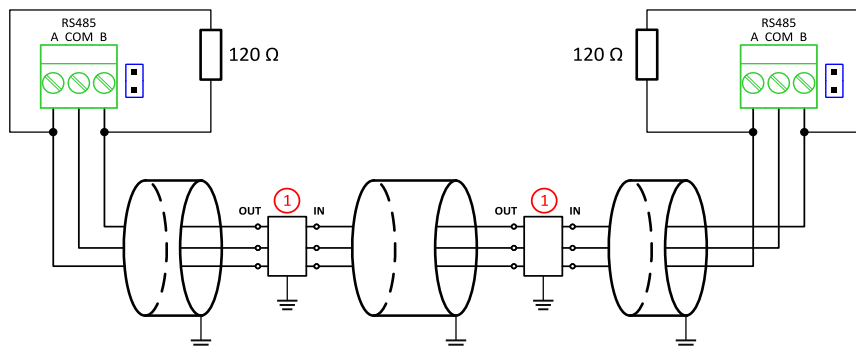


Image 4.28 RS485 wiring for longer distances

① Recommended PT5HF-5DC-ST¹

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

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

On board RS485 description

Balancing resistors

The transmission bus into the RS-485 port enters an indeterminate state when it is not being transmitted to. This indeterminate state can cause the receivers to receive invalid data bits from the noise picked up on the cable. To prevent these data bits, you should force the transmission line into a known state. By installing two 560 Ohm balancing resistors at one node on the transmission line, you can create a voltage divider that forces the voltage between the differential pair to be less than 200 mili-Volts, the threshold for the receiver. You should install these resistors on only one node. The figure below shows a transmission line using bias resistors. Balancing resistors are placed directly on the PCB of controller. Use jumpers PULL UP/PULL DOWN to connect the balancing resistors.

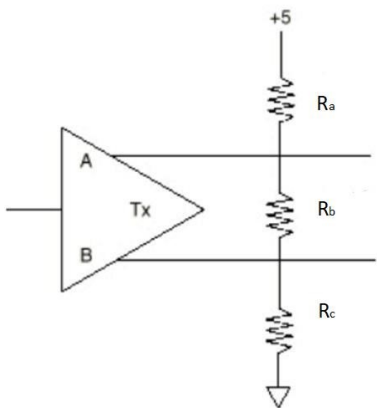


Image 4.29 Balancing resistors

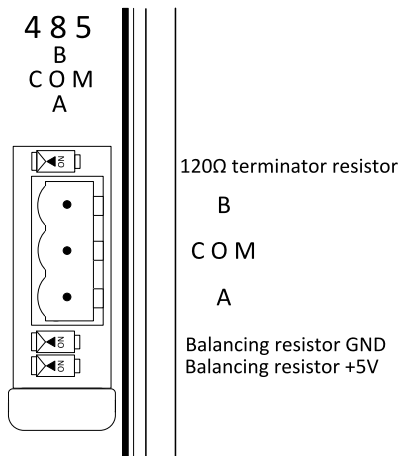


Image 4.30 RS485 on board

4.4.8 USB

The USB can be used for direct computer connection. Use the shielded USB A-B cable. See the chapter **Connection via USB (page 211)** for more information.

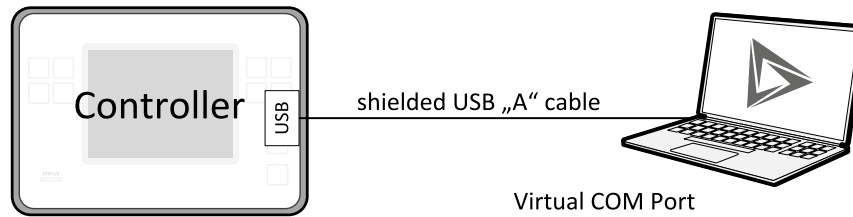


Image 4.31 USB connection

The USB cannot be used instead of power supply. The controller will not be turned on when the USB is connected and the controller is not powered from power supply.

4.4.9 USB HOST

USB Flash Drive can be connected into USB A connector.

4.4.10 Ethernet

Ethernet Cat5/Cat6 cable fitted with the RJ45 connector can be connected to the ethernet interface. The ethernet can be used for direct computer connection. See the chapter **Connection via Ethernet (page 210)** for more information.

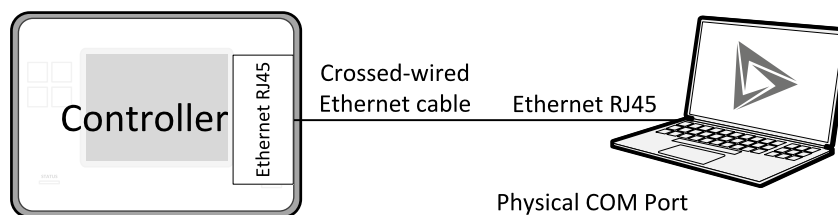
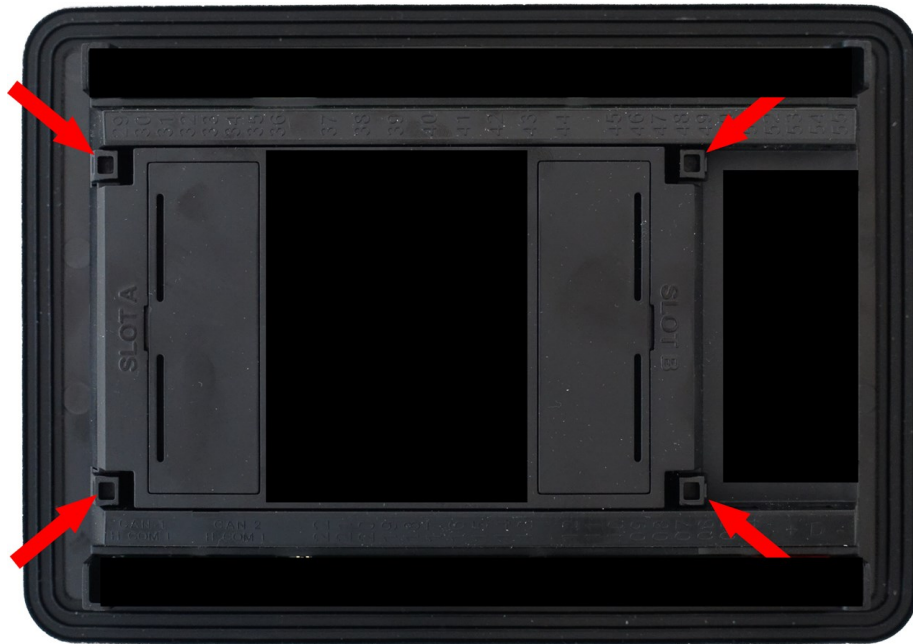


Image 4.32 Ethernet Connection

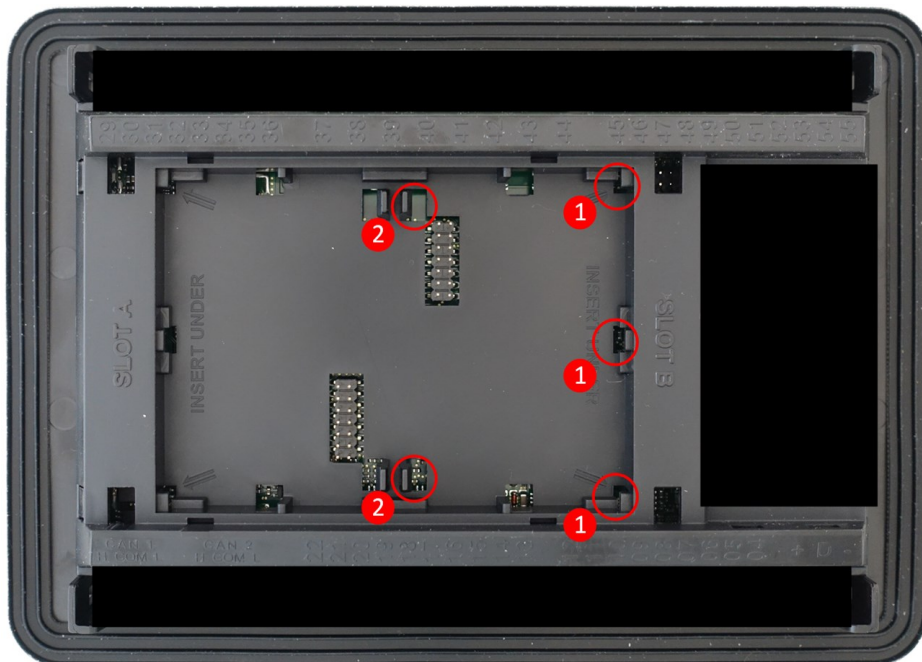
4.5 Plug-in module installation

4.5.1 Installation

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



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



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



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

4.6 Maintenance

4.6.1 Backup battery replacement

The internal backup battery lifetime is approx. 6 years. If alarm **Wrn RTC Battery Flat (page 665)** is present, replacement of backup battery is needed. Follow these instructions:

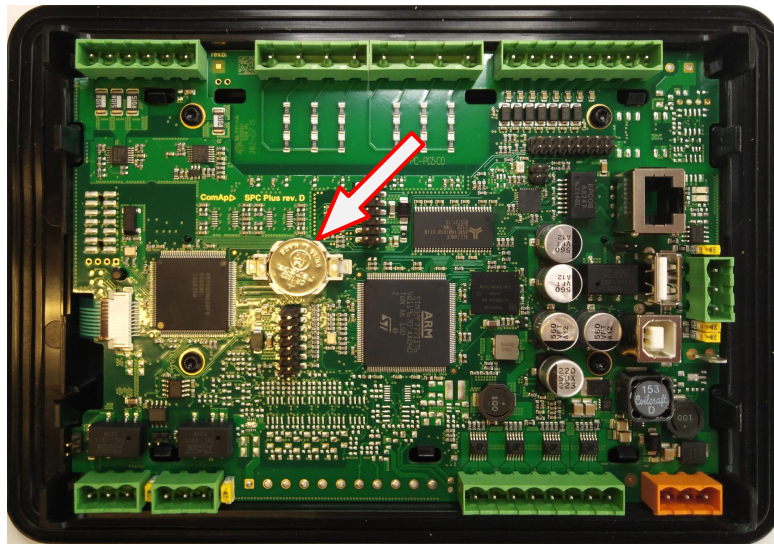
- Connect the controller to a PC and save an archive for backup purposes (not necessary but recommended).
- Disconnect all terminals from the controller and remove the controller from the switchboard.
- Release the rear cover using a flat screwdriver or another suitable tool.



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



Warning – Risk of fire if battery is replaced with incorrect type or polarity. Dispose of used batteries according to instructions. The CR1632 3V Lithium battery have to be used."



Note: The picture above is only illustrative and actual battery placement may vary.

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

⬅ back to Installation and wiring

5 Controller setup

5.1 Default configuration	58
5.2 Controller configuration and PC tools connection	58
5.3 Operator Guide	65
5.4 General Functions	99

[🔍 back to Table of contents](#)

5.1 Default configuration

5.1.1 Binary inputs

Number	Description	Configured function
BIN1	Mains circuit breaker feedback	MCB FEEDBACK (PAGE 547)
BIN2	System activation in AUT mode	REMOTE START/STOP (PAGE 560)
BIN3	Switch controller to TEST mode	REMOTE TEST (PAGE 560)
BIN4	Switch controller to TEST mode with load	REM TEST ON LOAD (PAGE 561)
BIN5	Access lock keyswitch	ACCESS LOCK (PAGE 536)
BIN6	Switch the site to Island state	FORCE ISLAND (PAGE 537)
BIN7	Active parallel run	FORCE PARALLEL (PAGE 538)
BIN8	Free slot	Not Used

5.1.2 Binary outputs

Number	Description	Configured function
BOUT1	Control of MCB	MCB CLOSE/OPEN (PAGE 579)
BOUT2	System activation	SYSTEM START/STOP (PAGE 591)
BOUT3	Indication of a system reserve	SYSTEM RESERVE OK (PAGE 591)
BOUT4	Free slot	Not Used
BOUT5	Free slot	Not Used
BOUT6	Free slot	Not Used
BOUT7	Free slot	Not Used
BOUT8	Free slot	Not Used

5.2 Controller configuration and PC tools connection

5.2.1 USB	59
5.2.2 Ethernet	60

[🔍 back to Controller setup](#)

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

5.2.1 USB

You may connect to the controller using the **USB (page 34)** Port. In this case standard USB A to B cable should be used - **USB (page 54)** connection.

Connection using InteliConfig

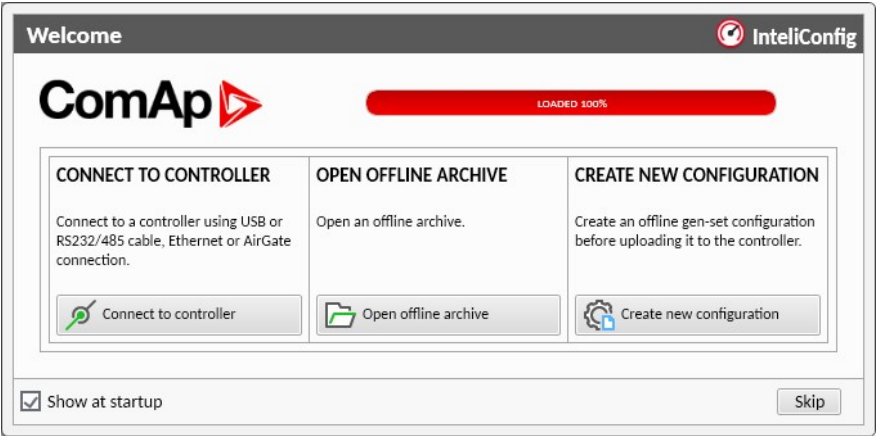


Image 5.1 First screen of InteliConfig - select connect to controller

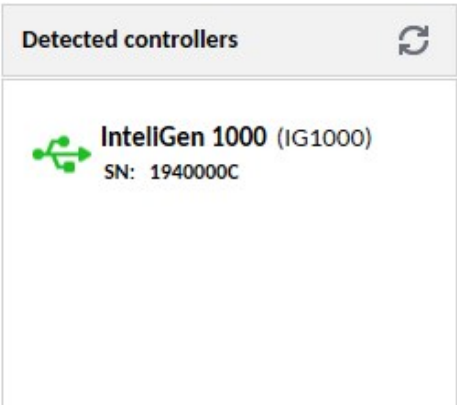


Image 5.2 Second screen of InteliConfig - Select your controller from list of Detected controllers.

Select your controller from the list of Detected controllers. You need to know your controller's serial number.

Note: You do not need to be using user account while connecting via USB.

Connection using WinScope

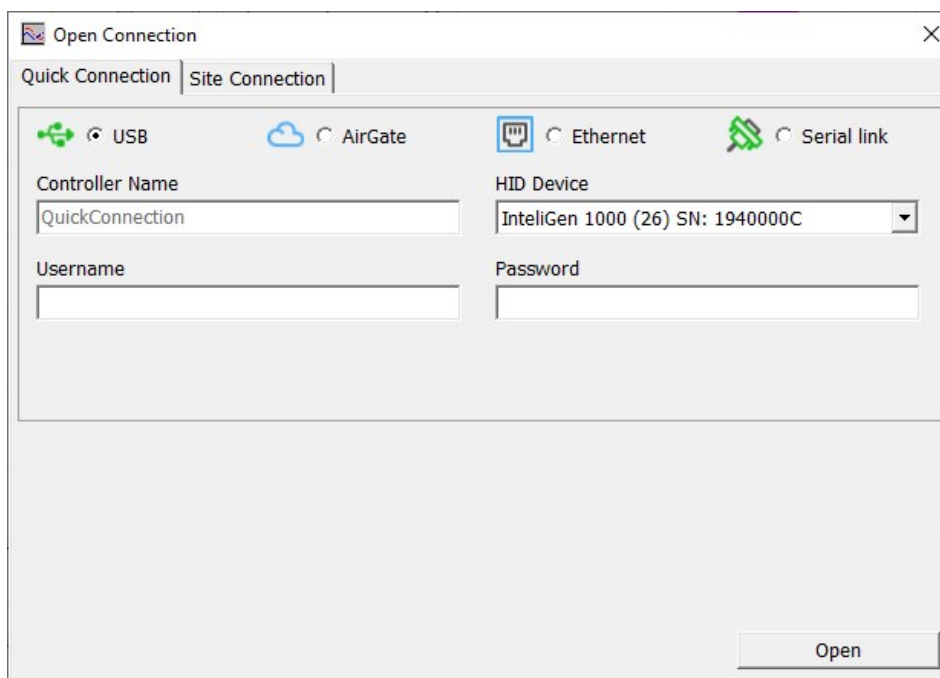


Image 5.3 WinScope screen - Select your controller from list of Detected controllers.

Select your controller from the list of Detected controllers. You need to know your controller's serial number.

Note: You do not need to be using user account while using WinScope1000 connected via USB.

5.2.2 Ethernet

You may connect to the controller using any of the **Recommended wiring (page 35)**, ports, if correct Ethernet Port Configuration settings are applied.

Note: See **Communication peripherals (page 17)** to see differences between these peripherals.

Direct connection

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

Note: The connection speed might be significantly limited when you connect the controller directly from the PC and your Ethernet card is setup to Energy-Efficient Ethernet option.

Connection using IntelliConfig

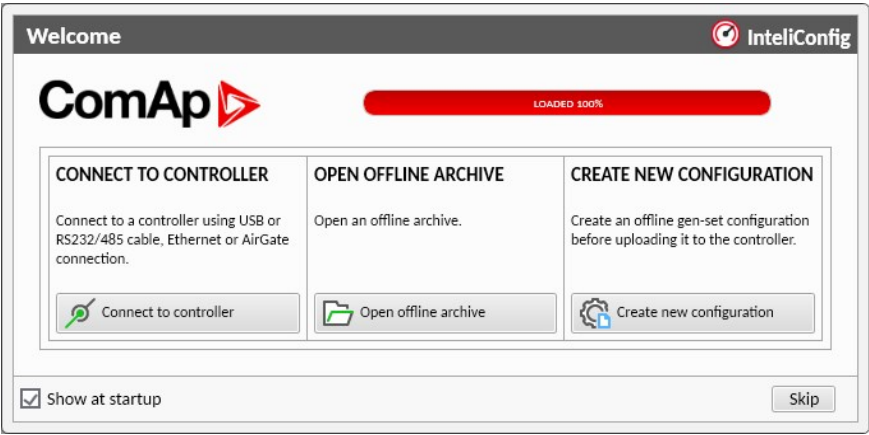


Image 5.4 First screen of IntelliConfig - select connect to controller

The screenshot shows the 'Online Connection' tab in the IntelConfig application. Three connection methods are available: AirGate, Ethernet (selected), and Serial link. Below the selection, there are input fields for 'IP address' (containing '10.0.0.6:23'), 'Access code', 'Controller address' (containing '1'), 'Username/UID', and 'Password/PIN'. A red 'OPEN' button is located at the bottom right of the form.

Image 5.5 Second screen of IntelliConfig - select Ethernet

Use **IP address** which is stored in proper value (based on selected Ethernet peripheral) and fill **Controller address**.

IMPORTANT: Never fill Access code!

IMPORTANT: In case of using Communication peripherals (page 17) you need to fill Username and Password of actual user account.

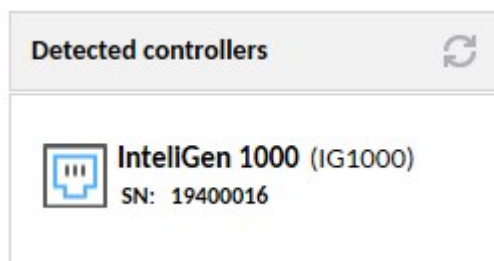


Image 5.6 Second option of connection via IntelliConfig

You can also select controller from "Detected controllers" feature. If this controller is connected via **Communication peripherals (page 17)** you will be prompted to fill **Username** and **Password** of actual user account.

Connection using WinScope

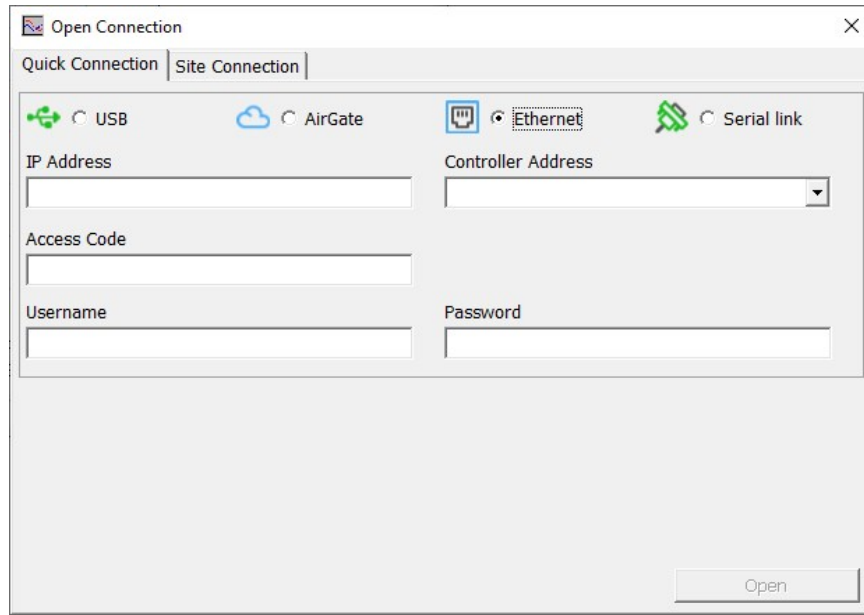


Image 5.7 WinScope screen - select Ethernet

Use **IP address** which is stored in proper value (based on selected Ethernet peripheral) and fill **Controller address**.

IMPORTANT: Never fill Access code!

IMPORTANT: In case of using Communication peripherals (page 17) you need to fill Username and Password of actual user account.

AirGate connection

You may connect to the controller using AirGate which works only via **Communication peripherals (page 17)**. If the AirGate key in the Access Administration is empty the controller will not connect to the AirGate despite the function is enabled. Access Administration is available in Tools of the IntelliConfig.

Setpoints and values related to connection via AirGate:

- **AirGate Connection (page 418)** - has to be **ENABLED**
- **AirGate Address (page 419)** - manually adjusted address of AirGate server
- **AirGate Port (page 419)** - manually adjusted port for communication between Controller and AirGate server
- **AirGate Status (page 498)** - has to be **connected, operable**
- **AirGate ID (page 498)** - 9 numbers long ID of the controller

IMPORTANT: Controller has to be connected to the Internet.

Connection using IntelliConfig

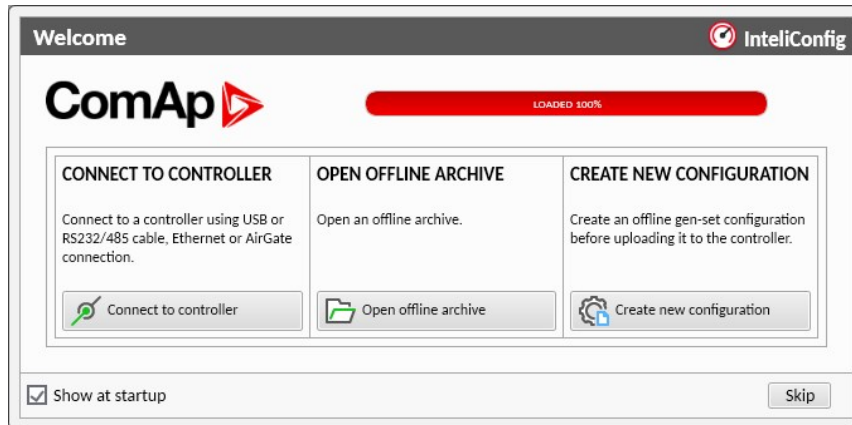


Image 5.8 First screen of IntelliConfig - select connect to controller

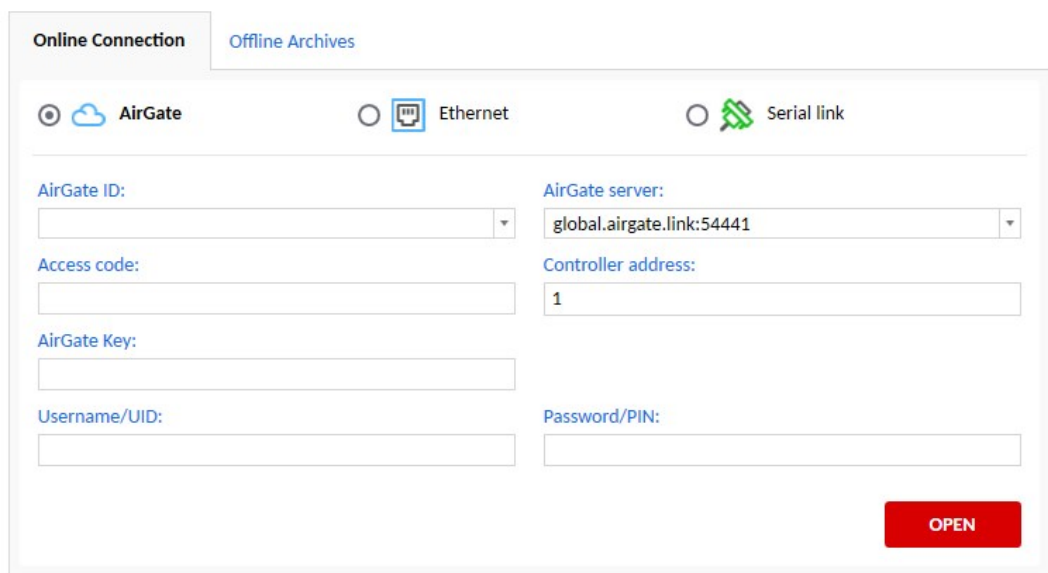
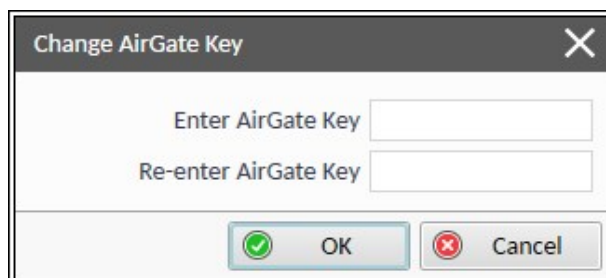
The image shows the 'Online Connection' tab of the IntelliConfig software. It features three radio buttons for connection types: 'AirGate' (selected), 'Ethernet', and 'Serial link'. Below these are several input fields: 'AirGate ID' (a dropdown menu), 'AirGate server' (a dropdown menu showing 'global.airgate.link:54441'), 'Access code' (a text field), 'Controller address' (a text field showing '1'), 'AirGate Key' (a text field), 'Username/UID' (a text field), and 'Password/PIN' (a text field). A red 'OPEN' button is located at the bottom right.

Image 5.9 Second screen of IntelliConfig - AirGate

Use **AirGate ID**, **AirGate server** with proper port (54441 for global.airgate.link), **AirGate Key** and **Controller address**. Valid user account - **Username** and **Password** - is required for the connection.

IMPORTANT: Never fill Access code!

Note: Ask your administrator for **AirGate Key**. Administrator can always change the key via IntelliConfig using "Tools -> Access administration -> Change AirGate key"

The image shows a 'Change AirGate Key' dialog box. It has a title bar with a close button (X). Inside, there are two text input fields: 'Enter AirGate Key' and 'Re-enter AirGate Key'. At the bottom, there are two buttons: 'OK' (with a green checkmark icon) and 'Cancel' (with a red X icon).

Connection using WinScope

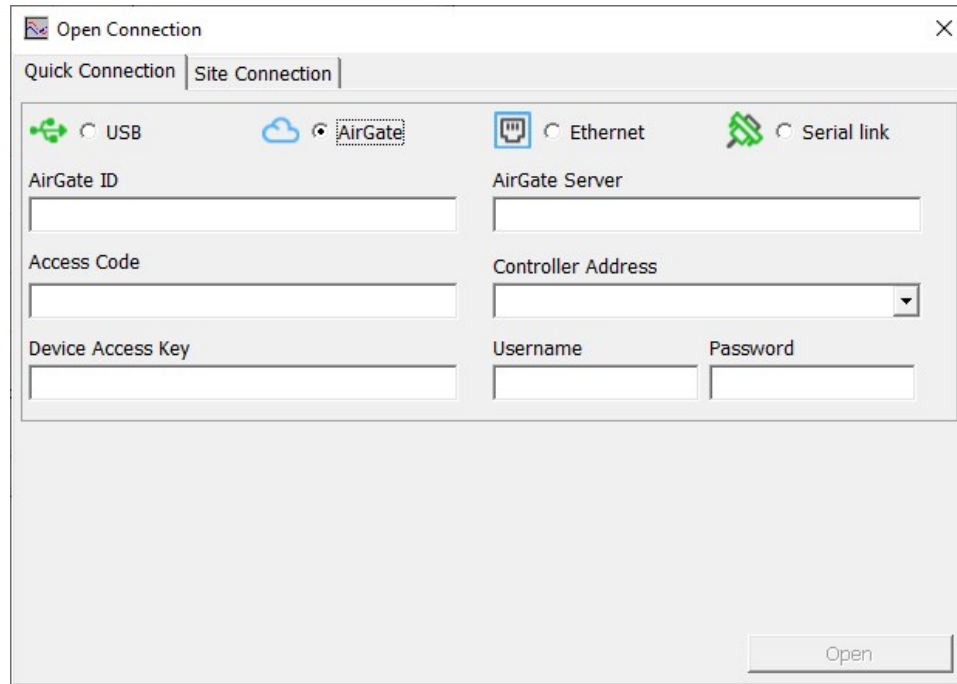


Image 5.10 WinScope1000 screen - select AirGate

Use **AirGate ID**, **AirGate Server** with proper port (54441 for global.airgate.link), **Device Access Key** and **Controller Address**. Valid user account - **Username** and **Password** - is required for the connection.











IMPORTANT: Never fill Access code!

5.3 Operator Guide



Image 5.11 Operator interface of IntelIMains 510

Control buttons

Position	Picture	Description
1		<p>LEFT button. Use this button to move left or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed.</p> <p><i>Note: This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.</i></p>
2		<p>RIGHT button. Use this button to move right or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed.</p> <p><i>Note: This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.</i></p>
3		<p>HORN RESET button. Use this button to deactivate the horn output without acknowledging the alarms.</p>
4		<p>FAULT RESET button. Use this button to acknowledge alarms and deactivate the horn output. Inactive alarms will disappear immediately and status of active alarms will be changed to "confirmed" so they will disappear as soon as their reasons dismiss.</p>
5		<p>UP button. Use this button to move up or increase value.</p>
6		<p>PAGE button. Use this button to switch over display pages.</p>
7		<p>DOWN button. Use this button to move down or decrease value.</p>
8		<p>ENTER button. Use this button to finish editing a setpoint or moving right in the history page.</p>
9		<p>START button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.</p>
10		<p>STOP button. Works in MAN mode only. Press this button to initiate the stop sequence of the Controller. Repeated pressing of button will cancel current phase of stop sequence (like cooling) and next phase will continue.</p>
11	MCB button. Works in MAN mode only. Press this button to open or close the MCB.	
12	GCB button. Works in MAN mode only. Press this button to open or close the GCB.	
13	ALARMLIST button. Use this button to get to the alarmalist screen.	

14	HISTORY button. Use this button to get to the history screen.
15	HOME button. Use this button to get to the main screen.
16	Multicolor (RGB) LED. The specified color and flashing function describes the actual state of the unit. For more information see Status LED Indication on page 67.

5.3.1 Status LED Indication

- LED intensity is directly connected with the actual setting of the backlight intensity in Administration menu "Settings" accessible by shortcut Enter + Menu
 - the intensity respects the value of the Manual or External brightness control
- The flashing of the status LED and indicative Alarm icon in the top statusbar have the same period
- Meaning of the status LED colors is described below

Color and flashing function meaning:

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

Color state priority:

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

Pages

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

The actual GUI consists of 6 different pages:

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

Screens

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

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

Service screen

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



Need technical support ?
Please contact your local distributor.

Image 5.12 : Service screen overview

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

Dialogs

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

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

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

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

Dialog Value

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

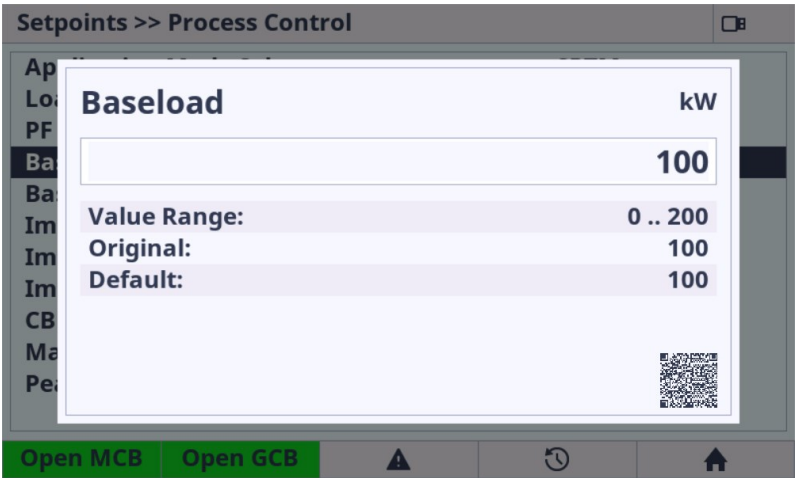


Image 5.13 : Dialog Value overview

Dialog Value Extended

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

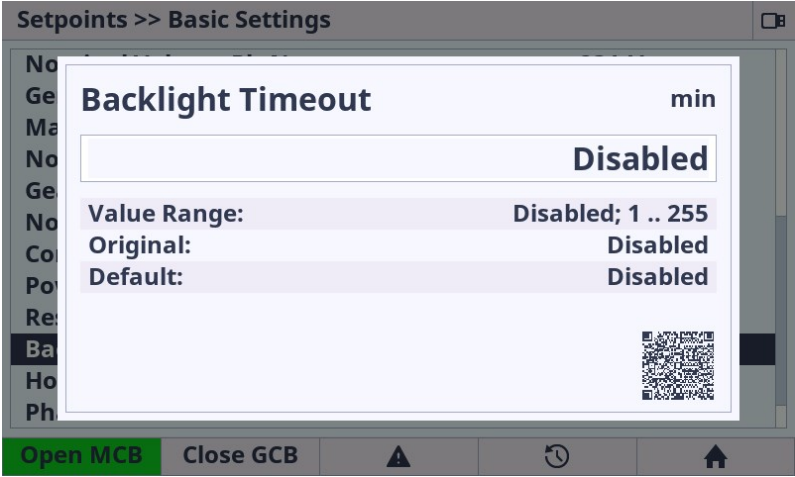


Image 5.14 : Dialog Value Extended overview

Dialog String List

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

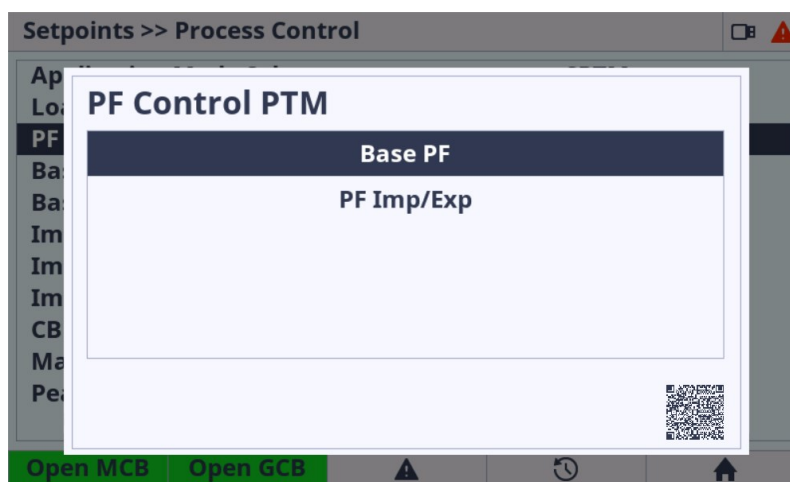


Image 5.15 : Dialog String List overview

Dialog Text

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

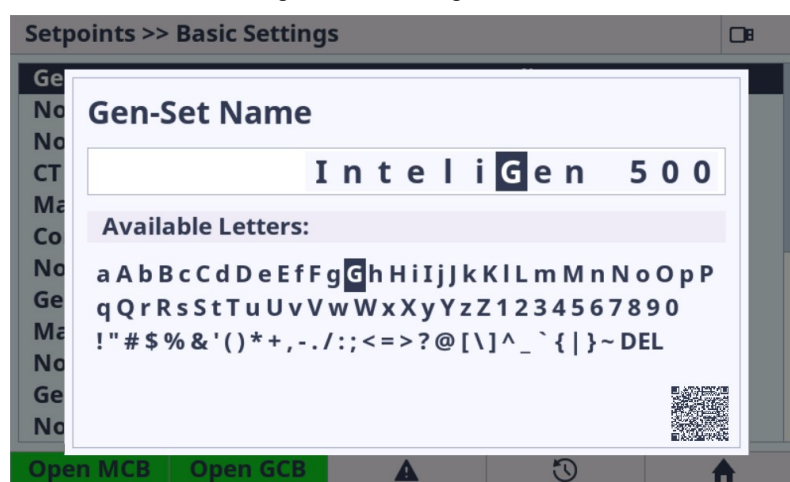


Image 5.16 : Dialog Text overview

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

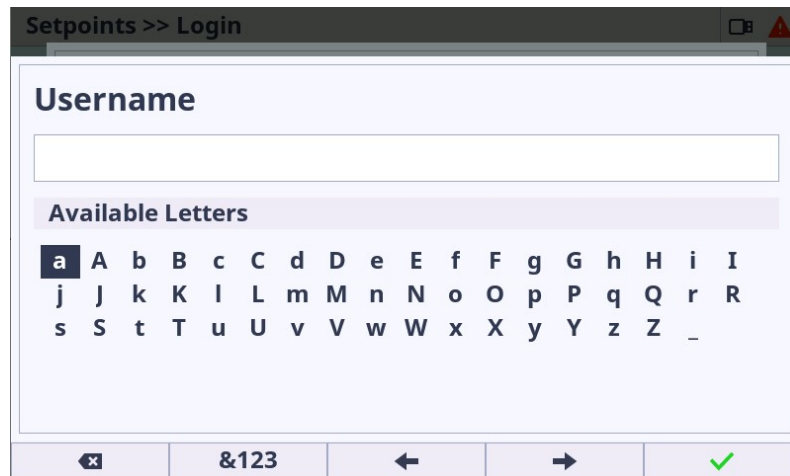


Image 5.17 : Dialog Text from ICD firmware version 1.4.0

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

Dialog IP address

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

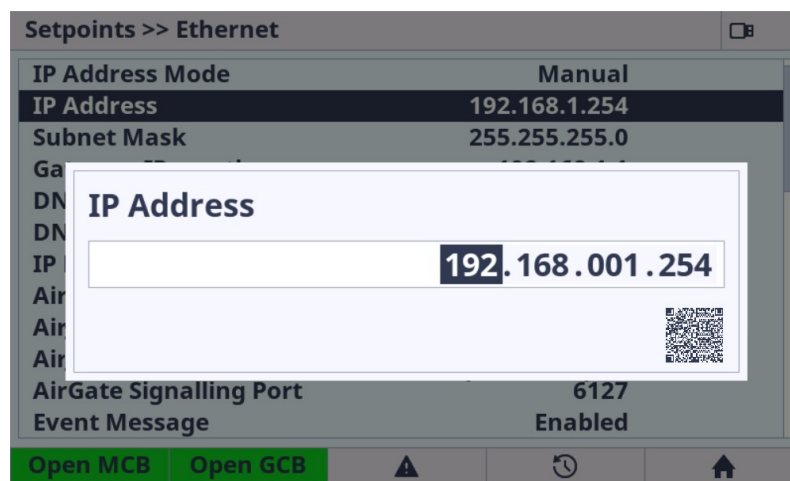


Image 5.18 : Dialog IP address overview

Dialog Message

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

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

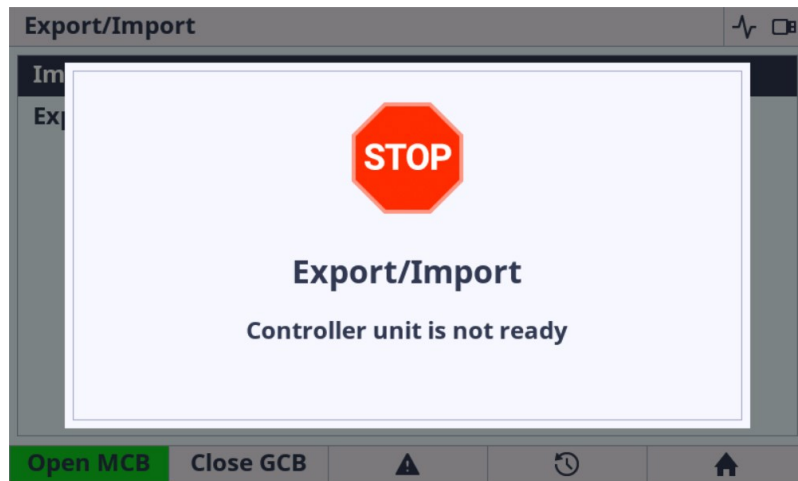


Image 5.19 : Dialog Message overview

Dialog Progress

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

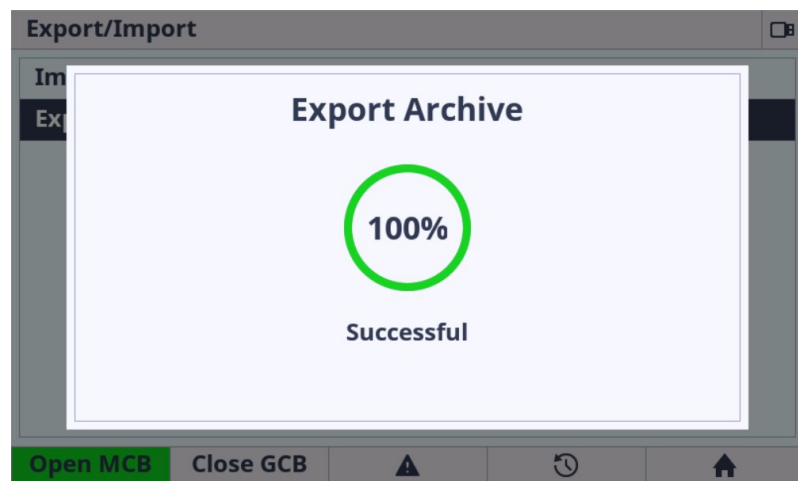


Image 5.20 : Dialog Progress overview

Dialog Date

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

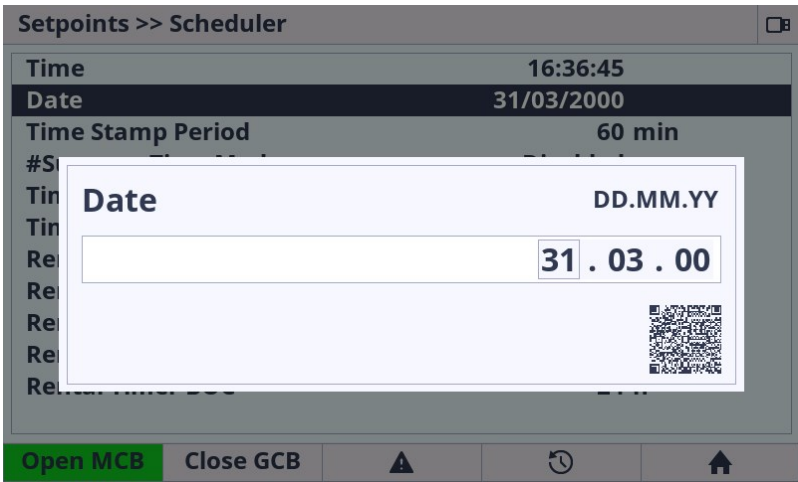


Image 5.21 : Dialog Date overview

Dialog Time

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

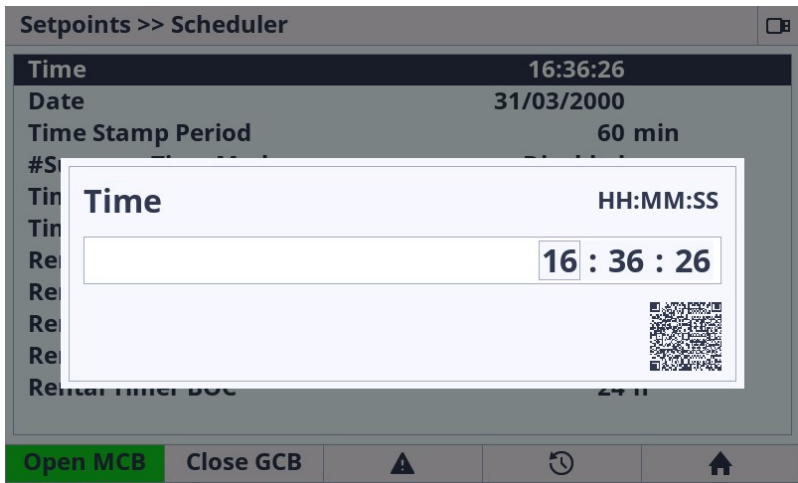


Image 5.22 : Dialog Time overview

Dialog Login

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

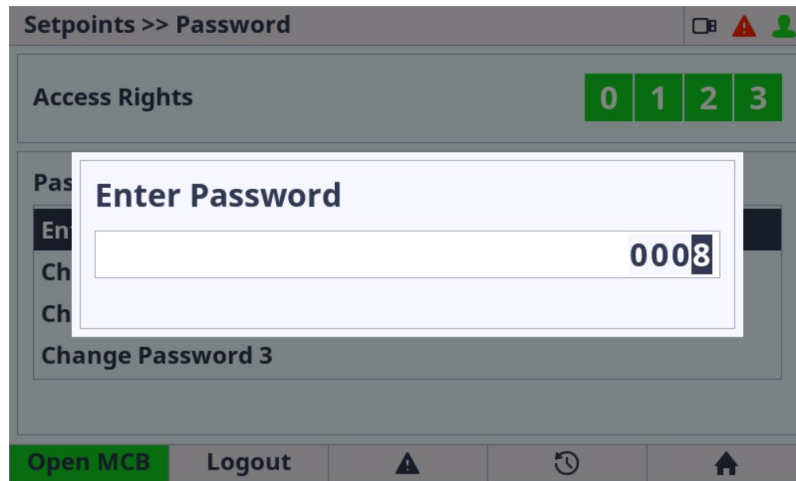


Image 5.23 : Dialog Login overview

Status bars

Bottom status bar

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

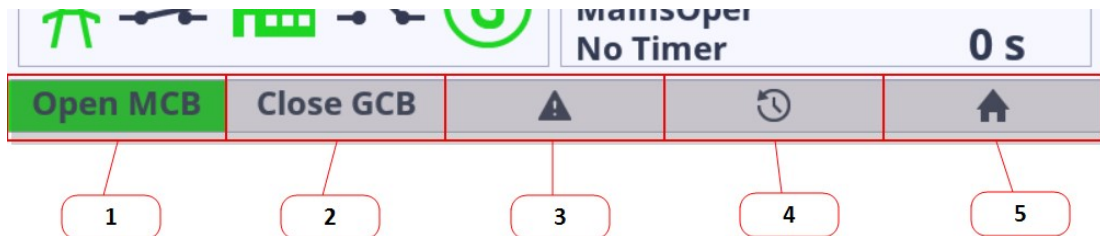


Image 5.24 : Example (bottom status bar on Home metering screen)

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

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

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

Top status bar

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

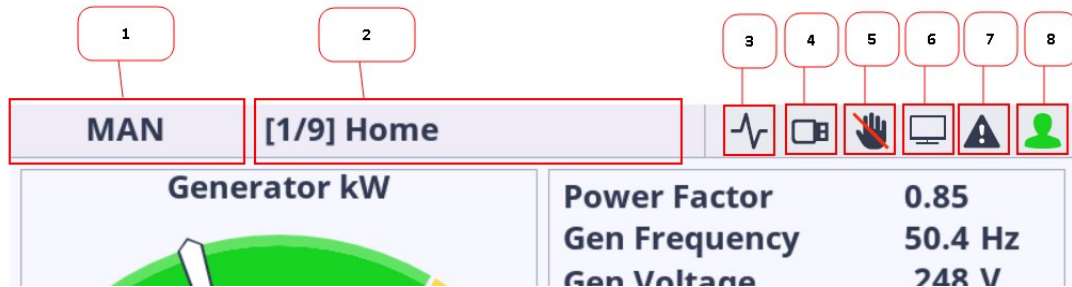


Image 5.25 Top Status Bar description



Image 5.26 : Top Status Bar – Mode selector dialog

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

5.3.2 Metering screens

Metering screens are dedicated for important controller values and setpoints.

InteliMains 510 metering screens are predefined by ComAp and covers all the application types.

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

InteliMains 510 metering screens by default

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

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

5.3.3 Alarmlist

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

There are 4 different types of controller alarms:

- **Warning (often also known as 1st level alarm)** – represented by the YELLOW color. These types of alarms inform the user that something is wrong and need to be checked and confirmed.
- **Shutdown (often also known as 2nd level alarm)** – represented by the RED color. These types of alarms protects the Gen-set or Engine during the wrong state.
- **ECU alarm** – represented by the BLUE color. This type of alarm comes from the connected external ECU units.
- **Sensor fail alarm** – represented by the WHITE color. A special kind of alarm that appears if any connected sensor emits the wrong state.

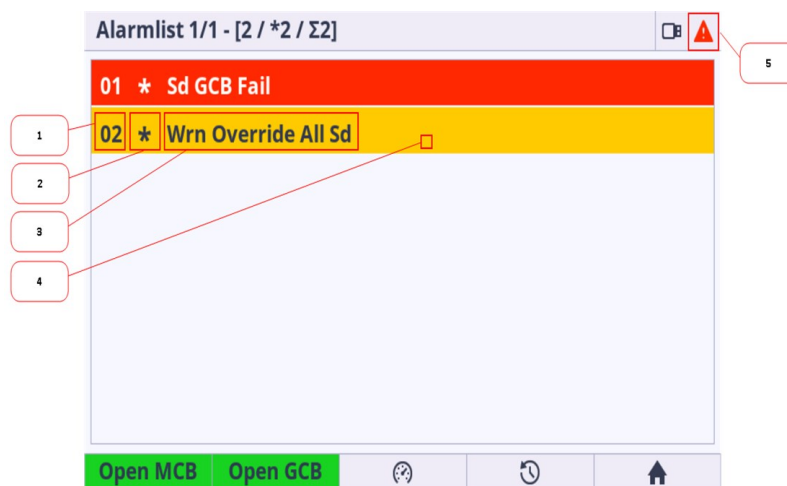


Image 5.27 : Alarmlist Page

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

➤ Level 2 (shutdown) alarm

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

➤ Sensor fail alarm

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

➤ ECU alarm

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

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

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

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

IMPORTANT: IntelliMains 510 controller displays maximum 16 alarms.

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

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

5.3.4 Setpoints

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

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

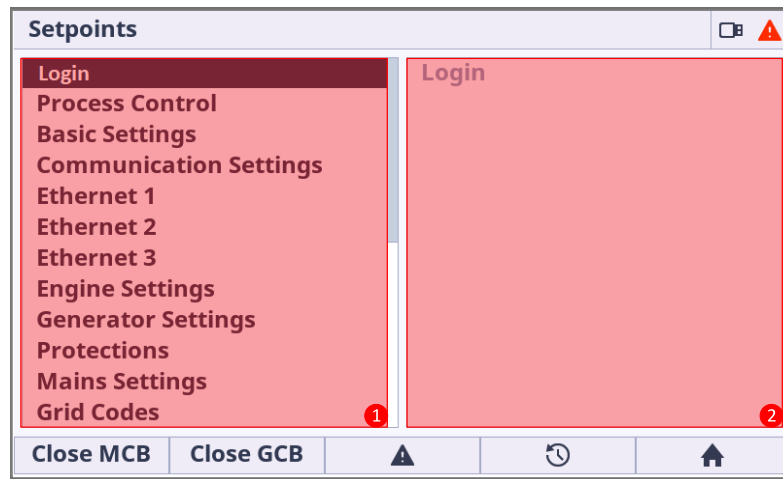


Image 5.28 : Setpoints Page overview

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

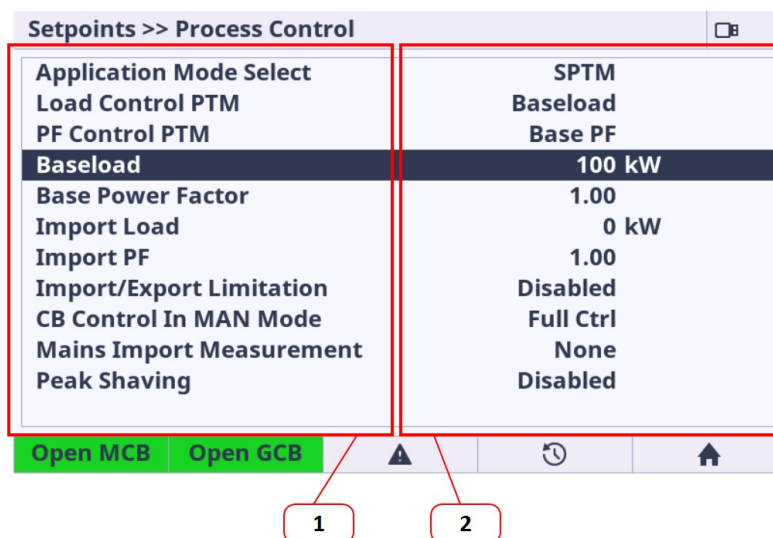


Image 5.29 : Group Setpoints Page

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

Protected Setpoint Indication

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

Force Value Indication

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

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

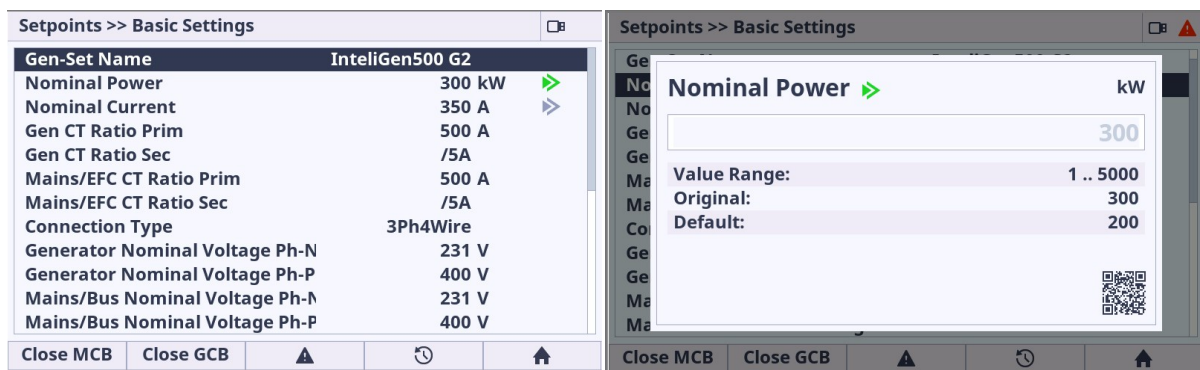


Image 5.30 : Force Value and Protected Setpoint Indication

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

Login screen

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

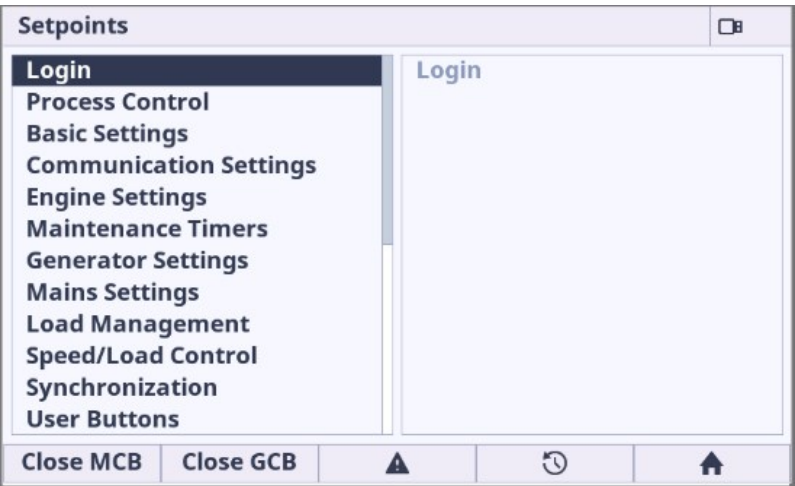


Image 5.31 : Main Setpoints Page

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

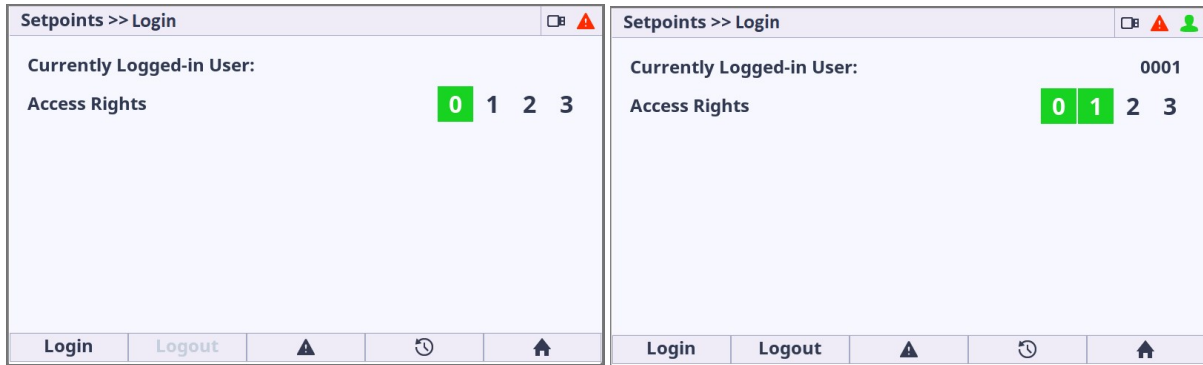


Image 5.32 : Setpoints Password Page

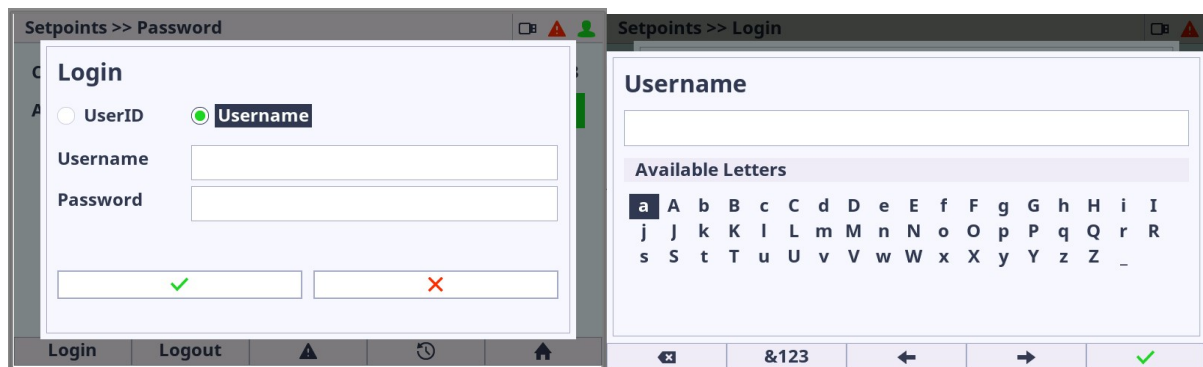


Image 5.33 : Login Dialog

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

Access Rights – Access rights of the actually logged in user

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

Login and Logout buttons

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

5.3.5 History

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

There are 2 types of history records :

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

The screenshot shows a 'History' table with columns: No., Reason, Date, Time, and RPM. The first column is highlighted in a darker shade. Below the table is a control bar with buttons: '1st Row/Col', '1x', a warning icon, a refresh icon, and a home icon. Red callout boxes are numbered 1 through 5.

No.	Reason	Date	Time	RPM
0.	Sd GCB Fail	25/02/2000	00:33:23	
-1.	SetpointChange	25/02/2000	00:30:44	T=USB C
-2.	Ready	25/02/2000	00:27:23	
-3.	Wrn Override All Sd	25/02/2000	00:27:21	
-4.	Gen-set Stop	25/02/2000	00:27:19	
-5.	Loaded	25/02/2000	00:27:18	
-6.	Soft Load	25/02/2000	00:27:12	
-7.	Sd GCB Fail	25/02/2000	00:27:12	

Below the table, the control bar contains: '1st Row/Col', '1x', a warning icon, a refresh icon, and a home icon.

Image 5.34 : History page overview

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

The screenshot shows a 'History' page with a dialog box titled 'Fls Fuel Level' overlaid on the table. The dialog displays various parameters and their values for a specific record.

Fls Fuel Level	
Date	12/03/2000
Time	02:15:51
RPM	0
Generator kW	0
Generator kVAr	0
Generator Power Factor	0.00
Generator Load Character	
Generator Frequency	0.0
Generator Voltage L1-N	0

Below the dialog, the control bar contains: '1st Row/Col', '1x', a warning icon, a refresh icon, and a home icon.

Image 5.35 : History page – Item detail dialog

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

IMPORTANT: Each controller unit supports the specific number of history records. E.g. controller IntelliMains 510 supports 500 history records. Default configuration consists of 33 columns. Maximal column amount is approximately 100 columns based on the type of the observed value.

5.3.6 Trends

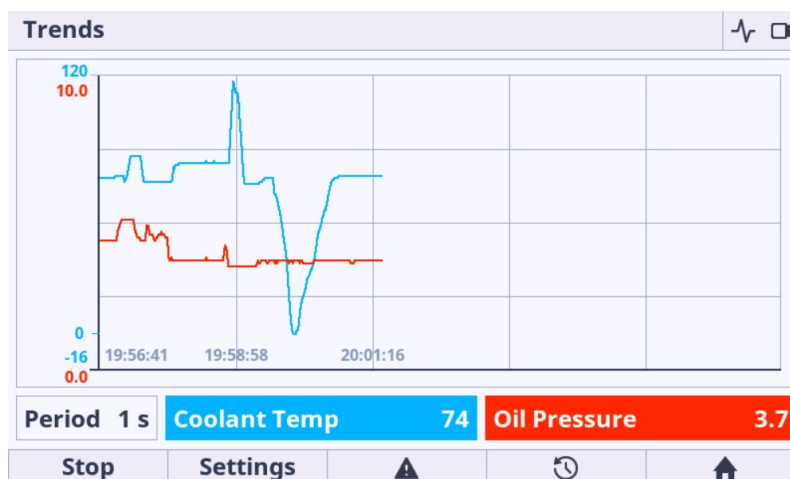


Image 5.36 : Trends page overview

The Trends page is divided on to 3 main blocks :

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

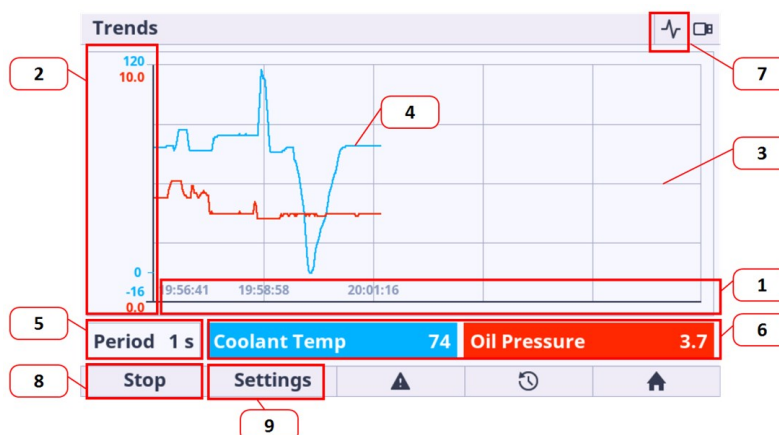


Image 5.37 : Trends page description

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

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

Trends settings

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

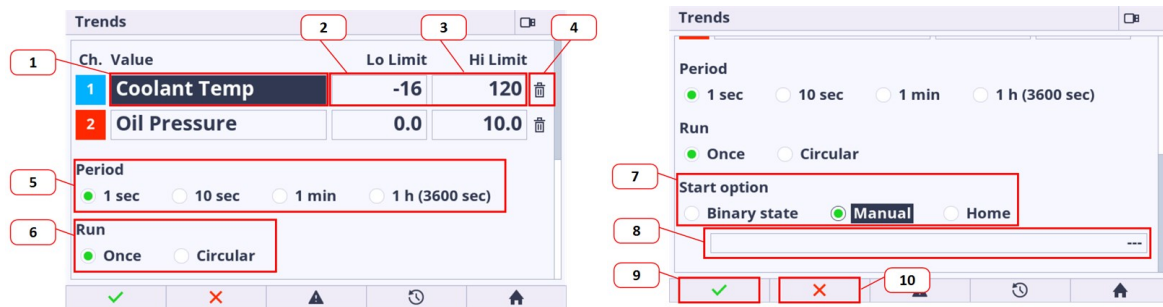


Image 5.38 : Trends page settings overview

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

9. **Acknowledgment button** – Pressing the user button 1 (Confirm) the settings are saved.
10. **Cancel button** – Pressing the user button 2 (Cancel) the settings are canceled and the main trends page is displayed without any change of the trends configuration.

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

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

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

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

5.3.7 Values

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

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

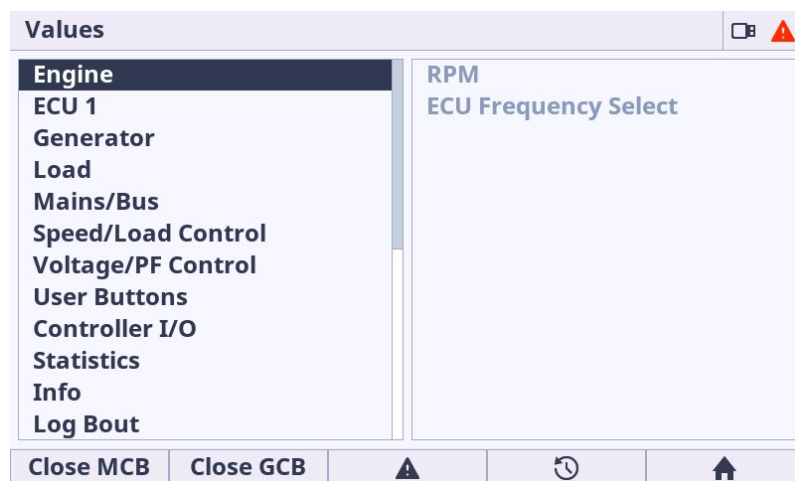


Image 5.39 : Values screen overview

5.3.8 Administration

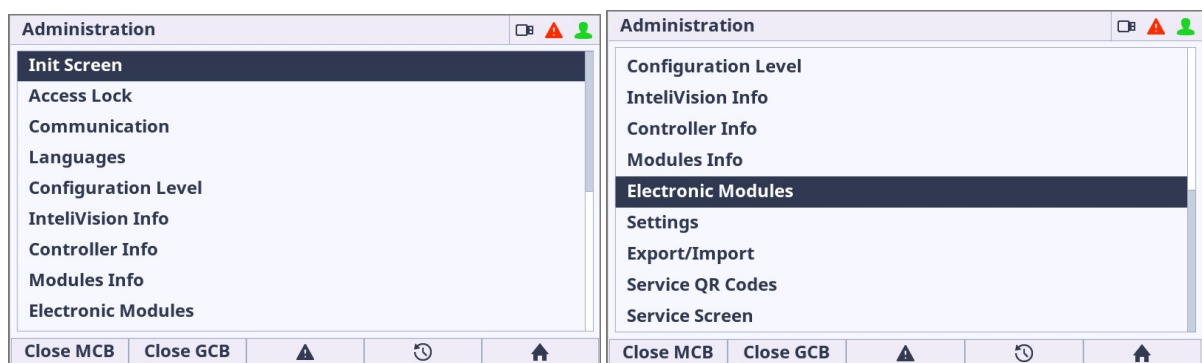


Image 5.40 : Administration Screen Overview

Init screen

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

I'm manageable
remotely

websupervisor.net

Image 5.41 : Init screen overview

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

Controller Info

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

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

- > Integrated Color Display unit
- > Controller unit
- > Configuration

ControllerInfo			
Name	Value		
ICD HW version	1.0.0.900		
ICD SW version	1.0.0.900		
ICD bootloader version	0.0.0.0		
ID String	InteliGen-500-1.0.0.20		
Software version	1.0.0.20		
Serial number	FF110339		
Controller type (HW)	21		
Application type (HW)	2		
Open MCB		Close GCB	

Image 5.42 : Administration Page – Controller Info

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

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

Modules Info

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

- Plug-In modules
- CAN peripheral extension modules



Modules Info			
Module name	HW ver.	SW ver.	Address

Image 5.43 : Administration Page - Modules Info

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

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

Electronic Devices

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



Electronic Devices			
ID	Module name	Device Address	Contr. Addr.
1	ECU 1	5	1
2	Modbus Master		8

Image 5.44 : Administration Page – Electronic Devices

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

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

Settings

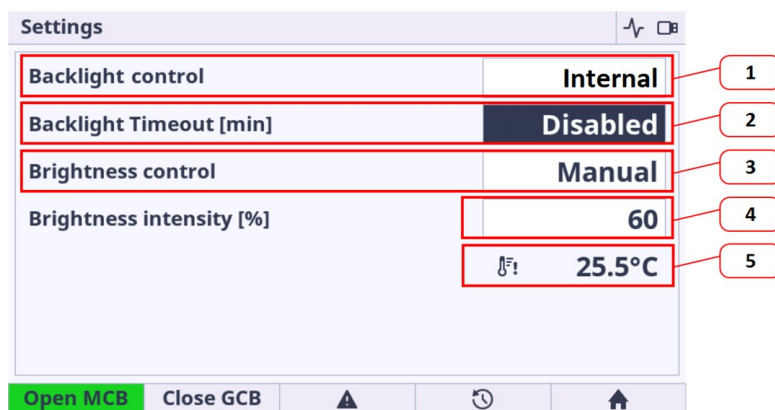


Image 5.45 : Administration Page – Settings

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

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

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

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

Languages

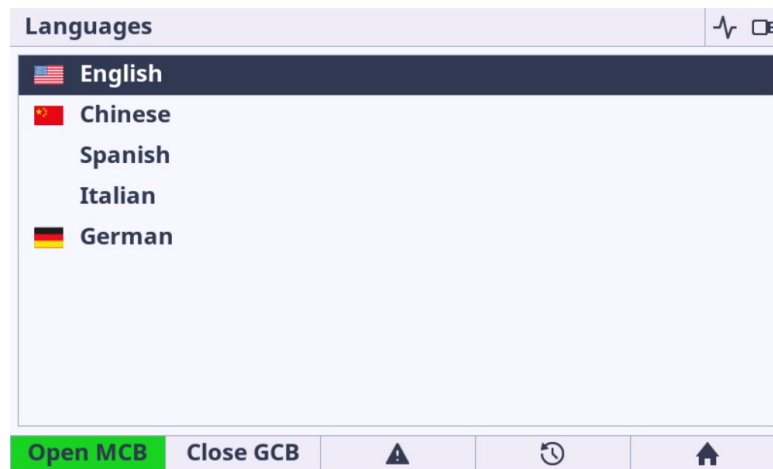


Image 5.46 : Administration Page – Languages

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

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

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

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

Configuration Level

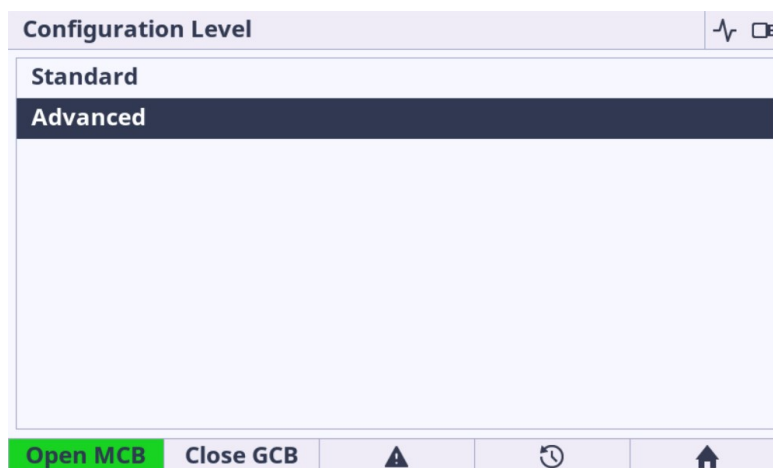


Image 5.47 : Administration Page – Configuration Level

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

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

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

Export / Import

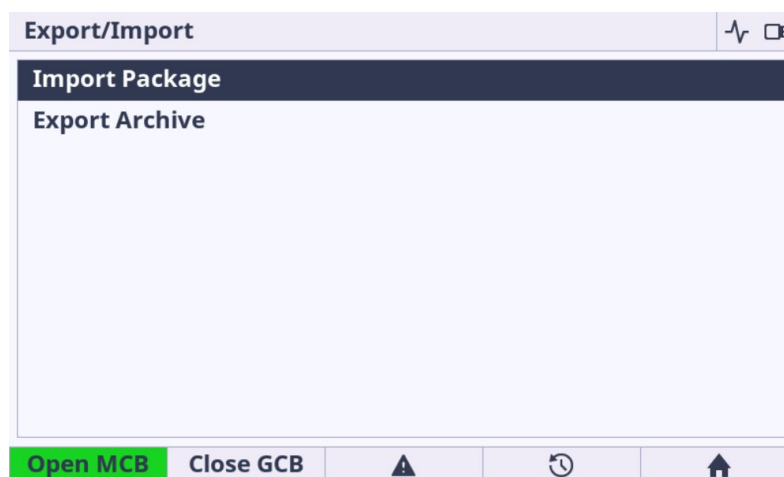
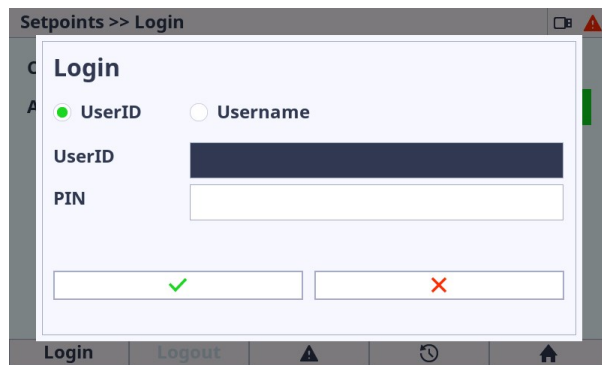


Image 5.48 : Administration Page – Export & Import

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

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



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

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

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

Imported File selection

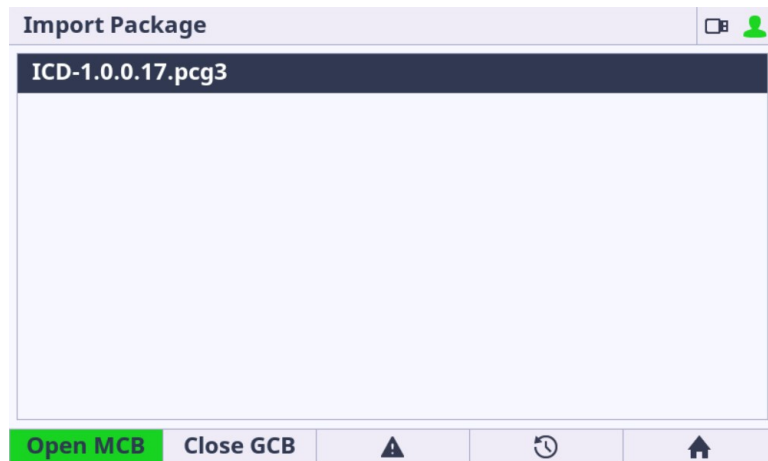


Image 5.49 : Administration Page – Export & Import - File selection

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

Import process




Import Package				
Name	Actual	Package		
HMI Logo	N/A	N/A		
HMI Fonts	1.0.0.0	1.0.0.0		
HMI Images	1.0.0.5	1.0.0.5		
HMI Firmware	1.0.0.900	1.0.0.17		
HMI Service screen	N/A	N/A		

Image 5.50 : Administration Page – Export & Import – Import process

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

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

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

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

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

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

Note: If the import process fails try the import process again.

Note: If the import process fails try to create new package file using IntelliConfig.

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

Service QR Codes

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

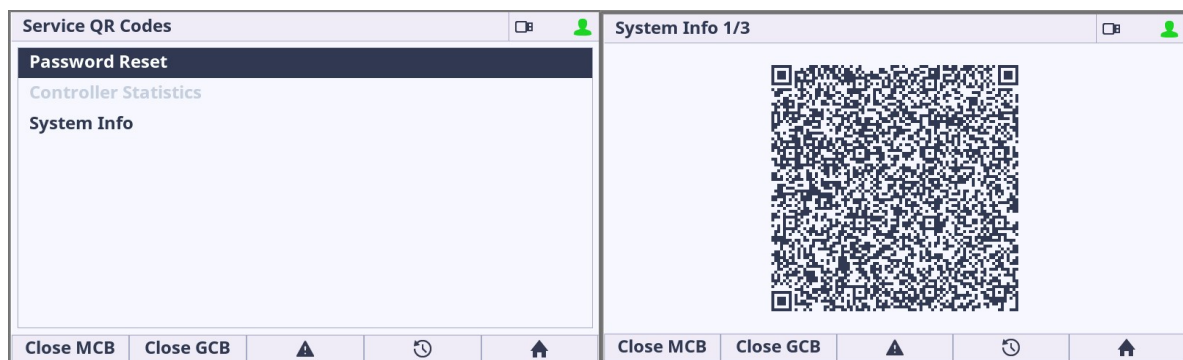


Image 5.51 : Administration Page – Service QR Codes

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

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

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

Service screen

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



Need technical support ?
Please contact your local distributor.

Image 5.52 : Service screen overview

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

5.3.9 Quick help

🔍 back to Table of contents

Logging in/off to the Controller

The user is able to log in/off to/from the controller via the menu Passwords in Setpoint page.

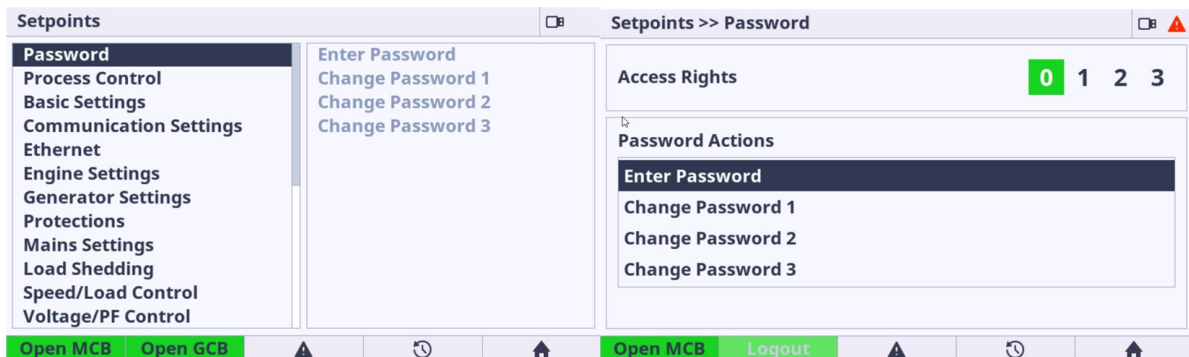


Image 5.53 : Password menu

1. Current Access Rights are shown on the top of the page.
2. Press the button on item Enter Password, the Password dialog will appear.

3. Insert the correct password. If the password is not correct, the user is informed about it. Be aware there is a brute force algorithm protection implemented.
4. The icon (user) in the top status bar turns green when the user is logged in.

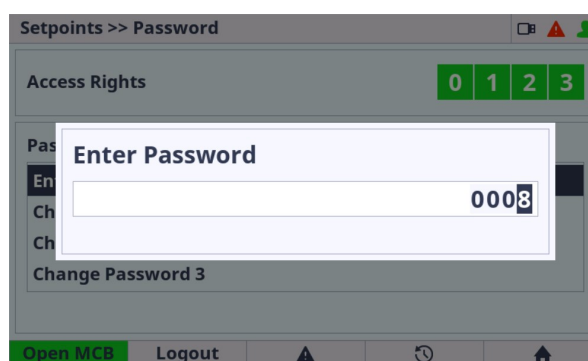


Image 5.54 : Password dialog

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

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

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

Important values

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

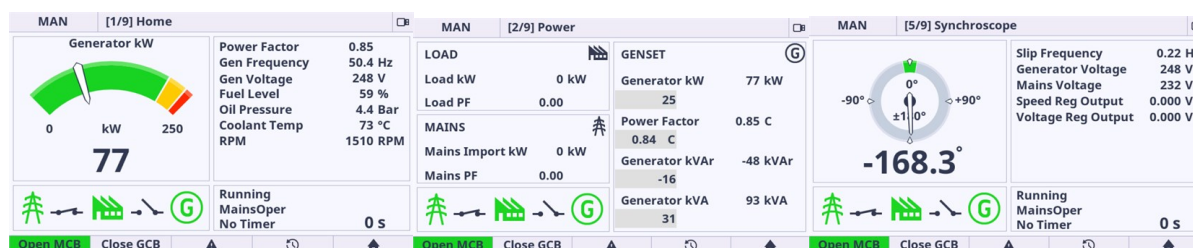


Image 5.55 : Important values

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

Controller mode change

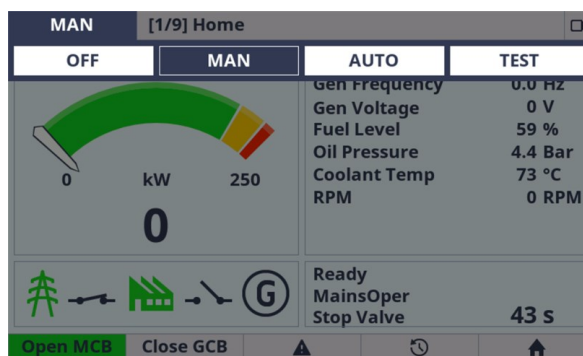


Image 5.56 : Controller mode change

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

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

Password change

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

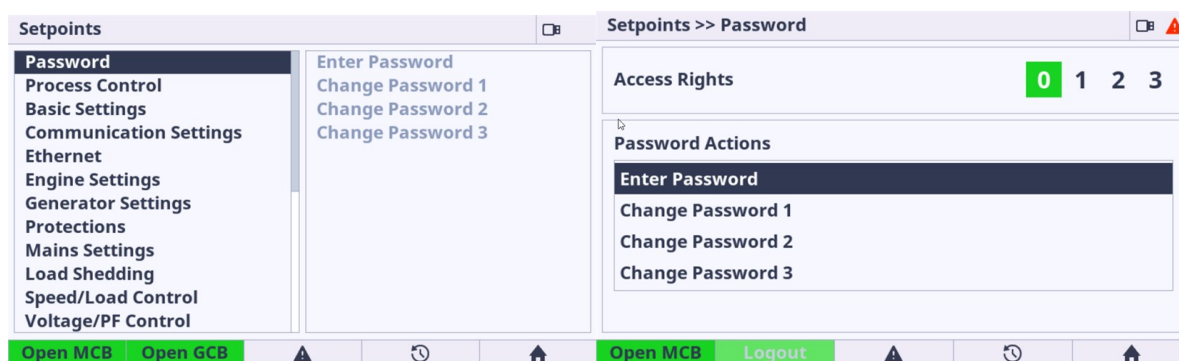


Image 5.57 : Password menu

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

Display brightness settings

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

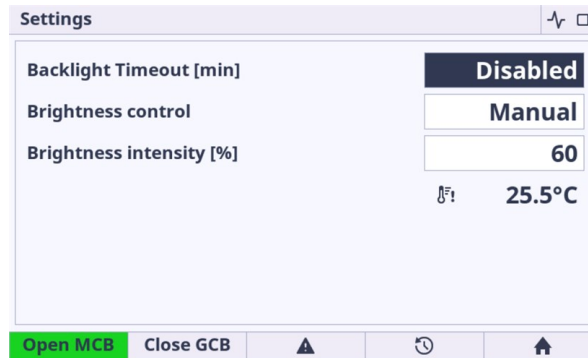


Image 5.58 : Display brightness settings

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

Brightness control

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

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

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

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

State messages

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

[!\[\]\(d0262bbe9d2356661a2e89321dfcc781_img.jpg\) back to Quick help](#)

Hints

UI Position	Issue	Hint / Description
StartUp Screen	Detecting main CU failed	<ol style="list-style-type: none"> 1. Download the latest FW from the ComAp webpage. 2. Import or reimport the newest ICD firmware.
StartUp Screen	Not compatible application branch in CU	<ol style="list-style-type: none"> 1. Download the latest FW from the ComAp webpage. 2. Import or reimport the newest ICD firmware.
StartUp Screen	Firmware is corrupted	<ol style="list-style-type: none"> 1. Import or reimport the newest ICD firmware.
StartUp Screen	Unsupported configuration format	<ol style="list-style-type: none"> 1. Import the newest ICD firmware. 2. Upgrade the controller firmware to the newest version.
StartUp Screen	Unsupported screen format	<ol style="list-style-type: none"> 1. Import the newest ICD firmware. 2. Upgrade the controller firmware to the newest version. 3. Check if there is at least one language in configuration using IntelliConfig.
StartUp Screen	Wrong configuration content	<ol style="list-style-type: none"> 1. Check the controller configuration using IntelliConfig Tool. 2. Try to rewrite the controller configuration.
StartUp Screen	Controller unreachable	<ol style="list-style-type: none"> 1. Check if the expected controller is online
StartUp Screen	Controller identification timeout	<ol style="list-style-type: none"> 1. Double check the wiring. 2. Double check all the communication parameters. 3. Double check the missing or wrong Access Code in Communication settings screen.
StartUp Screen	Connecting / Connected (with IntelliGen 500)	Connecting and connected state are marked red because at that moment the user is not logged in yet. Login procedure is automatic to IntelliGen 500 controller on StartUp screen (user with access rights 0 is always logged in). Due to this fact the connecting and connected state are the transition states only on StartUp screen.
Metering Screens	Adjustment	The metering screens are adjustable using the Screen Editor (in IntelliConfig). See chapter Screen Editor for more information. The Screen Editor tool also has its own manual.
Administration	Access to administration	Administration screens is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.
Init Screen Service Screen	Adjustment	Both screens are adjustable only in Integrated Color Display unit. The feature is not available in IntelliVision 5.2 1.0.0.
Bottom Statusbar	Inactive Buttons	Inactive buttons are visually indicated as grayed button. It means that the button is not available for any reason (e.g. password protected button).
Alarmlist	Buttons Function	Alarm reset button confirms all the unconfirmed alarms stored in controller and resets the horn. Horn reset button resets only the horn.
Alarmlist	Automatic Jump	If the actual GUI position is Alarmlist page and there is at least one unconfirmed alarm in the Alarmlist the jump to the home metering screen and backlight timeout are ignored.

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

5.4 General Functions

5.4.1 Alarm Management	100
5.4.2 AMF Function	102
5.4.3 Breaker Control	104
5.4.4 Connecting To Load	107
5.4.5 Control Groups	112
5.4.6 Crash Dump	113
5.4.7 Distributed Power Management Signals	114
5.4.8 Electric state machine	119
5.4.9 Event History	121
5.4.10 Exercise Timers	123
5.4.11 Firewall	130
5.4.12 Forced Value	131
5.4.13 I/O Configuration	132
5.4.14 Load Shedding	134
5.4.15 Mains Decoupling Protections	137
5.4.16 Mains Import Measurement	138
5.4.17 Multi soft start	139
5.4.18 Operating Modes	139
5.4.19 Output Control – Frequency/Load	141
5.4.20 Output Control - Voltage/PF	143
5.4.21 Parallel To Mains Operation	144
5.4.22 Peak shaving	152
5.4.23 PLC - Programmable Logic Controller	152
5.4.24 Power Formats And Units	164

5.4.25 Power Management	165
5.4.26 Protections	185
5.4.27 Pulse Counters	194
5.4.28 Regulation Loops	195
5.4.29 Sensor Curves	196
5.4.30 Soft unload	198
5.4.31 System Start/Stop	199
5.4.32 User Buttons	199
5.4.33 User management and data access control	201
5.4.34 User Setpoints	206
5.4.35 Voltage Phase Sequence Detection	208

🔍 back to Controller setup

5.4.1 Alarm Management

Alarms purpose is to indicate occurrence of unwanted situation such as unexpected opening of breaker, generator overvoltage etc. But in certain situations, we use alarms as a way to visualize information that affects current behavior of the controller.

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

- One alarm of level 1 and one alarm of level 2 can be assigned to each binary input
- Multiple protections can be assigned on each analog input.
- There are also **Controller integrated protections (page 102)** with **Fixed Protection States (page 600)**.
- Each alarm is written to the **Alarmlist (page 102)**.
- Each alarm causes a record to be written into the history log.
- Each alarm activates the Alarm and Horn output.
- Each alarm can cause sending of a SMS message or an email.

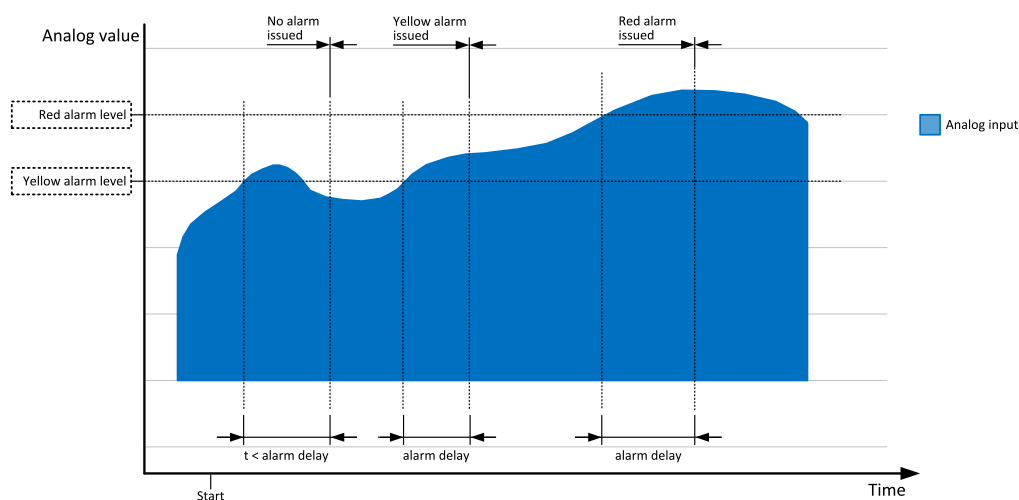


Image 5.59 Analog input alarm evaluation principle

Alarm states

An alarm can have following states:

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

*Sd ECU Communication Fail	Unconfirmed inactive alarm lvl 2
*ECU FC: 029953 (07501h) FMI:0; OC:0; ADR:0	Unconfirmed active ecu alarm
*ECU FC: 037888 (09400h) FMI:0; OC:0; ADR:0	Unconfirmed inactive ecu alarm
*Wrn Fuel Level	Unconfirmed inactive alarm lvl 1
*Wrn Coolant Temp	Unconfirmed active alarm lvl 1
Sd DISTIN 03	Confirmed active alarm lvl 2

Image 5.60 Alarm List

Visual interpretation of alarm is decided by terminal side. Commonly for active alarms whole row background is colored (yellow/red/blue). Inactive alarms have transparent background color and text is colored (yellow/red/blue)

Remote alarm messaging

The controller can send emails at the moment when a new alarm appears in the **Alarmlist** (page 102) or new event is written in **Event History** (page 121). The message will contain a copy of the **Alarmlist** (page 102) or reasons from **Event History** (page 121). To enable this function, adjust setpoints **MPR Message** (page 431), **Wrn Message** (page 431), or **Event Message** (page 431) to ON. Also enter a valid email address to the setpoints, **E-mail Address 1** (page 427), **E-mail Address 2** (page 427), **E-mail Address 3** (page 427), or **E-mail Address 4** (page 428).

The list of all supported terminals shows the table below:

Terminal	Event email	Warning email	BOC email	Mains Protection email
RS485	NO	NO	NO	NO
USB	NO	NO	NO	NO
Ethernet	YES	YES	YES	YES

Alarmlist

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

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

Alarmlist contains three types of alarms:

- > Controller built-in alarms
- > User configured alarms
- > ECU alarms

Controller integrated protections

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

User configured protections

An alarm message in the alarmlist begins with a prefix, which represents the protection type (e.g. Wrn, Al, Hst, ALI). Protection type and alarm name are selected by user during the **Configuration of protections in IntelliConfig (page 189)**. Then the alarm name follows.

ECU alarms

The ECU alarms are received from the Electronic Control Unit. 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 ECU fault codes list must be used to determine the reason.

5.4.2 AMF Function

The "AMF function" represents the automatic start in the event that the mains have failed and stop after the mains has been restored. The automatic start can be enabled or disabled by setpoint **AMF Start (page 286)** and can be affected by binary inputs **AMF START BLOCK (PAGE 536)** or **MAINS FAIL BLOCK (PAGE 545)**.

IMPORTANT: The AMF function works only in AUTO mode.

Related setpoints are:

AMF Timers

- > AMF Start (page 286)
- > Emergency Start Delay (page 287)
- > Mains Return Delay (page 287)
- > MCB Close Delay (page 288)

AMF Settings

- > Return From Island (page 288)
- > Return to Mains in TEST Mode (page 289)
- > MCB Logic (page 289)
- > MCB Opens On (page 290)

Mains failure detection

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

- The mains voltage is out of the limits given by the setpoints **Mains Undervoltage (page 282)** and **Mains Overvoltage (page 281)** for a time period longer than **Mains Undervoltage Delay (page 283)** respectively **Mains Overvoltage Delay (page 281)**.
- The mains voltage unbalance is out of limit given by setpoint **Mains Voltage Unbalance (page 284)** for a time period longer than **Mains Voltage Unbalance Delay (page 284)**.
- The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 285)** and **Mains Overfrequency (page 285)** for a time period longer than **Mains <>f Delay (page 286)**.
- Alarm **ALI Mains Ph Rotation Opposite (page 671)** is active.

Healthy mains detection

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

- The mains voltage is within the limits given by the setpoints **Mains Undervoltage (page 282)** and **Mains Overvoltage (page 281)**.
- The mains voltage unbalance is within the limits given by the setpoint **Mains Voltage Unbalance (page 284)**.
- The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 285)** and **Mains Overfrequency (page 285)**.
- Alarm **ALI Mains Ph Rotation Opposite (page 671)** is not active.

The AMF procedure

IMPORTANT: The controller has this behavior only in AUTO mode and partly in TEST mode.

When the mains failure is detected and **AMF Start (page 286)** = Enabled, the following steps are performed:

- If the setpoint **MCB Opens On (page 290)** is set to Mains Fail, the MCB is opened.
- The timer for automatic start of the System **Emergency Start Delay (page 287)** begins to count down.
- If Gen-sets are not in parallel with the mains (MCB or MGCB is opened) **#System Start Delay (page 317)** is count down on Gen-set controllers, otherwise the timer is skipped after 1 second count down.
- After the timers has elapsed, the System is started.

Note: The automatic start of the System due to AMF function can be disabled by the binary inputs **AMF START BLOCK (PAGE 536)** or **MAINS FAIL BLOCK (PAGE 545)**.

- If the setpoint **MCB Opens On (page 290)** is set to Gen Run / BUS Voltage, the MCB is opened once the Gen-set / BUS voltage and frequency are within limits.
- After **Open Transfer Min Break (page 339)** elapses, the MGCB and MGCB (in case of MGCB application) is closed and the System begins to supply the load.
- After the mains is restored to normal, the timer **Mains Return Delay (page 287)** begins to count down.
- Transition of load back to mains is adjusted via setpoint **Transfer Gen To Mains (page 341)**. Behavior of transition is also affected by binary inputs **FORCE ISLAND (PAGE 537)**, **FORCE PARALLEL (PAGE 538)** and **REMOTE START/STOP (PAGE 560)**. After the transition the Gen-set goes to cooling.
- If Gen-sets are not in parallel with the mains (MGCB is opened) **#System Stop Delay (page 317)** is count down on Gen-set controllers, otherwise the timer is skipped after 1 second count down. After that the Gen-set goes to cooling.

- If mains fails during the transition the System takes the load again. The MGCB s and MGCB (in case of MGCB application) are closed again if gen-sets are in cooling.
- The AMF procedure ends when the System is stopped.
- If AMF procedure is activated during TEST mode the System is normally loaded and once the mains is restored the transfer of load to mains is defined by the setpoint **Return to Mains in TEST Mode (page 289)**.

5.4.3 Breaker Control

The following power switches are controlled by the controller:

- The Master Mains Circuit Breaker or contactor – MGCB
- The Mains Circuit Breaker or contactor – MCB (see the chapter **MCB special requirements (page 107)**)

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

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

Breaker control outputs

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

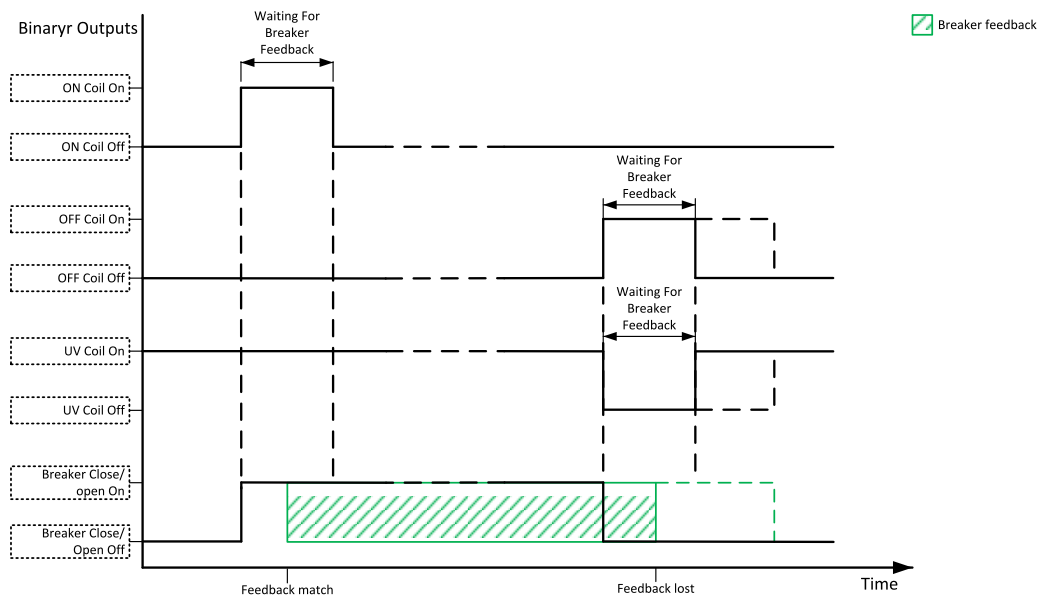


Image 5.61 Breaker control outputs

Breaker fail detection

Breaker fail detection is based on binary output breaker close/open comparing with binary input breaker feedback. If breaker feedback is not configured and breaker control mode is internal, the alarm will be activated always because the change of the breaker close/open will not be followed by breaker feedback.

There is an exception for the MCB breaker. If the breaker feedback indicates the MCB has unexpectedly opened without any command given by the breaker close/open the controller will accept it and following behavior will depend on mains condition. The MCB breaker stay opened if mains fails or is closed if mains is healthy.

There are three different alarm types, see following diagrams.

- When binary output breaker close/open is in steady state and breaker feedback is changed the breaker fail is detected immediately without delay and alarm **Wrn MGCB Fail (page 660)** is issued. The alarm is issued also after 500 ms when there is mismatch of LBI **GCB FEEDBACK (PAGE 552)** and LBI **GCB FEEDBACK NEGATIVE (PAGE 553)**. Except opening of MCB.

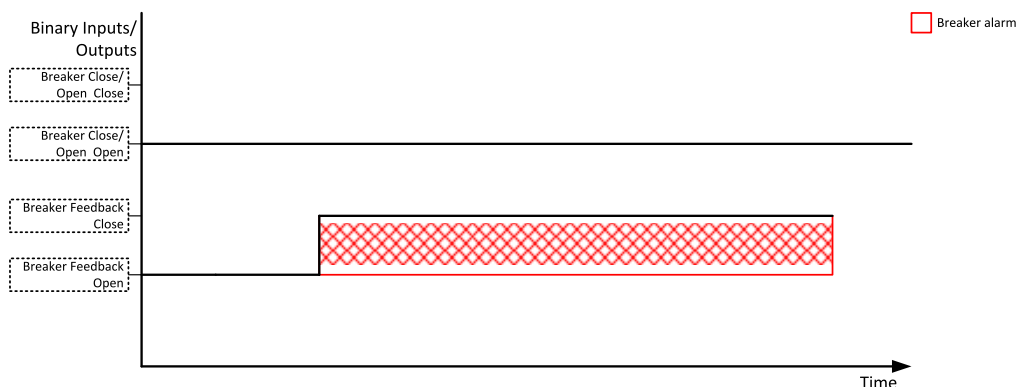


Image 5.62 Breaker fail - breaker close/open in steady position - open

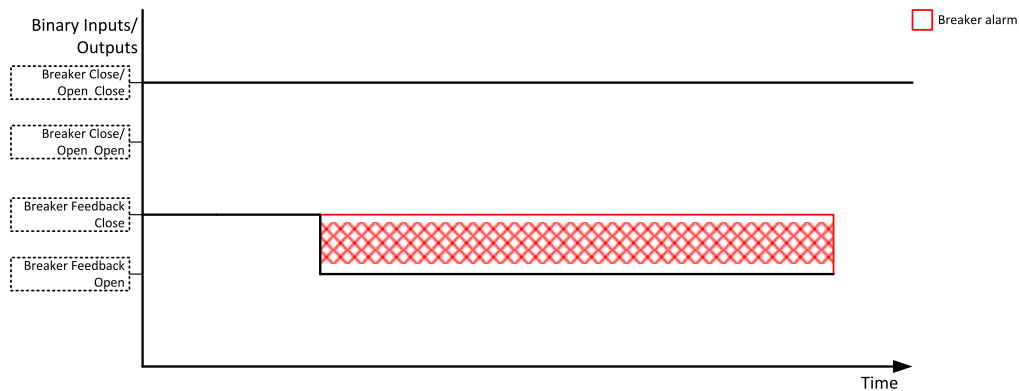


Image 5.63 Breaker fail - breaker close/open in steady position - close

- When binary output breaker close/open is opened, there is 2 seconds waiting time for feedback. If feedback doesn't match, the alarm **Wrn MGCB Fail To Open (page 661)/Wrn MCB Fail To Open (page 659)** is issued.

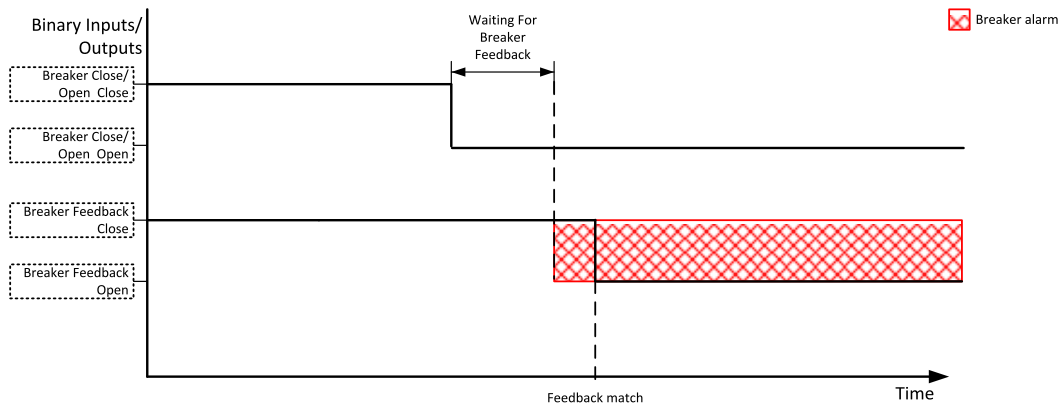


Image 5.64 Breaker fail - breaker close/open opens

- When binary output breaker close/open is closed there is 2 seconds waiting time for feedback. If the feedback doesn't match the output, close/open is opened and closed again after delay defined by setpoint **Delay Between Closing Attempts (page 256)**. If feedback doesn't match after second try and 2 seconds delay elapsed, the alarm **Wrn MGCB Fail To Close (page 661)/Wrn MCB Fail To Close (page 658)** is issued.

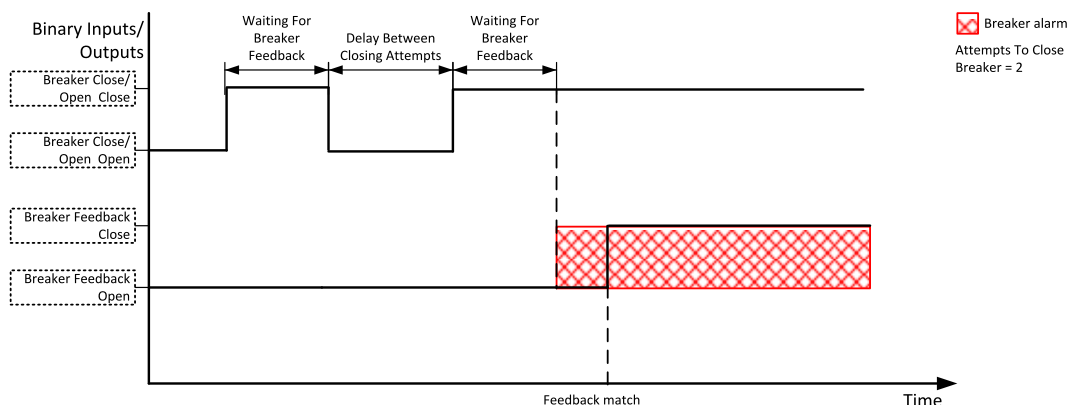


Image 5.65 Breaker fail - breaker close/open closes

Note: In case of using both feedbacks (standard and negative), both of them have to be in correct position, otherwise breaker fail is issued after 500 ms.

- A new alarm **ALI GCB Closing Is Blocked (page 1)** is activated in case Setpoint **GCB Control Mode (page 254)** is set to **Internal** and any of following generator protections are switched to Disabled
 - Generator <f Protection
 - Generator >f Protection
 - Generator <V Protection
 - Generator >V and >>V Protection (both overvoltage must be disabled)
 - Short Circuit Protection

MCB special requirements

- If a contactor is used on the MCB position, it is recommended that the wiring be provided in such a way that the contactor will be normally closed and will open if the logical binary output **MCB CLOSE/OPEN (PAGE 579)** closes. This behavior is called "negative logic" and can be adjusted by the setpoint **MCB Logic (page 289)**. The negative logic will prevent accidental opening of the MCB when the controller is switched off.
- If a contactor is used on the MCB position, it will open itself immediately after the mains have failed, because it will lose power for the coil. That is why the following adjustment is necessary to prevent triggering the **Wrn MCB Fail (page 657)** alarm: **MCB Opens On (page 290)** = Mains Fail.
- If a 230 V motor driven circuit breaker is used on the MCB position and an undervoltage coil is not fitted, it is not possible to open the breaker after the mains have failed, because there is no power for the motor drive until the System is started and providing voltage. Adjusting the setpoint **MCB Opens On (page 290)** = Gen Run will prevent triggering the **Wrn MCB Fail (page 657)** alarm.

5.4.4 Connecting To Load

Connecting To Dead Bus	107
Synchronization	108

Connecting to load depends on the state of **MCB FEEDBACK (PAGE 547)** and on the measured bus voltage. In case the Load is without power (bus voltage is below 2 % of nominal voltage and MCB is opened) the **Connecting To Dead Bus (page 107)** is applied, in other case the **Synchronization (page 108)** process is needed.

Connecting Mains to Load

Connecting to load depends on application, for MGCB application it depends on the state of **GCB FEEDBACK (PAGE 552)** and on the measured bus voltage. In case of MCB application depends only on measured bus voltage. In case the Load is without power (bus voltage is below 2 % of nominal voltage or MGCB is opened) the connecting to dead bus is applied, in other case the synchronization process (reverse synchronization) is needed. See more information about synchronization process in chapter **Synchronization (page 108)**.

Connecting To Dead Bus

MGCB

- The Bus (System) is connected to the Load by closing MGCB if Bus (System) voltage and frequency are within limits.

- Mains is connected to the Load by closing MCB if Mains voltage and frequency are within limits.

MCB

- There is no circuit breaker between the Bus (Gen-sets) and the Load. The Load is powered immediately from the Bus once Gen-sets are started (their MGCB are closed) or Bus is powered by another way.
- Mains is connected to the Load by closing MCB if Mains voltage and frequency are within limits.

Synchronization

Synchronization Process	108
Synchronization Types	109

Synchronization Process

Behavior of synchronization process depends on, which breaker is used for synchronization and on which **Controller mode (page 267)** is controller switched to.

It is possible to influence the behavior of the controller in MAN and AUTO mode and limit the process of synchronization. Following setpoints have influence to synchronization process:

Note: When the controller starts to synchronize and the main measuring screen is displayed, it will be automatically changed to the synchroscope screen for the entire duration of synchronization. The screen will also show **value Voltage Match 321** to inform you better about synchronization process. After synchronization the synchroscope screen is automatically changed back to the main measuring screen. It is also possible to change screens manually (arrows up and down) after displaying the synchroscope screen. In this case there is no automatic return to the main measuring screen after synchronization is finished.

Synchronization via MCB in AUTO mode for MGCB application

Bus synchronization to the Mains via Mains Circuit Breaker. If MGCB is closed everything is the same as for MCB application in AUTO mode.

- If there is Bus voltage present from another Mains and MGCB is closed, the MCB will be closed in case the setpoint **Mains Coupling (page 248)** is switched to ENABLE.
- If there is Bus voltage present from Gen-sets and MGCB is closed, the MCB will try to synchronize Gen-sets to Mains.
- If the Mains voltage or the Mains frequency gets out of the limits during synchronization, then the synchronization process is interrupted and can continue again when Mains parameters gets restored after **Mains Return Delay (page 287)**.
- If the Bus (Gen-sets) voltage or frequency gets out of the limits during the synchronization, the synchronization process continues until the Bus (Gen-sets) parameters fail is confirmed.
- If the MCB synchronization timeout gets elapsed the **Wrn Synchronization Fail (page 664)** protection gets active, M stays closed and synchronization is stopped.

Synchronization via MCB in MAN mode for MGCB application

Bus synchronization to the Mains via Mains Circuit Breaker. If MGCB is closed everything is the same as for MCB application in MAN mode.

- The behavior is exactly the same as in AUTO mode - but the synchronization does not start again automatically in case of Mains parameters gets out of limits and back. The breaker control button must be pressed again.

- When the MCB button is pressed during the synchronization, then the synchronization process is interrupted.

Synchronization via MGCB in AUTO mode

Bus synchronization to the Mains via Master Mains Circuit Breaker.

- If there is Bus voltage present from another Mains and MCB is closed, the M will be closed in case the setpoint **Mains Coupling (page 248)** is switched to ENABLE.
- If MCB is closed (Mains healthy), the M will try to synchronize Gen-sets to Mains only if the system start is activated (e.g. by the LBI **REMOTE START/STOP (PAGE 560)**, **REM TEST ON LOAD (PAGE 561)**).
- If the Mains voltage or the Mains frequency gets out of the limits during synchronization, then the synchronization process is interrupted and can continue again when Mains parameters gets restored after Mains Return Delay **Mains Return Delay (page 287)**.
- If the Bus (Gen-sets) voltage or frequency gets out of the limits during the synchronization, the synchronization process continues until the Bus (Gen-sets) parameters fail is confirmed.
- If the M synchronization timeout gets elapsed the **Wrn Synchronization Fail (page 664)** protection gets active, MCB stays closed and synchronization is stopped.

Synchronization via MGCB in MAN mode

Bus synchronization to the Mains via Master Mains Circuit Breaker.

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

🔍 back to Synchronization

Synchronization Types

There are two types of synchronization. Type of synchronization is adjusted via setpoint **Synchronization Type (page 347)**.

Phase Match

The phase match synchronization consists of voltage matching and frequency/angle matching. The maximum duration of synchronization is given by the setpoint **Synchronization Timeout (page 348)**. If the synchronization is not successful within this period of time, the alarm will be issued.

Slip Synchronization

The slip synchronizing is based on frequency/angle matching. The maximum duration of synchronizing is given by the setpoint **Synchronization Timeout (page 348)**. If the synchronizing is not successful within this period of time, the alarm will be issued.

The Bus frequency is regulated to match the Mains frequency + **Slip Frequency (page 350)** value and the window is set by setpoint **Slip Frequency Window (page 350)**. When the Bus frequency reaches (Mains Frequency + Slip frequency) value regulation loop is stopped (output is frozen at the actual value). If the Bus frequency remains inside the window for the time longer than setpoint **Dwell Time (page 349)** the controller will allow MGCB or MCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip Frequency (page 448)** and CB closing delay given by the setpoints **MGCB Latency (page 350)** or **MCB Latency (page 351)**). When the preclosing angle is reached the controller issues CB closing

command. The breaker will close and CB feedback confirms that to the controller. When the breaker is closed the controller goes to parallel and activates regulation loops again (parallel to Mains regulation loop).

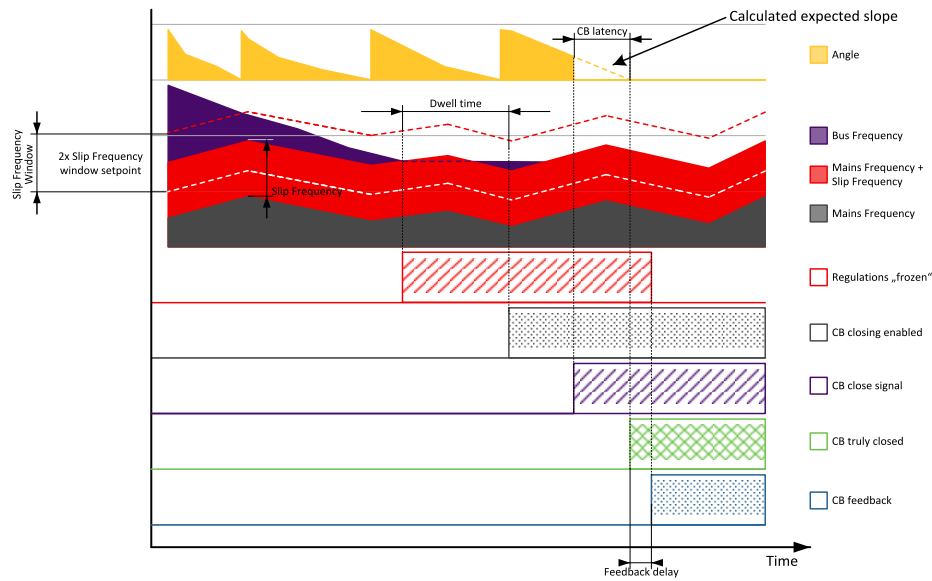


Image 5.66 Slip synchronization

Whenever the **Bus Frequency** (page 458) leaves off the **Slip Frequency Window** (page 350) (either because of **Bus Frequency** (page 458) or setpoint **Slip Frequency Window** (page 350) changes) the controller will reactivate frequency regulation loop and try to reach the target value again. The **Synchronization Timeout** (page 348) timer runs regardless of this while whole slip synchronization process is repeated. If the **Bus Frequency** (page 458) reaches the target frequency again the regulations are frozen and if the **Bus Frequency** (page 458) remains in the window for the time longer than setpoint **Dwell Time** (page 349) the controller will continue in the standard sequence as seen in the previous case. *If the **Synchronization Timeout** (page 348) elapses the controller will immediately stop synchronization and issue alarm .

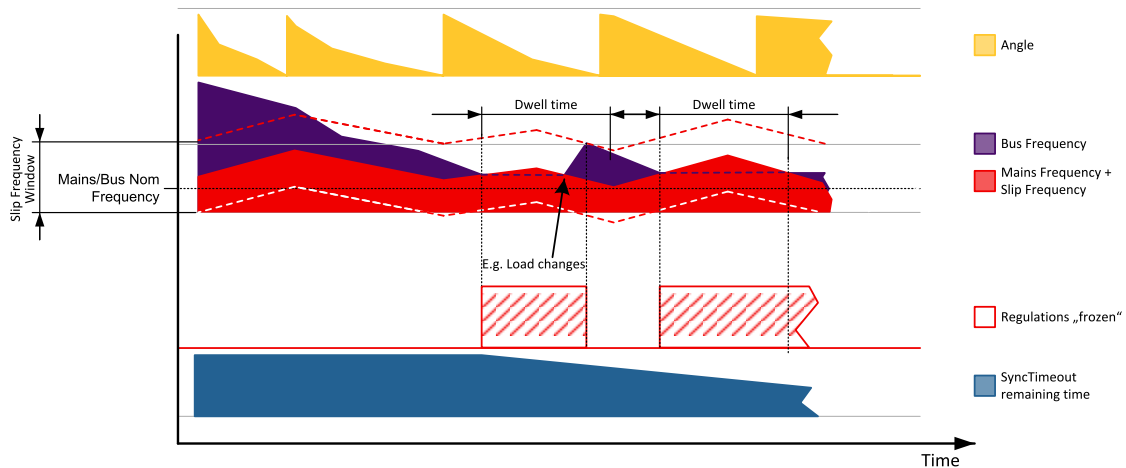


Image 5.67 Slip synchronization

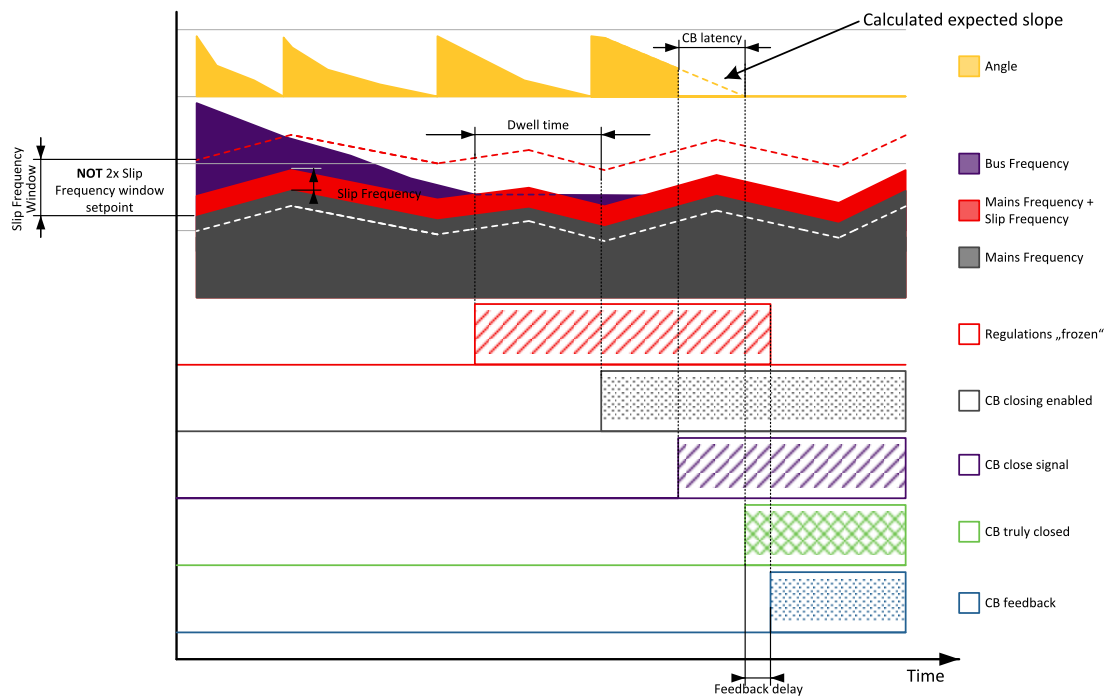


Image 5.68 Slip synchronization

Slip synchronization has a dead band. When the dead band is reached the frequency regulation is disabled. Once it is disabled it will be enabled again only when the frequency goes out of the slip frequency window. Dead band is introduced to allow the controller to detect the match.

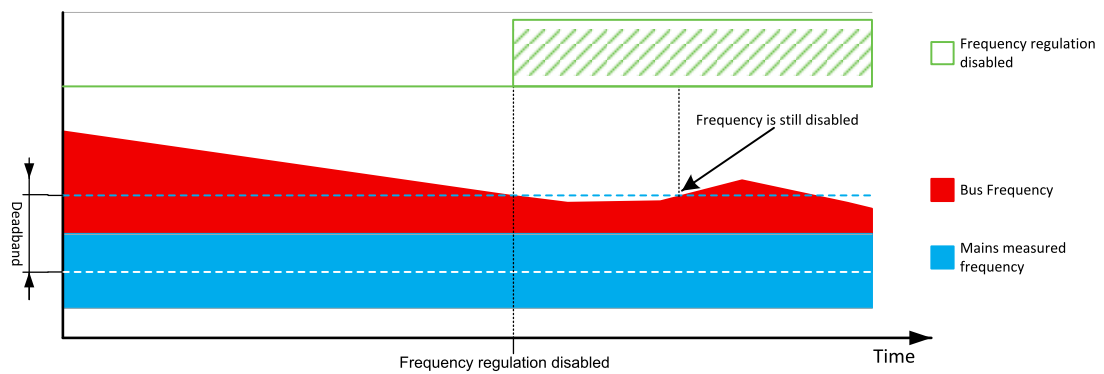
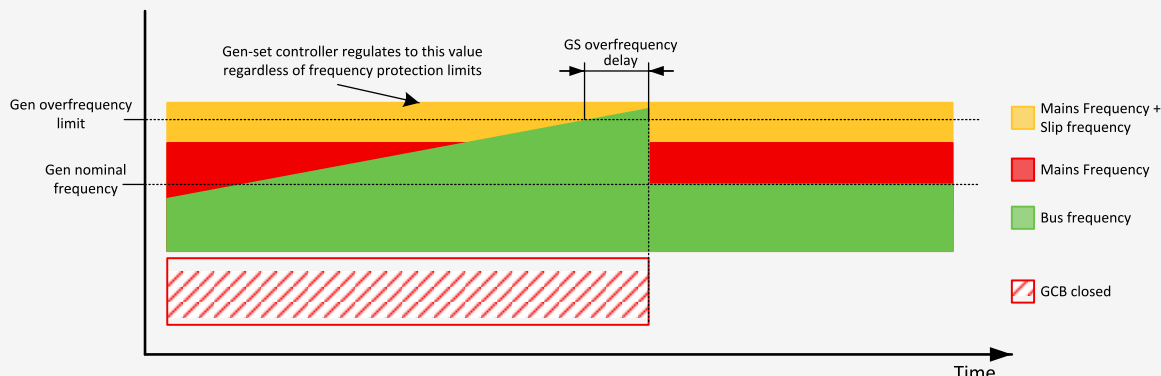


Image 5.69 Slip synchronization - deadband

Note: Due to the nature of this function it is possible that in limit cases the controller will regulate the Bus frequency outside of protection limits. Example: Mains frequency is high but within its protection limits (e.g. 50.9 Hz, limit is 51 Hz). **Slip Frequency (page 350)** is set to 0.5Hz. This will cause regulation loop of the controller can push the Bus frequency to 51.4 Hz and eventually the controller will issue overfrequency alarm. It is recommended to set the setpoint **Slip Frequency (page 350)** as low as possible that still enables successful synchronization. This minimizes the risk of this problem happening. Furthermore when slip synchronization is used it is recommended to set Mains Frequency protection limits to more rigid values than the Bus frequency protection limits. In this case the setpoint **Slip Frequency (page 350)** can be set to 0.1Hz and the Mains Frequency overfrequency protection limit is set to 50.9Hz instead of 51Hz. This will ensure that problematic state cannot be reached.



⬅ back to Synchronization

5.4.5 Control Groups

Note: This chapter is relevant for all ComAp controllers working in Multiple Island-Parallel operation.

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

- The group which the particular controller belongs to is adjusted by the setpoint **Control Group (page 337)**. Use the default setting 1 with all controllers, if there is no bus-tie breaker.
- The information which groups are currently linked together is being distributed via the CAN. Each controller can provide information about one BTB breaker. The breaker position is detected by the input function *GroupLink* (i.e. this input is to be connected to the breaker feedback).
- The two groups which are connected together by the BTB, are defined with parameters **Group Link L (page 337)** and **Group Link R (page 338)**. BTB controller sends via **CAN2 (page 17) (Communication peripherals (page 17))** information that controllers from groups *Group Link L* and *Group Link R* are linked together.
- If external BTB is used (there is no CAN communication between external BTB and other controllers) or in case of redundant information about BTB position is required, the *Group link* function in any ComAp controller can be used. If the LBI **GROUP LINK (PAGE 542)** is activated the controller will send information to all controllers on CAN that the groups defined by setpoints **Group Link L (page 337)** and **Group Link R (page 338)** are connected together.
- A history record is written into every controller that is affected by the group link whenever the BTB is closed / opened (control groups are linked / unlinked).

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

- All controllers in linked groups cooperate with each other and perform Power Management, Load sharing and VAr sharing together. The mentioned functions are performed independently in each group, when the groups are separated.

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

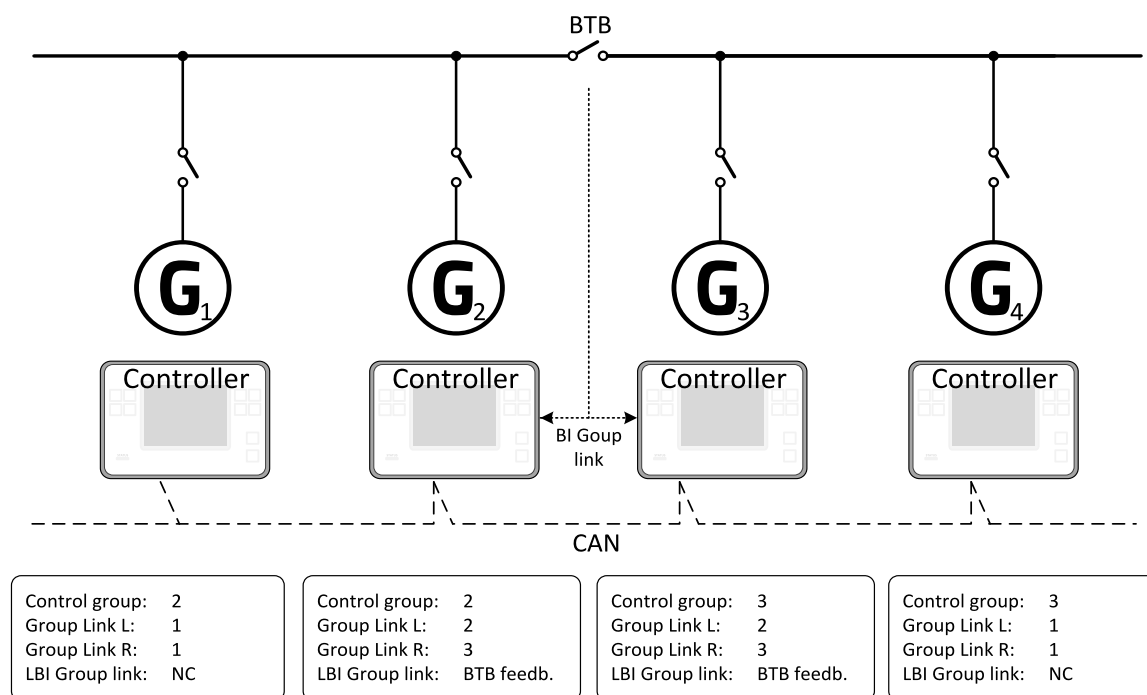


Image 5.70 Example of control groups


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

5.4.6 Crash Dump

Crash dump is new functionality which allows controller to collect and store important information related to controller's failure before the controller is restarted. These information are stored in controller's nonvolatile memory for later evaluation and easier solution of a problem.

Collecting crash dump

To collect Crash Dump from the controller, you need to connect to the controller using IntelIConfig either via **USB** (page 59) or **Ethernet** (page 60).

- Log in as user with administrator rights.
- In top right corner click wrench icon  and select "Collect logs".

- IntelliConfig begins to collect Crash Dump data from the controller and also adds its own crash logs. User is informed about the ongoing process in IntelliConfig, before prompt to save *.zip file appears.

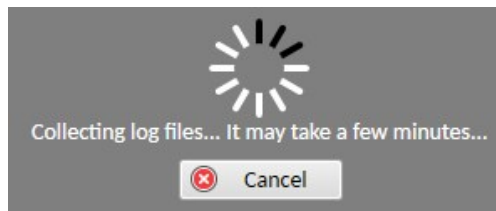


Image 5.71 Crash Dump Collection

Note: It is recommended to use connection via Ethernet to reduce time required for data collection.

IMPORTANT: This action may take significantly long period.

Contacting TSUP with crash dump

After collection of Crash Dump, you shall contact TSUP. To help resolve your issue:

- Send description of the issue from your side of view
- Send approximated time of the event
- Send Crash Dump data collected in *.zip file

5.4.7 Distributed Power Management Signals

Note: This chapter is relevant for all ComAp controllers working in Multiple Island-Parallel operation.

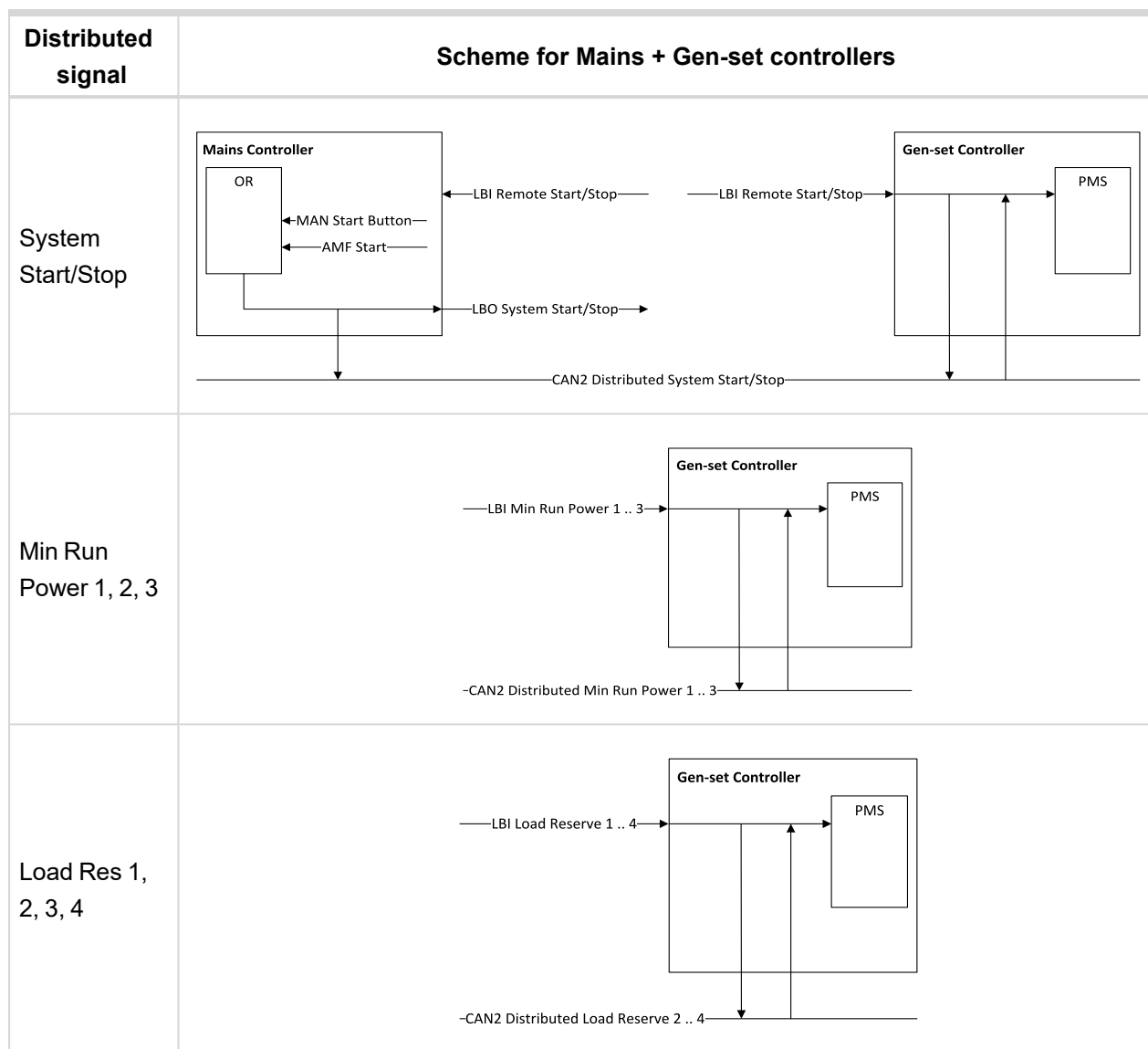
Signals which are considered to be visible the same way for every controller on CAN. Synchronization of these signals is the internal part of the Power management function.

Basic principle:

- For every signal, there is a LBI with the same function as the signal.
- If the LBI is not configured on any input (physical binary, virtual in PLC etc.), its value is taken from CAN and the value is not being shared back on CAN.
- If the LBI is configured, its value is taken from the input and the value is shared on CAN.
 - The relevant function is activated only by the state of the signal, which is configured on LBI. That means that function cannot be activated by the state of relevant CAN signal.
- In case of the collision, there is a predefined behavior. If any controller with configured LBI receives a logical "1", it then activates the signal on CAN.
- Distributed Power Management Signals are shared only in the scope of logical **Control Groups (page 112)**. If you merge Control Groups together (**GROUP LINK (PAGE 542)**), signals are applied in both groups.
- The BTB controller is used to connect the groups together. When the Bus Tie Breaker is closed the BTB informs appropriate controllers that their groups has been connected.

Note: For example see chapter *System Start/Stop (page 199)*.

Distributed signal	Description for Mains controller	Description for the Gen-set controller (MINT application)
System Start/Stop	<ul style="list-style-type: none"> ➤ LB1 REMOTE START/STOP (PAGE 560) is the request to start the group (part of the system). It is shared to SYSTEM START/STOP (PAGE 591) and distributed through CAN2 (page 17) or Communication peripherals (page 17) to the controllers in the same group. 	<ul style="list-style-type: none"> ➤ Accepted only in controllers belonging to the same logical group. ➤ Accepted only in controllers where the Distributed signal is not configured. ➤ If the Distributed signal is configured to any binary input (physical or virtual), the signal is automatically shared to other controllers via CAN2 (page 17) as CAN Distributed signal. ➤ If distributed signal is shared on CAN2 (page 17) by more sources, it is accepted from any of them.
Min Run Power 1, 2, 3	N/A	
Load Reserve 1, 2, 3, 4		
MCB Feedback	<ul style="list-style-type: none"> ➤ The mains controller set this signal on whenever there is a closed path between the Mains and the Load side. ➤ The signal is shared only inside the logical group (or interconnected logical groups). 	<ul style="list-style-type: none"> ➤ Accepted only in controllers belonging to the same logical group as the source Mains Controller only. ➤ Accepted only in controllers where the Distributed signal is not configured.



Sharing of multiple Logical Binary Input (LBI) functions is critical for power management system operation, because several power management functionality require simultaneous activation of LBI functions in controllers, which are involved in power management operation. It can be done either automatically using **CAN2 (page 17)** bus link between controllers or using dedicated LBI functions.

These LBI functions are shared automatically:

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

Note: *InteliMains 510 controller activates the System Start/Stop signal in case of all system activations (e.g. AMF, TEST Mode, ...)*

The following rules applies to the automatic sharing of the selected signals between Mains / Gen-set controllers.

1. LBI state is automatically shared via **CAN2 (page 17)** bus, if corresponding LBI function is not configured in a controller.

Example: Logical input Remote Start/Stop is configured with a controller. State of the signal is automatically transmitted to other controllers via **CAN2 (page 17)** bus as System Start/Stop.

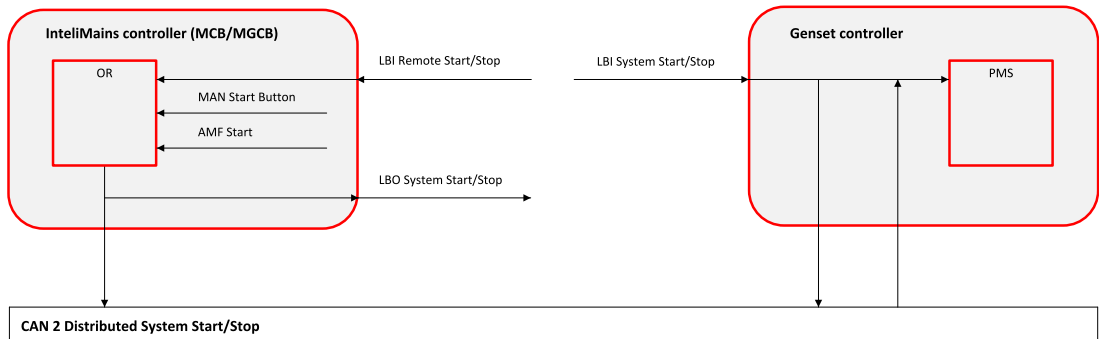


Image 5.72 Distributed signals case 1

2. LBI state received from **CAN2 (page 17)** bus is automatically used, if corresponding LBI function is not configured in a controller.

Example: LBI Remote Start/Stop is not configured with a controller, but automatically shared System Start/Stop is received from **CAN2 (page 17)** bus. Controller follows state of the shared LBI signal then.

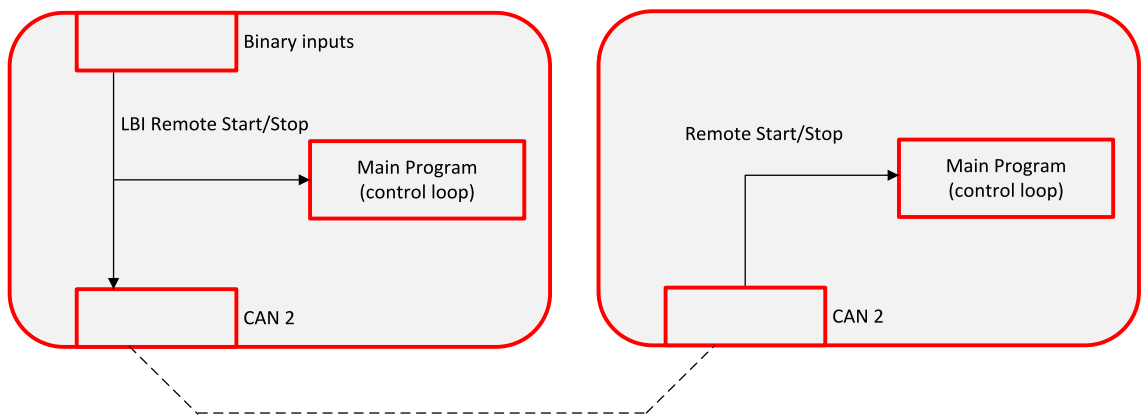


Image 5.73 Distributed signals case 1&2

3. LBI state received from **CAN2 (page 17)** bus is not used, if corresponding LBI function is configured in a controller.

Example: LBI Remote Start/Stop is configured with a controller. Controller follows only state of signal linked with the Remote Start/Stop function. The function is not activated by a shared System Start/Stop signal.

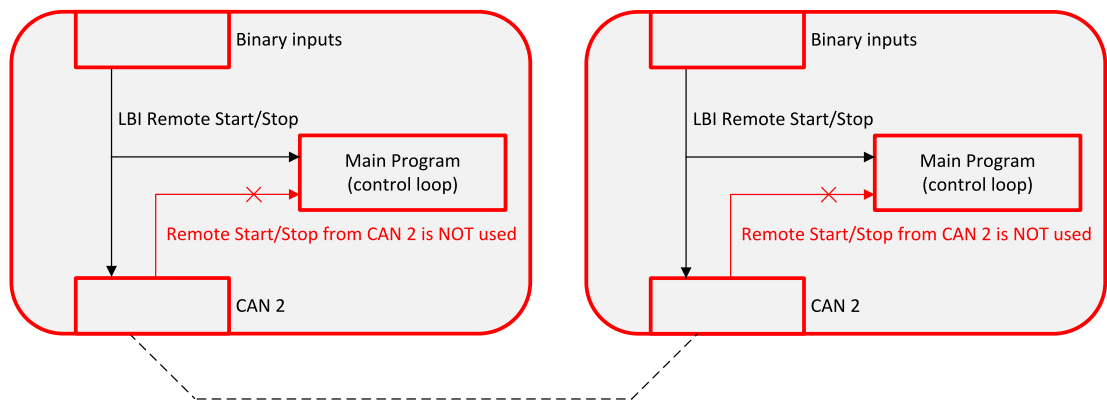


Image 5.74 Distributed signals case 3

4. LBI function state transmitted via **CAN2 (page 17)** bus is used only by controllers, which are in the same group as controller, which is source of the shared signal. Signal coming from controller in a different group is accepted only if the “source controller” group is linked with the “receiving controller” group.

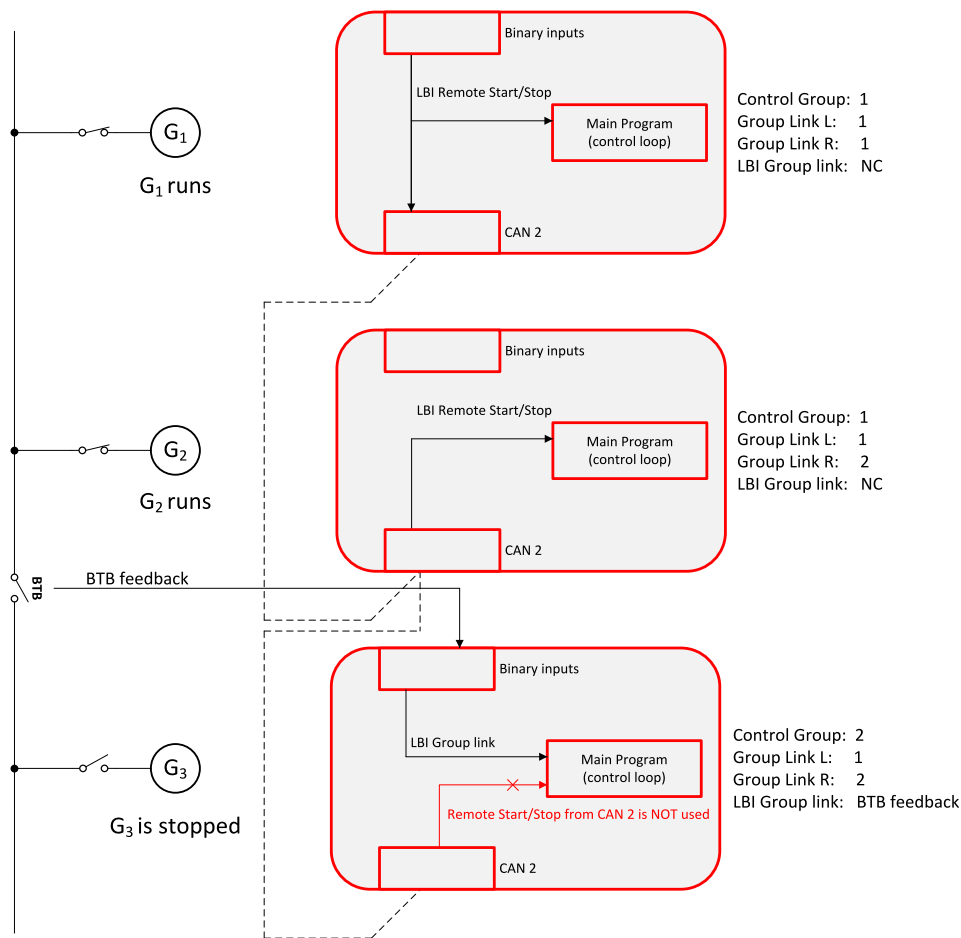


Image 5.75 Distributed signals case 4

5. LBI function can be configured with multiple controllers, which transmit through **CAN2 (page 17)** bus state of the function. Or function applies to the function evaluation in controllers, in which the function is not configured. It means that function is activated by shared signal coming from any controller (rule 4. applies).

5.4.8 Electric state machine

State	Description	
Init	Initialization of the controller. The application is not active yet.	
BrksOff	Application Mode = MCB	MCB is opened (LBO MCB Close/Open is not active and LBI MCB Feedback is not active either).
	Application Mode = MGCB	MCB is opened (LBO MCB Close/Open is not active and LBI MCB Feedback is not active either) and MGCB is opened (LBO MGCB Close/Open is not active and LBI MGCB Feedback is not active either).

IsOper	Application Mode = MCB	LBO Mains Healthy is not active, MCB is opened (LBO MCB Close/Open) is not active and LBI MCB Feedback is not active either) and LBO Any GCB Closed is active.
	Application Mode = MGCB	LBO Mains Healthy is not active, MCB is opened (LBO MCB Close/Open is not active and LBI MCB Feedback is not active either) and MGCB is closed (LBO MGCB Close/Open is active and LBI MGCB Feedback is also active).
MainsOper	Application Mode = MCB	LBO Mains Healthy is active, MCB is closed (LBO MCB Close/Open is active and LBI MCB Feedback is active as well) and LBO Any GCB Closed is not active.
	Application Mode = MGCB	LBO Mains Healthy is active, MCB is closed (LBO MCB Close/Open is active and LBI MCB Feedback is active as well) and MGCB is opened (LBO MGCB Close/Open is not active and LBI MGCB Feedback is not active either).
ParalOper	Application Mode = MCB	LBO Mains Healthy is active, MCB is closed (LBO MCB Close/Open is active and LBI MCB Feedback is active as well) and LBO Any GCB Closed is also active.
	Application Mode = MGCB	LBO Mains Healthy is active, MCB is closed (LBO MCB Close/Open is active and LBI MCB Feedback is active as well) and MGCB is closed (LBO MGCB Close/Open is active and LBI MGCB Feedback is also active).
RevSync	This state is active during synchronization via MCB. LBO Reverse Synchronization is active.	
Synchro	Application Mode = MCB	This state cannot occur.
	Application Mode = MGCB	This state is active during synchronization via MGCB. MCB is closed (LBO MCB Close/Open is active and LBI MCB Feedback is active as well) and LBO Forward Synchronization is active.
Bus is being synchronized to healthy Mains (or vice versa). LBO Synchronization is active.		
MainsFlt	This state is active when LBO Mains Healthy is deactivated and until Emergency Start Delay timer expires.	
MainsRet	Application Mode = MCB	This state is active during Mains Return Delay timer after LBO Mains Healthy is reactivated.
	Application Mode = MGCB	This state is active when LBO Mains Healthy is active, MCB is opened (LBO MCB Close/Open is not active and LBI MCB Feedback is not active either) and MGCB is closed (LBO MGCB Close/Open is active and LBI MGCB Feedback is also active).
This state is active during Mains Return Delay timer or if LBO Mains Healthy .		
ValidFlt	State activated after Emergency start del.	
MCB Off	This state is never activated and stays here for backward compatibility.	
EmergMan	This state is active while LBI Emergency MAN is active. All control functions e.g. BO are disabled.	

5.4.9 Event History

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. "Overfrequency alarm, undervoltage alarm, MCB closed, MGCB closed, etc.).
- The date and time when it was recorded.
- All important data values like frequency, kW, voltages, etc. from the moment that the event occurred.
- The number of events is fixed to 500 lines.
- Values are recorded based on actual column selected, on special events values are recorded in text form.
 - » Special events:
 - When the user logs in
 - Modifying a setpoint
 - Fault Reset
 - Horn Reset
 - Start/Stop

Configurable history

It is possible to configure the columns (values) which will be displayed in the History window. The configuration can be found in the Controller Configuration → Others → History. See the picture below.

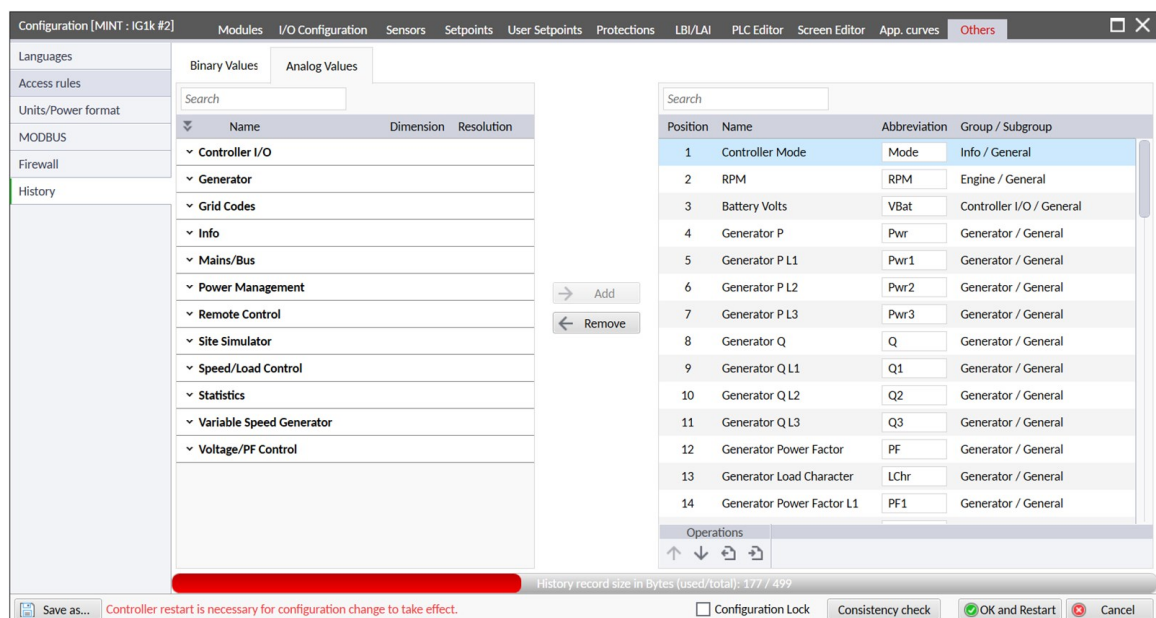


Image 5.76 Configurable history

In the left part of the configuration window there are all available binary and analog values (columns) which can be configured to history event log. In the right side of the configuration window there is a table with all already configured columns. By buttons Add and Remove in the middle of the configuration window or by

double click on value in the left / right part of the configuration, it is possible to add / remove any analog or binary value to / from the history event log.

Under the table with already configured values there are buttons for the operations. By the buttons Move up and Move down it is possible to change the position of the history columns so you can sort all columns according to your priorities. Next to these buttons there are buttons for export and import data so you can import history columns configuration from another controller. And it is also possible to change the abbreviation for each history column. In the down part of the configuration window there is a progress bar which shows how much memory for history events is used. For one history record maximum 499 Bytes can be used.

In the next chapter are shown history columns used in the default archive.

Default history columns

Column name	Short name	Value	Units
Bus frequency	Bfrq	Bus Frequency (page 458)	Hz
Bus Voltage L1-N	Vb1	Bus Voltage L1-N (page 458)	V
Bus Voltage L2-N	Vb2	Bus Voltage L2-N (page 458)	V
Bus Voltage L3-N	Vb3	Bus Voltage L3-N (page 458)	V
Bus Voltage L1-L2	Vb12	Bus Voltage L1-L2 (page 458)	V
Bus Voltage L2-L3	Vb23	Bus Voltage L2-L3 (page 459)	V
Bus Voltage L3-L1	Vb31	Bus Voltage L3-L1 (page 459)	V
Mains Frequency	Frqm	Mains Frequency (page 444)	Hz
Mains Voltage L1-N	Vm1	Mains Voltage L1-N (page 445)	V
Mains Voltage L2-N	Vm2	Mains Voltage L2-N (page 445)	V
Mains Voltage L3-N	Vm3	Mains Voltage L3-N (page 445)	V
Mains Voltage L1-L2	Vm12	Mains Voltage L1-L2 (page 445)	V
Mains Voltage L2-L3	Vm23	Mains Voltage L2-L3 (page 445)	V
Mains Voltage L3-L1	Vm31	Mains Voltage L3-L1 (page 446)	V
Mains Current L1	Im1	Mains Current THD L1 (page 444)	%
Mains Current L2	Im2	Mains Current THD L2 (page 444)	%
Mains Current L3	Im3	Mains Current THD L3 (page 444)	%
Battery Volts	VBat	Battery Voltage (page 468)	V
Binary Inputs	BIN	Binary Inputs (page 468)	-
Binary Outputs	BOUT	Binary Outputs (page 469)	-
Controller Mode	Mode	Controller Mode (page 472)	-
Forced value status	FVST	Forced Value Status (page 474)	-
Running Nominal Power Of All	TRPN	Running Nominal Power Of All (page 463)	kW
Available Nominal Power In PM	APN	Available Nominal Power In PM (page 463)	kW

5.4.10 Exercise Timers

Mode Once	124
Mode Daily	125
Mode Weekly	126
Monthly mode	127
Mode Short period	129

The exercise (general-purpose) timers in controller are intended for scheduling of any operations such as e.g. periodic tests of the System, scheduled transfer of the Load to the System prior to an expected disconnection of the Mains etc. These timers can be also used in the PLC.

The function of each timer can be changed by respective Timer Function setpoint. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The following timer functions are available:

- Disabled - The Timer is disabled.
- Manual On - The Timer is disabled but his binary output is activated (can be used for testing purposes).
- No Func - There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.
- Mode OFF - The binary output of the Timer is internally connected to the Remote OFF binary input.
- TEST - The binary output of the Timer is internally connected to the binary input Remote TEST.
- TEST OnLd - The binary output of the Timer is internally connected to the Remote TEST On Load binary input.
- MFail Blk - The binary output of the Timer is internally connected to the Mains Fail Block binary input.

The activation condition of each Timer is configured via respective Timer Setup setpoint.

Each Timer has its LBO Exercise Timer which is closed regardless of chosen timer function once the Timer is activated. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled. The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.

See the list of related setpoints and LBOs below.

Related setpoints for choosing of the timer function:

- **Timer 1 Function (page 365)**
- **Timer 2 Function (page 367)**
- **Timer 3 Function (page 369)**
- **Timer 4 Function (page 371)**
- **Timer 5 Function (page 373)**
- **Timer 6 Function (page 375)**

Related setpoints for the timer setup:

- **Timer 1 Setup (page 366)**
- **Timer 2 Setup (page 368)**
- **Timer 3 Setup (page 370)**
- **Timer 4 Setup (page 372)**
- **Timer 5 Setup (page 374)**
- **Timer 6 Setup (page 376)**

Related LBOs:

- **Exercise Timer 1 (page 572)**
- **Exercise Timer 2 (page 573)**
- **Exercise Timer 3 (page 573)**
- **Exercise Timer 4 (page 573)**
- **Exercise Timer 5 (page 574)**
- **Exercise Timer 6 (page 574)**

Note: This manual shows step by step guide only for Timer 1 setup because the procedure is same for the all timers.

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.

Mode Once

Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint **Timer 1 Setup** (page 366).

Note: Setpoint **Timer 1 Setup** (page 366) is visible only if setpoint **Timer 1 Function** (page 365) has any other value than disabled.

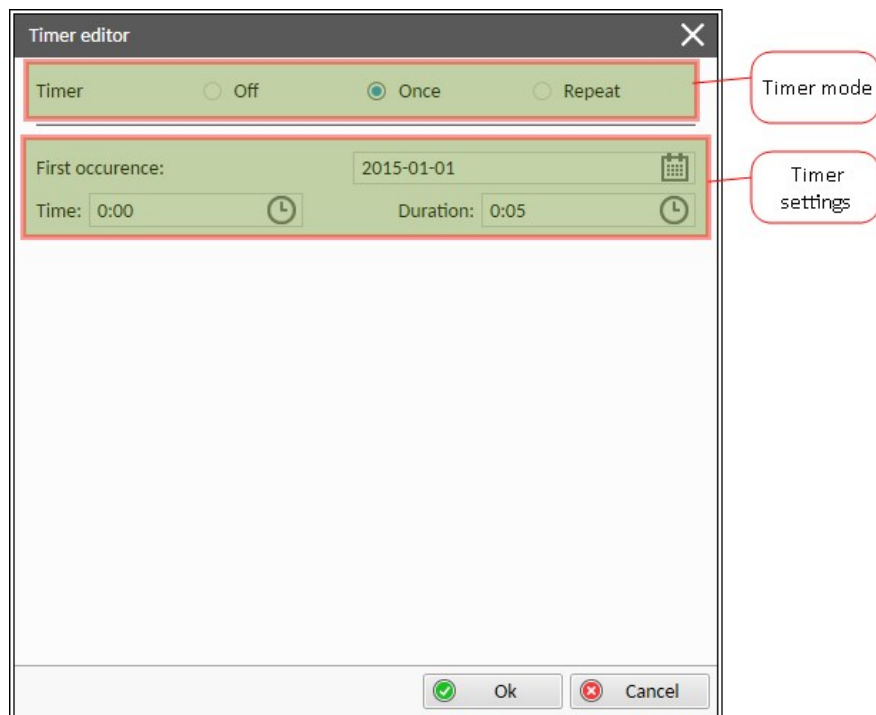


Image 5.77 Mode Once - IntelliConfig

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

Set-up via external display

Navigate to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 365)** setpoint. Then go to **Timer 1 Setup (page 366)** and press enter button.

Note: Use left and right arrow to move in a single row. Use up and down arrow to adjust time or date. Use enter button for confirmation.

⬅ back to Exercise Timers

Mode Daily

Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint **Timer 1 Setup (page 366)**

Note: Setpoint **Timer 1 Setup (page 366)** is visible only if setpoint **Timer 1 Function (page 365)** has any other value than disabled.

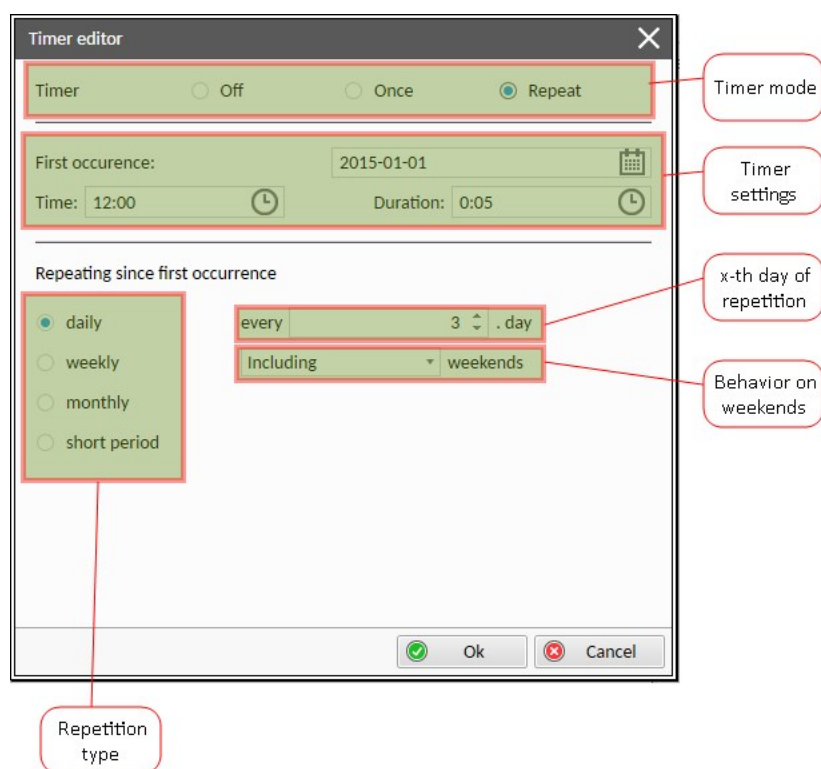


Image 5.78 Daily mode - IntelliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the x-th day of repetition and behavior of timer on weekends.

Example: On image example first start of timer will be 2015-01-01 at 12:00. Duration will be 5 minutes. Timer will be again activated every 3rd day at 12:00 for 5 minutes including weekends.

Set-up via external display

Navigate to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 365)** setpoint. Then go to **Timer 1 Setup (page 366)** and press enter button.

Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration. Select Daily occurrence, set amount of days between occurrences and decide which behavior shall be applied during weekends.

Note: Use left and right arrow to move in a single row. Use up and down arrow to adjust time or date. Use enter button for confirmation.

⬅ back to Exercise Timers

Mode Weekly

Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint **Timer 1 Setup (page 366)**.

Note: Setpoint **Timer 1 Setup (page 366)** is visible only if setpoint **Timer 1 Function (page 365)** has any other value than disabled.

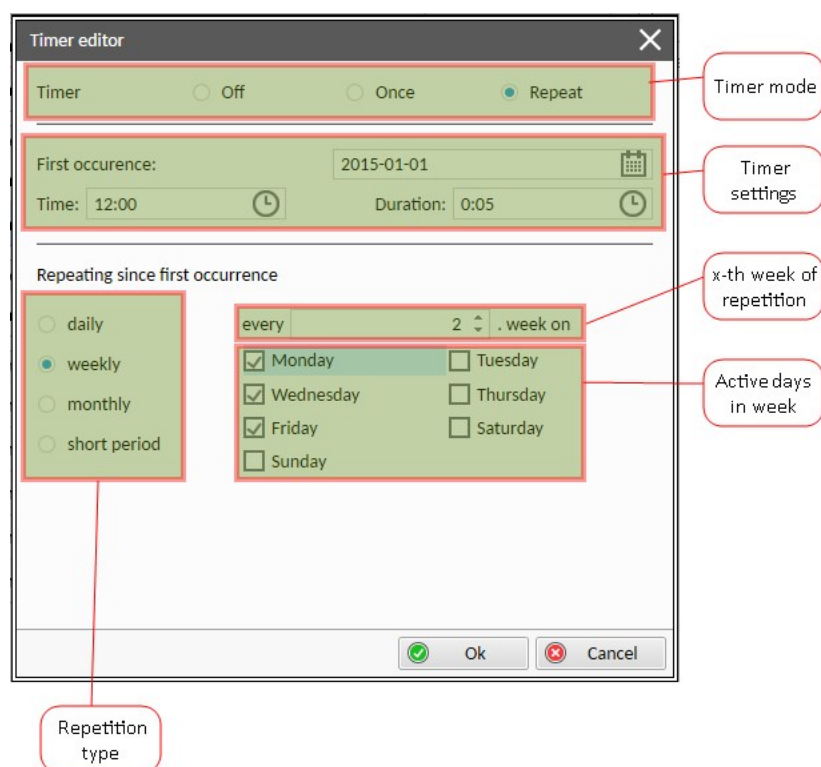


Image 5.79 Mode Weekly - IntelliConfig

In timer mode select Repeat. In repetition type select Weekly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the x-th week of repetition and days when timer should be active.

Example: On image example first start of timer will be 2015-01-12 at 12:00. Duration will be 5 minutes. Timer will be again activated every 2nd week on Monday, Wednesday and Friday at 12:00 for 5 minutes.

Set-up via external display

Navigate to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 365)** setpoint. Then go to **Timer 1 Setup (page 366)** and press enter button. Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration. Select Weekly occurrence, set amount of weeks between occurrences and select days which will be timer triggered (use arrows left, right for activating/deactivating of day and arrow up, down for moving to another day).

Note: Use left and right arrow to move in a single row. Use up and down arrow to adjust time or date. Use enter button for confirmation.

⬅ back to Exercise Timers

Monthly mode

Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint **Timer 1 Setup (page 366)**.

Note: Setpoint **Timer 1 Setup (page 366)** is visible only if setpoint **Timer 1 Function (page 365)** has any other value than disabled.

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

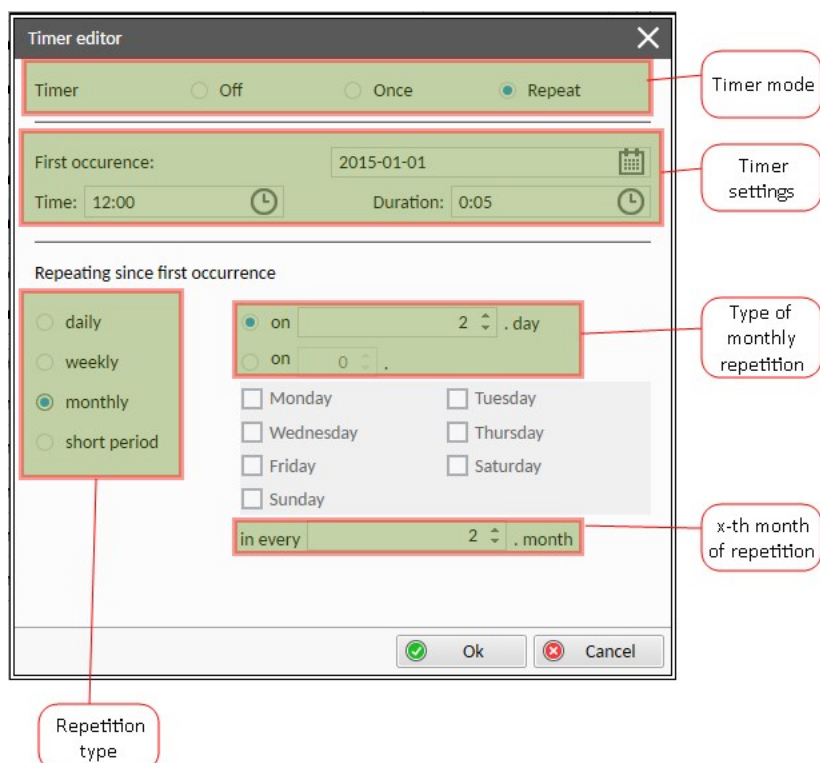


Image 5.80 Mode Monthly - IntelliConfig

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

Example: On image example first start of timer will be 2015-01-02 at 12:00. Duration will be 5 minutes. Timer will be again activated every 2nd day in 2nd month at 12:00 for 5 minutes.

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

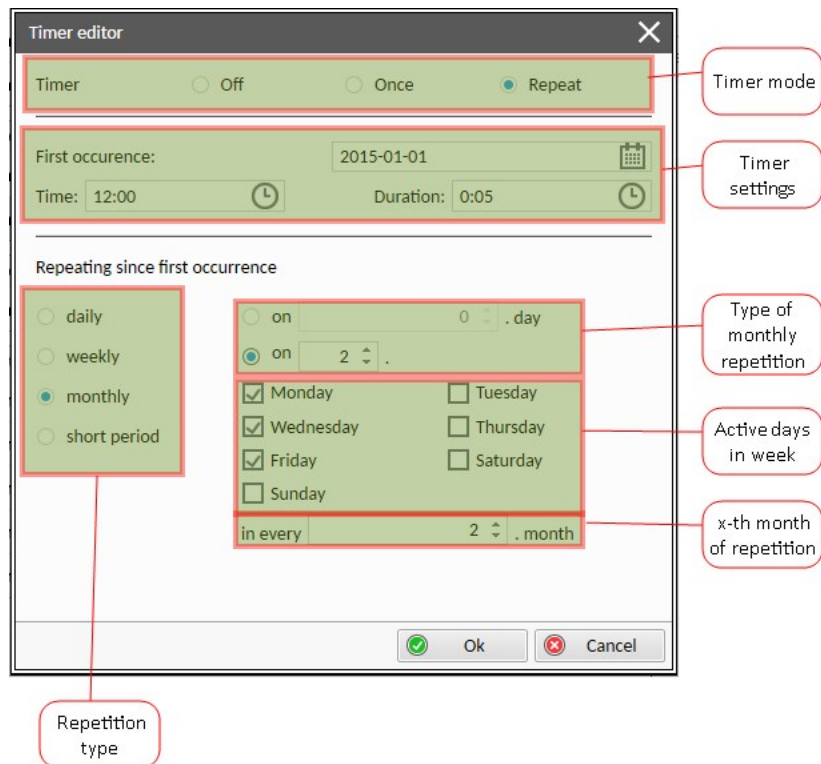


Image 5.81 Mode Monthly - Intelliconfig

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

Example: On image example first start of timer will be 2015-01-05 at 12:00. Duration will be 5 minutes. Timer will be again activated every 2nd week in 2nd month on Monday, Wednesday and Friday at 12:00 for 5 minutes.

Set-up via external display

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

Navigate to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 365)** setpoint. Then go to **Timer 1 Setup (page 366)** and press enter button. Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration. Select Monthly occurrence, then Daily and choose which day in a month will be timer triggered. Set amount of months between occurrences and confirm the selection

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

Navigate to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 365)** setpoint. Than go to **Timer 1 Setup (page 366)** and press enter button. Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration. Select Monthly occurrence, then Weekly and choose which week and week days in a month will be timer triggered. Set amount of months between occurrences and confirm the selection

Note: Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration.

🔍 back to Exercise Timers

Mode Short period

Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint **Timer 1 Setup** (page 366).

Note: Setpoint **Timer 1 Setup** (page 366) is visible only if setpoint **Timer 1 Function** (page 365) has any other value than disabled.

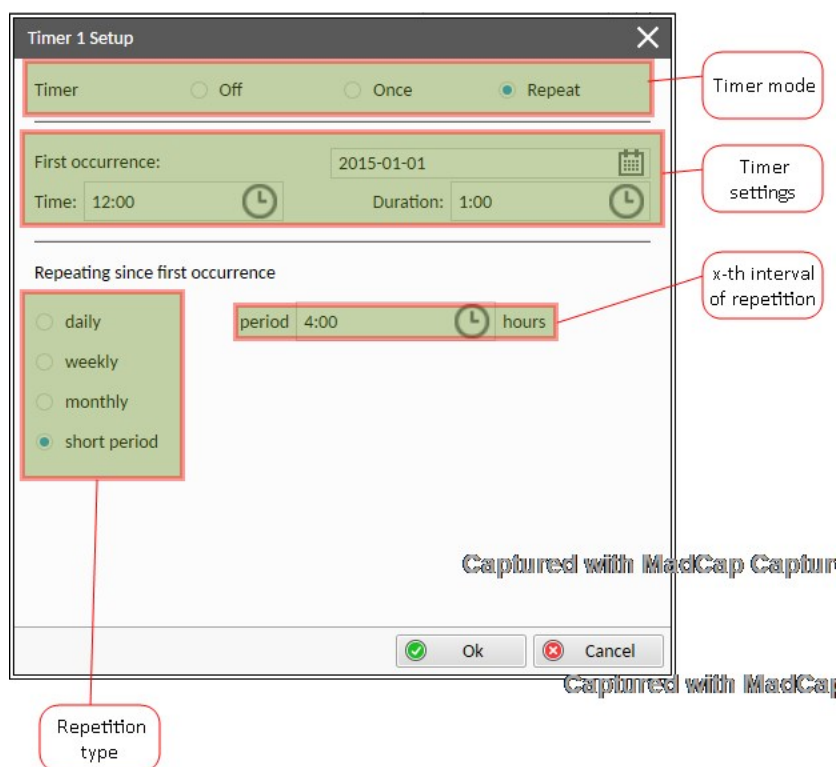


Image 5.82 Mode Short period - IntelliConfig

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

Example: On image example first start of timer will be 2015-01-01 at 12:00. Duration will be 1 hours. Timer will be again activated every 4th hour for 1 hour.

Set-up via external display

Navigate to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function** (page 365) setpoint. Then go to **Timer 1 Setup** (page 366) and press enter button. Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration. Select Period occurrence, then set period of repetition (shorter than 1 day).

Note: Select mode Repeat and confirm it. After that, you will set the first occurrence date, time of occurrence and duration.

🔍 back to Exercise Timers

5.4.11 Firewall

The firewall function allows to restrict the access to the controller application services (ComAp/TCP server, MODBUS/TCP server etc.), to the specific computers, or networks using **Ethernet (page 17)** and **Communication peripherals (page 17)** ports. The firewall can be enabled by the setpoint IP Firewall in the **Group: Ethernet (page 377)**. The firewall settings is made in the IntelliConfig: Control → Controller Configuration → Others → Firewall.

Example:

Address: 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 IntelliConfig via Ethernet).

Example:

Address: 192.168.1.100

Netmask: 255.255.255.255

Port: 502

Only the single computer with IP address 192.168.1.100 can connect to MODBUS/TCP server

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

5.4.12 Forced Value

This function allows forcing of preconfigured value into selected setpoints via activation of LBI. Each LBI can force only one value into one setpoint. There are 16 LBIs - **FORCED VALUE INPUT 01 (PAGE 538) ... FORCED VALUE INPUT 16 (PAGE 541)**. You can see current states of all LBIs in value **Forced Value Status (page 474)**. Setpoints for which is Forced Value already configured are marked with gray arrow in IntelliConfig and on display.

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

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

Force Value Indication

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

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

Integrated color display / IntelliVision 5.2

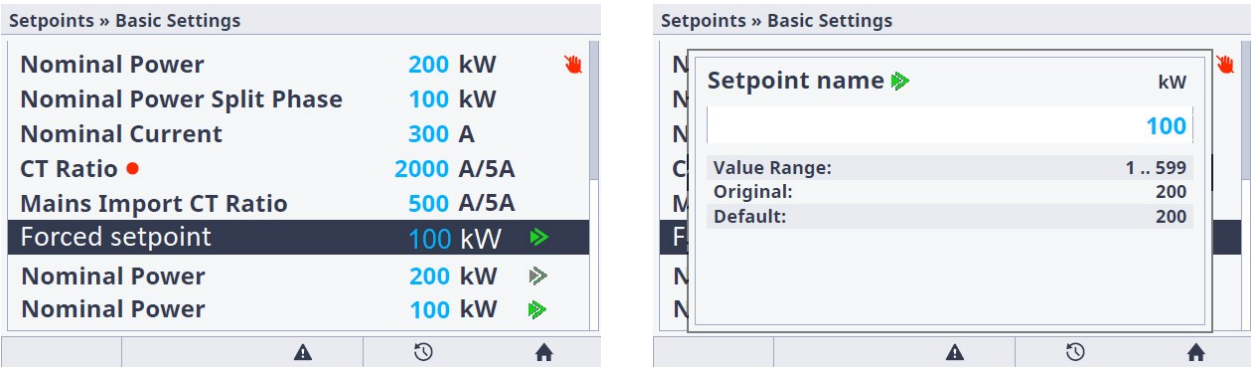


Image 5.83 : Force Value and Protected Setpoint Indication

IntelliConfig

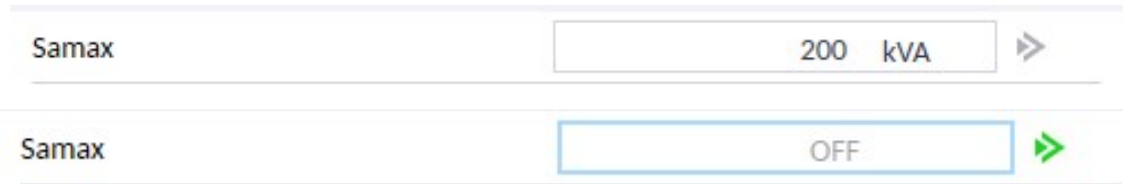


Image 5.84 : Force Value Indication in IntelliConfig

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

5.4.13 I/O Configuration

Binary Inputs	132
Binary Outputs	133
Functions Configuration	133
Protections Configuration	133
Transfer I/O Configuration	134
Remove I/O Configuration	134

Note: This is only quick illustration for I/O configuration, see the IntelliConfig manual for more information about configuration via PC tool IntelliConfig.

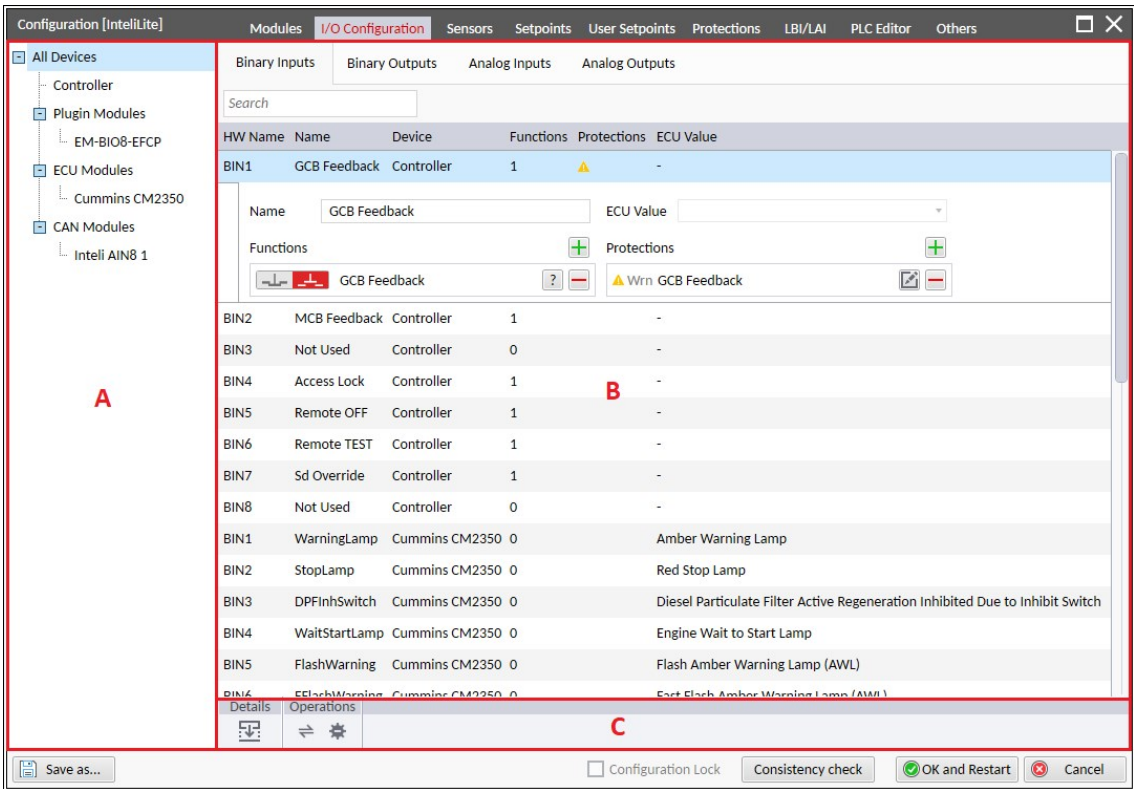


Image 5.85 I/O Configuration window

- A. **Device tree** – contains groups of devices with inputs/outputs to configure
- B. **Configuration panel** – the list of available inputs/outputs related to device tree selection
- C. **Tool bar**
 - > **Expand All Details** - Expands the configuration part of all inputs/outputs
 - > **Transfer IO Configuration** - see Transfer I/O Configuration on page 134
 - > **Remove IO Configuration** - see Remove I/O Configuration on page 134

Binary Inputs

The configuration of the binary input consists of:

1. **Name** - the name identification of the binary input
2. **ECU Value** - electronic control unit value, available only for ECU devices (otherwise disabled)

3. **Functions** - the set of functions **see Functions Configuration on page 133**
4. **Protections** - the set of protections **see Protections Configuration on page 133**

HW Name	Name	Device	Functions	Protections	ECU Value
BIN1	GCB Feedback	Controller 1			-

Name:

ECU Value:

Functions

Protections

Image 5.86 Binary input configuration

Binary Outputs

The configuration of the binary output consists of:

1. **Name** - the identification name of the binary output
2. **Source** - the source value for the binary output
3. **Contact Type** - represents the default state of output (Normally Open/Normally Closed)
4. **ECU Value** - electronic control unit value, available only for ECU devices (otherwise disabled)
5. **Protections** - the set of protections **see Protections Configuration on page 133**

HW Name	Name	Device	Source	Contact Type	Protections	ECU Value
BOUT1	Starter 1	Controller	Starter 1	Normally Closed		-

Name:

Source:

Contact Type: ☒ Normally Closed

ECU Value:

Protections:

Image 5.87 Binary output configuration

Functions Configuration


- > It is possible to assign more functions (Logical Binary Inputs) to the specific input (BIN, AIN)
 - >> Add new function to the input
 - >> Remove function from the input
- > For the binary input functions the contact type for each function can be set
 - >> - Normally Closed/Normally Open
- > Each function (LBI) has the link to the help through button

Protections Configuration

- > It is possible to assign one level 1 and level 2 protection to the specific input or output (BINT, BOUT, AIN).
 - >> Add new protection
 - >> Remove protection
 - >> Edit protection

For more information about protections **see Protections on page 185**

Transfer I/O Configuration

This functionality offers to transfer the whole input/output configuration to another compatible input/output in the same category. The icon  for transfer is available in the bottom toolbar.

After clicking on the transfer icon is displayed window for selecting the target input/output. Offered are only compatible inputs/outputs of the same category. When the required input/output is selected and confirmed by the OK button, the transfer operation starts.

Note: The configuration is transferred completely (functions, protections, sensor, PLC configuration) except Modbus definition.

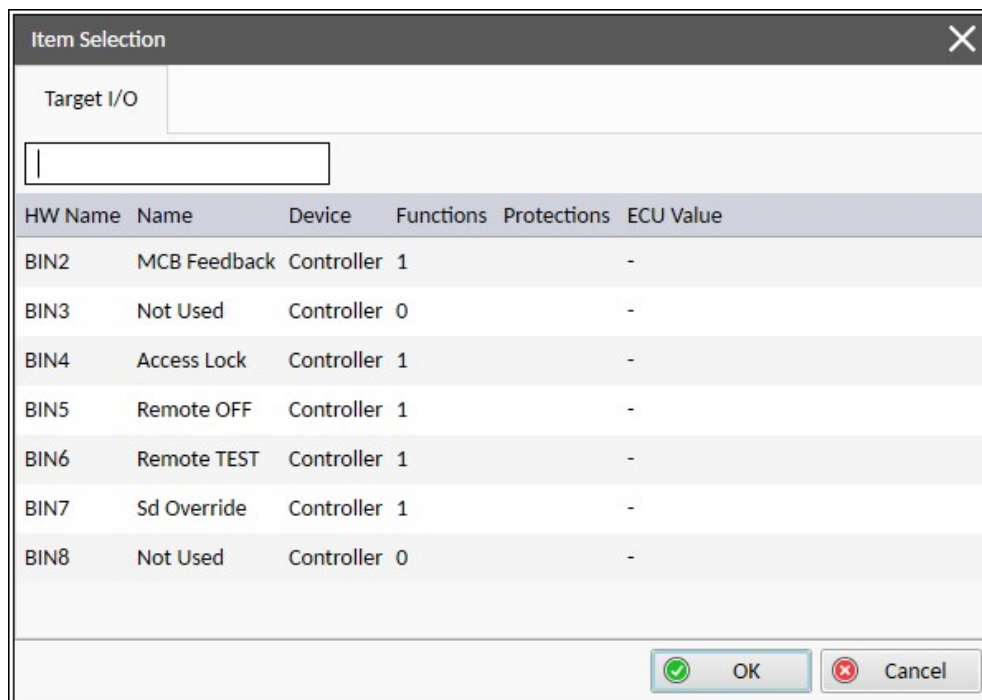



Image 5.88 The window for selecting the target for I/O configuration transfer

Remove I/O Configuration

This functionality offers to remove the whole input/output configuration. The icon  for remove is available in the bottom toolbar. The name of input/output is after remove set to "Not Used".

Note: The configuration is removed completely (functions, protections, sensor, PLC configuration) except Modbus definition.

5.4.14 Load Shedding

The Load Shedding is controlled disconnection of less important load groups when the object consumption is too high.

Load shedding stages

The Load Shedding function consists of 6 stages which are numbered 1-6. Stages are disconnected in ascending order up to the last configured stage. Reconnecting of stages is in descending order and starts with higher configured stage. Stage is considered as configured when respective Load Shedding Output is configured. Highest activated load shedding stage is stored in value **Load Shedding Status** (page 472).

Load shedding outputs

Stage	LBO
Stage 1	LOAD SHEDDING STAGE 1 (PAGE 577)
Stage 2	LOAD SHEDDING STAGE 2 (PAGE 577)-
Stage 3	LOAD SHEDDING STAGE 3 (PAGE 577)
Stage 4	LOAD SHEDDING STAGE 4 (PAGE 578)
Stage 5	LOAD SHEDDING STAGE 5 (PAGE 578)
Stage 6	LOAD SHEDDING STAGE 6 (PAGE 578)

How the load shedding controls the load shedding outputs

The Load Shedding function can be used if **Controller mode (page 267) != OFF**.

Activation of the function is adjusted via setpoint **Load Shedding Active (page 311)**. Function could be active when:

- Entering **Breaker state (page 473) = IsIOper/MultIsIOp** - all stages are disconnected.
- Change from **Breaker state (page 473) = ParalOper/MultParOp** to **Breaker state (page 473) = IsIOper/MultIsIOp** - all stages are disconnected.
- During **Breaker state (page 473) = IsIOper/MultIsIOp** - only one stage is disconnected/reconnected at a moment

Decisive level for disconnecting of load is adjusted via setpoint **Load Shedding Level (page 312)** and the minimal delay between two disconnections is adjusted via setpoint **Load Shedding Delay (page 313)**. When relative **Total Running P (page 462)** or **Mains Import P (page 439)** (depends on the setpoint **Load Shedding Based On (page 312)**) exceeds **Load Shedding Level (page 312)** and delay **Load Shedding Delay (page 313)** elapsed from last disconnection of stage, another stage is disconnected.

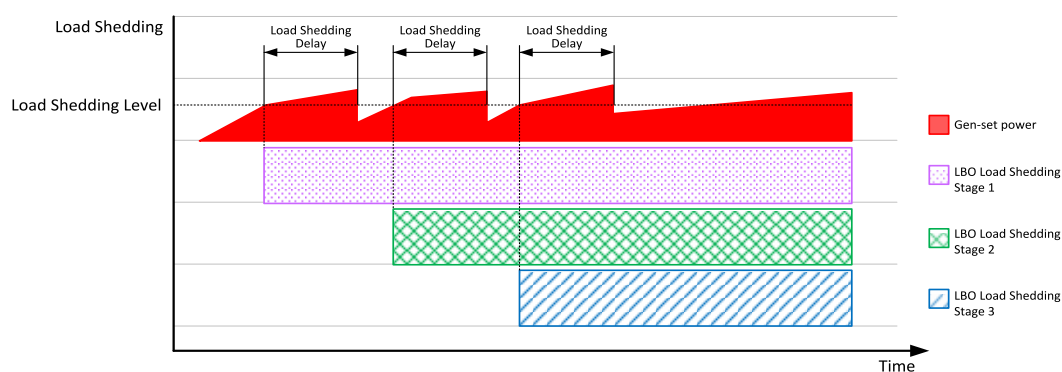


Image 5.89 Load shedding

Reconnection of load

Disconnected load can be also reconnected. Reconnecting of stages is in descending order and begins with highest disconnected stage. Behavior of this function is adjusted via setpoints **Auto Load Reconnection** (page 314), **Load Reconnection Level** (page 313) and **Load Reconnection Delay** (page 313).

Manual reconnection

Conditions:

- Setpoint **Auto Load Reconnection** (page 314) = Manual
- **LBI MANUAL LOAD RECONNECTION** (PAGE 546) has to be configured

When relative **Total Running P** (page 462) or **Mains Import P** (page 439) (depends on the setpoint **Load Shedding Based On** (page 312)) drops below **Load Reconnection Level** (page 313) rising edge of **LBI MANUAL LOAD RECONNECTION** (PAGE 546) reconnects the highest disconnected stage.

Note: Setpoint **Load Reconnection Delay** (page 313) is not considered

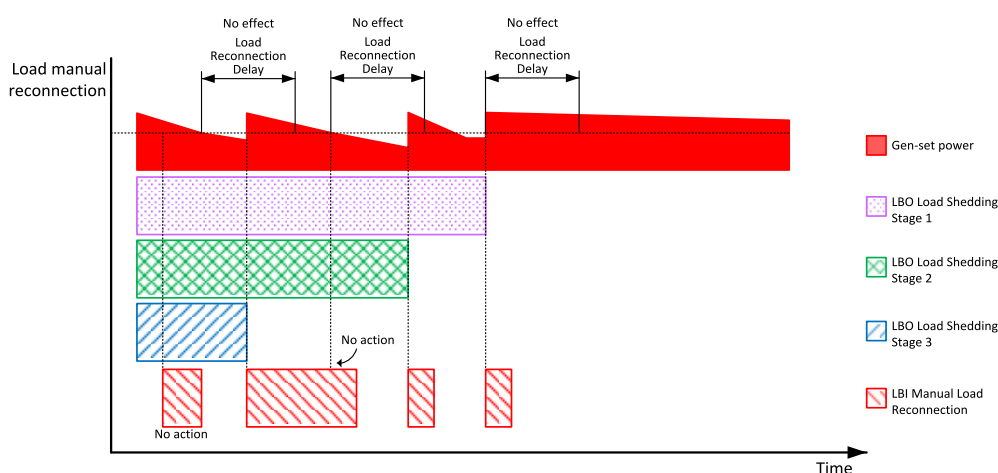


Image 5.90 Manual Load reconnection

Auto reconnection

Conditions:

- Setpoint **Auto Load Reconnection** (page 314) = Auto

When relative **Total Running P** (page 462) or **Mains Import P** (page 439) (depends on the setpoint **Load Shedding Based On** (page 312)) drops below **Load Reconnection Level** (page 313) and delay **Load Reconnection Delay** (page 313) elapsed from last reconnecting of stage, another stage is reconnected.

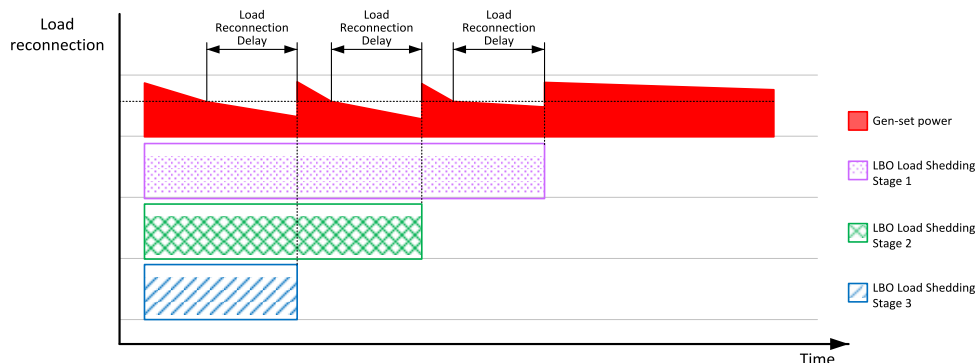


Image 5.91 Auto Load reconnection

5.4.15 Mains Decoupling Protections

Vector shift

The vector shift function is the fast protection for mains decoupling. It monitors the Load angle of the System and if it gets changed dramatically, the protection is issued. The Vector shift is evaluated from the **Mains Voltage L1-N** (page 445).

Protection is enabled via setpoint **Vector Shift Protection** (page 305). Limit of protection is adjusted via setpoint **Vector Shift Limit** (page 291). When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift/ROCOF CB Selector** (page 292) (For MCB application is fixedly opened only MCB breaker). Maximal value of vector shift is represented by value **Max Vector Shift** (page 448).

Note: VectorShift protection gets active (is unblocked) right 500 ms after the condition for activation of protection gets fulfilled = when Controller goes to parallel to mains operation (When Vector Shift Protection = PARALLEL ONLY) or when MCB gets closed (when Vector shift protection = Enabled).

The settings can lead to these situations:

MCB STATUS (PAGE 582)	MGCB STATUS (PAGE 587)	Vector Shift/ROCOF CB Selector (page 292)	Vector Shift Protection (page 305)	Action
1	1	MCB or MGCB	Enabled or Parallel Only(no influence)	Opens MCB or MGCB based on Vector Shift/ROCOF CB Selector (page 292)
0	1	MCB or MGCB (no influence)	Enabled or Parallel Only(no influence)	No action (MGCB stays always closed)
1	0	MCB or MGCB (no influence)	Parallel Only	No action (MCB stays closed)
1	0	MCB	Enabled	Opens MCB
1	0	MGCB	Enabled	No action (MCB stays closed)

If a vector shift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then closed again (synchronized) after **Mains Return Delay** (page 287) as the mains is evaluated as healthy.

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

Note: If the MCB application is chosen, then MCB is always opened even there are some gen-set controllers connected on the bus.

ROCOF

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

There are in total 4 independent ROCOF protections divided to 2 kinds.

Common behavior

Protections are enabled/disabled by setpoints **ROCOF Protection (page 306)**.

Option	Vector Shift/ROCOF CB Selector (page 292)	Behavior
Enabled	MCB	Protection is reactivated with closing of MCB
	MGCB	Protection is reactivated with closing of MGCB
Parallel Only	Not relevant	Protection is reactivated with entering Parallel Operation Mode Breaker state (page 473) = ParalOper

Sample based ROCOF

These protections are based on controller's sampling. This means that protection is evaluated after certain amount of samples have been obtained by the controller.

ROCOF Protection (page 306)

- Protection is evaluated from last **ROCOF Windows Length (page 291)** samples. If **ROCOF (page 448)** is over **ROCOF df/dt (page 292)**, breaker selected by **Vector Shift/ROCOF CB Selector (page 292)** is opened. Maximal measured ROCOF, from start of evaluation, is stored in **Max ROCOF (page 449)**.

5.4.16 Mains Import Measurement

The Mains measurement can be measured by dedicated CT terminals or by analog inputs, and it is divided to **Mains Measurement P (page 250)** and **Mains Measurement Q (page 251)**. The Mains Measurement P has to be enabled for proper work of active power Import/Export. The both measurements has to be enabled for proper work of reactive power Import/Export and power factor control.

Mains Measurement P

- If **Mains Measurement P (page 250)** = Mains CT then **Mains Import P (page 439)** is counted from the current which is measured on **Terminal Diagram (page 33)**.
- If **Mains Measurement P (page 250)** = Analog Input then **Mains Import P (page 439)** is taken from LAI **MAINS MEASUREMENT P (PAGE 597)**. Mains current can still be measured if **Mains Measurement Q (page 251)** = Mains CT.
- If **Mains Measurement P (page 250)** = None then **Mains Import P (page 439)** is not counted because there is no current measurement. This affects load transferring.

Note: When **Mains Measurement P (page 250)** is set to None or Analog Input (and LAI **MAINS MEASUREMENT P (PAGE 597)** is not configured or has invalid value) alarm **Wrn Load IMP/EXP Fail (page 656)** is activated if Import/Export P is required and alarm **Wrn PF/Q IMP/EXP Fail (page 663)** is activated if Import/Export Q is required.

MainsMeasurement Q

- If **Mains Measurement Q (page 251)** = MainsCT then **Mains Import Q (page 439)** is counted from the current which is measured on **Terminal Diagram (page 33)**.
- If **Mains Measurement Q (page 251)** = Analog Input then **Mains Import Q (page 439)** is taken from the LAI **MAINS MEASUREMENT P (PAGE 597)**. Mains current can be still measured if **Mains Measurement P (page 250)** = Mains CT.

- If **Mains Measurement Q (page 251)** = None then **Mains Import Q (page 439)** is not counted because there is no current measurement. This affects load transferring.

Note: When **Mains Measurement Q (page 251)** is set to None or Analog Input (and **LAI MAINS MEASUREMENT P (PAGE 597)** is not configured or has invalid value) alarm **Wrn Wrn PF/Q IMP/EXP Fail (page 663)** is activated if Import/Export Q is required.


5.4.17 Multi soft start

Multi soft start is a ComAp feature set that allows faster connection of multiple Mainss to the Load while Start up Synchronization (SUS). This function is used once there is the request for starting of Gen-sets with SUS sequence and it determinate whether the Load will be connected before or after all Gen-sets are started.

This function can be enabled by the setpoint **Multi Soft Start (page 255)**. If the setpoint is Enabled, the MGCB will be closed together with Gen-sets' MGCBs during SUS sequence if there is no voltage on the Bus. If the setpoint is disabled the MGCB will be closed after the SUS sequence is successfully / unsuccessfully finished (Gen-sets are excited and Bus voltage is in the voltage window).

This function can be used only if the application is MGCB and MCB is opened so the Load is without power and Gen-sets are starting into Island / Multiple Island operation.

5.4.18 Operating Modes

The operating mode can be selected by pressing Left and Right buttons  on the front panel/display, by changing the **Controller mode (page 267)** setpoint, or by activating respective LBI.

Note: If the setpoint is configured as password-protected, the correct password must be entered prior to attempting to change the mode.

The following binary inputs can be used to force one respective operating mode independent of the mode setpoint selection:





- **Remote OFF (page 559)**
- **Remote TEST (page 560) + REM TEST ON LOAD (PAGE 561)**
- **Remote MAN (page 559)**
- **Remote AUTO (page 558)**

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

Another chapter related to the Operating modes is in the Operator Guide **see Basic operating modes description on page 1**.


OFF

System start activation is blocked, if mains is healthy and MCB is opened, then MCB is automatically closed after the delay given by setpoint MCB Close Delay. The MCB is closed permanently (**MCB Opens On (page 290)** = GenRun) or is open or closed according to whether the mains is present or not (**MCB Opens On (page 290)** = MainsFail). In case of MGCB application, the MGCB is opened if it is closed.

No AMF or Power management function will be performed. The buttons **MCB ON/OFF** , **MGCB ON/OFF** , **START** , and **STOP**  including the appropriate binary inputs for external buttons are not active.

MAN

The system can be started and stopped manually using the START and STOP buttons (or external buttons wired to the appropriate binary inputs). If there is present Gen-set controller, their system start/stop is activated/deactivated via internal communication line. In case of MCB application can be controlled only the MCB breaker by pressing the MCB button or by activating the binary input MCB Button. In case of MGCB application the control of MCB breaker and MGCB breaker is depending on the setting of the Setpoint **CB Control In MAN Mode** (page 248). MGCB breaker can be controlled also by pressing the MGCB button or by activating the binary input MGCB Button.

IMPORTANT: Control of MGCB is affected by SYSTEM START/STOP (PAGE 591) even in Controller mode (page 267) = MAN. SYSTEM START/STOP (PAGE 591) has to be active or bus must be already powered before MGCB can be closed. You can activate SYSTEM START/STOP (PAGE 591) for example by pressing the  Start Button.

AUTO

System activation is controlled based on external signal (**REMOTE START/STOP (PAGE 560)**) or by conditions (AMF, Peak shaving, Power management system, etc.). When one condition deactivates the System does not stop if another condition for automatic starts is active.

The controller does not respond to the buttons **START**, **STOP**, **MCB ON/OFF**, and **MGCB ON/OFF**.

If peak shaving stop condition occurs, but **REMOTE START/STOP (PAGE 560)** is active, System stays running.

TEST

The behavior of the controller in TEST mode depends on the setting of the setpoints and binary inputs.

The test mode behavior is common for both SPTM and MINT applications.

The Bus will be started when the controller is put to the TEST mode and will remain running unloaded. To perform test on load the **LCB REM TEST ON LOAD (PAGE 561)** must be activated, or System Start/Stop for the Bus's **Control Group (page 337)** must be activated (for MINT application).

If a Mains failure occurs, the MCB will be opened after **Open Transfer Min Break (page 339)**, the MGCB will be closed, and the Bus will supply the load.

The **SYSTEM START/STOP (PAGE 591)** is activated when the controller is put into the TEST mode.

MCB application - system start is active, if Gen-sets will be started their GCBs will be closed in to the parallel state.

MGCB application - system start is active, if Gen-sets will be started their GCBs will be closed but MGCB stays opened.

To perform test on load the **LCB REM TEST ON LOAD (PAGE 561)** must be activated.

If a Mains failure occurs, the MCB is opened, after **Open Transfer Min Break (page 339)**, the MGCB (only for MGCB application) will be closed and the Gen-sets will supply the load.

After the Mains return and the setpoint **Return to Mains in TEST Mode (page 289)** is Enabled, the delay **Mains Return Delay (page 287)** will count down. When it elapses the back synchronization is activated, the controller will transfer the load back to the Mains after **Open Transfer Min Break (page 339)** and the System will remain running unloaded again until the mode is changed. If the setpoint **Return to Mains in TEST Mode (page 289)** is Disabled the Load is kept supplied from the System until this situation is resolved by user e.g. putting the controller back into the AUTO mode.

The load transfer is depending on the settings **Subgroup: Load Transfer (page 339)** and on binary inputs **FORCE ISLAND (PAGE 537)** and **FORCE PARALLEL (PAGE 538)**.

The controller does not respond to the buttons **START**, **STOP**, **MCB ON/OFF**, and **MGCB ON/OFF**.

5.4.19 Output Control – Frequency/Load

The frequency control output is used to control the frequency (speed) of the Controllers presented on the bus. The frequency regulation, load regulation and load sharing are realized through the frequency control. The frequency request is internal value of the regulator which is transformed to range 0 .. 100 % of the **Loadsharing Output (page 467)** which comes out of the controller via communication line. Gen-set controller accepts this value and transform this to his speed control output.

Frequency/Load Control Adjustment

IMPORTANT: Prior to Frequency/Load control adjustment, the Voltage/PF control has to be adjusted.

Frequency & Synchronization Adjustment

Frequency and Angle control loop is active during synchronization process.

1. Set the **Frequency Gain (page 351)** to 0 and start the system in MAN Mode.
2. In case of MCB application follow the synchronization procedure over the MGCB according to rules described in particular Gen-set guide.
3. Change the Gen-sets Speed Bias a little bit to get different frequency than Mains frequency.
4. Set **Angle Gain (page 352)** to 0 and start the synchronization by pressing MGCB ON/OFF button. MGCB LED starts to flash to indicate synchronization. To stop synchronization press again MGCB ON/OFF.
5. Adjust **Frequency Gain (page 351)** to unstable frequency control and decrease value by 30 % to insure stable performance.
6. Adjust **Frequency Int (page 352)** to stable (fast and smooth) frequency control and change Gen-sets Speed Bias back to original value.
7. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because **Angle Gain (page 352)** control is off).
8. Set **Angle Gain (page 352)**. Synchroscope on the controller measure screen should move slowly and stop in “up” position. Set **Angle Gain (page 352)** to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.
9. Now your frequency regulation loop setup is done.

Load Control Adjustment

MINT application

Load control loop is active in parallel to mains mode only (**MCB FEEDBACK (PAGE 547)** is closed). Switch off other parts of the system (Gen-sets) while adjusting.

1. Set **#System Baseload (page 241)** setpoint to 30 % of one Controller.
2. Set **Load Gain (page 338)** to the same value as **Angle Gain (page 352)** and **Load Int (page 339)** to 0.
3. Start the Controller in MAN Mode, press MGCB ON/OFF button to synchronize and close Controller to mains.
4. When MGCB is closed, Controller load slowly increases to the **#System Baseload (page 241)** value. Check that Controller power is positive (CT polarity).
5. Increase **Load Int (page 339)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 339)** factor is set to zero Controller load can differ from required **#System Baseload (page 241)**.
6. To adjust and optimize **Load Int (page 339)** change **#System Baseload (page 241)** several times between 30 and 70 % of **Nominal DC Shore Power (page 258)**.
7. Now your Load regulation loop setup is done.

SPTM application

Load control loop is active in parallel to mains mode only (**MCB FEEDBACK (PAGE 547)** is closed).

1. Set **Load Control PTM Mode (page 240)** = BASELOAD, **BESS P request source (page 1)** = Setpoint, **BESS Charge Power (page 1)/BESS Discharge Power (page 1)** setpoint to 30 % **Nominal DC Shore Power (page 258)** of Controller and activate **LB1 BATT CHARGE ENABLE (PAGE 1)/BATT DISCHARGE ENABLE (PAGE 1)**.
2. Set **Load Control PTM Mode (page 240)** = BASELOAD, set **Baseload (page 1)** setpoint to 30 % **Nominal DC Shore Power (page 258)** of Controller.
3. Set **Load Gain (page 338)** to the same value as **Angle Gain (page 352)**. Set **Load Int (page 339)** to zero.
4. Start the Controller in MAN Mode, press MGCB ON/OFF button to synchronize and close Bus to mains.
5. When MGCB is closed, Controller load slowly increases to **BESS Charge Power (page 1)/BESS Discharge Power (page 1)** value **Baseload (page 1)** value. Check that Controller power is positive (CT polarity).
6. Increase **Load Gain (page 338)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 339)** factor is set to zero Controller load can differ from required **BESS Charge Power (page 1)/BESS Discharge Power (page 1)** **Baseload (page 1)**.
7. To adjust and optimize **Load Int (page 339)** change **BESS Charge Power (page 1)/BESS Discharge Power (page 1)** **Baseload (page 1)** several times between 30 and 70 % of **Nominal DC Shore Power (page 258)**. Usually setting **Load Int (page 339)** to 100% gives optimal performance.
8. When Controller is running under full load check if speed governor output voltage value is not limited (it does not reach **Speed Governor Low Limit (page 1)** or **Speed Governor High Limit (page 1)**).
 - a. Speed governor output voltage value is not limited (it does not reach **Speed Governor Low Limit (page 1)** or **Speed Governor High Limit (page 1)**)
 - b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.
9. Now your Load regulation loop setup is done.

Load control loop is active in parallel to mains mode only (**MCB FEEDBACK (PAGE 547)** is closed). 1 Gen-set is enough for settings, switch off other Gen-sets while adjusting.

1. Set **#System Baseload (page 241)** setpoint to 30 % of one Gen-set.
2. Set **Load Gain (page 338)** to the same value as **Angle Gain (page 352)** and **Load Int (page 339)** to 0.

3. Start the system in MAN Mode, press MGCB ON/OFF button to synchronize and close Gen-set to mains.
4. When MGCB is closed, Gen-set load slowly increases to **#System Baseload (page 241)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load Int (page 339)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 339)** factor is set to zero Gen-set load can differ from required **#System Baseload (page 241)**.
6. To adjust and optimize **Load Int (page 339)** change **#System Baseload (page 241)** several times between 30 and 70 % of **Nominal DC Shore Power (page 258)**.
7. Now your Load regulation loop setup is done.

5.4.20 Output Control - Voltage/PF

The voltage control output is used to control the voltage or the power factor of the Gen-set. The voltage regulation, PF regulation and VAr sharing are realized through the voltage control. The voltage request is internal value of the regulator which is transformed to range 0...100% of the **Varsharing Output (page 468)** which comes out of the controller via communication line. Gen-set accepts this value and transform this to its AVR control output.

Voltage/PF control adjustment

Voltage Adjustment

1. Set **Voltage Gain (page 353)**, **Voltage Int (page 353)** to 0 .
2. Start the System in MAN Mode without load.
3. Increase **Voltage Gain (page 353)** to unstable voltage control and decrease value by 30 % to insure stable performance.
4. Adjust **Voltage Int (page 353)** to stable (fast and smooth) voltage control.
5. Now your voltage regulation loop setup is done.

PF Adjustment

Power factor control loop is active in parallel to mains mode only (**MCB FEEDBACK (PAGE 547)** is closed).

1. Set **PF Gain (page 345)** to the same value as parameters **Voltage Gain (page 353)** and **Voltage Int (page 353)** to 0.
2. Set **#System Baseload (page 241)** = 30 % of **Nominal DC Shore Power (page 258)** and **#System Power Factor (page 245)** = 1.0.
3. Start and synchronize the system in MAN Mode by pressing MGCB ON/OFF (in case of MCB application press the MGCB button on Gen-set controller).
4. When running in parallel to mains loaded on 30%, increase slowly **PF Gain (page 345)** to unstable point and then decrease the value by 30 % to insure stable performance.
5. Increase **Load Int (page 339)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 339)** factor is set to zero Controller load can differ from required **#System Power Factor (page 245)**.
6. Now your PF/Q regulation loop setup is done.

5.4.21 Parallel To Mains Operation

Ramping the power	144
Load control	145
PF/Q control	146
Transfers of Load	149

This chapter describes the situation where the multiple Gen-sets are running parallel to mains. This situation will occur when the common bus bar is connected to the mains (**MCB FEEDBACK (PAGE 547)** is present) and the group of Gen-sets has been connected to the bus. If the bus bar is healthy, all Gen-sets will synchronize to the already energized bus bar.

IMPORTANT: The controller in MINT application does not control the MCB! Only the MCB position is evaluated from the binary input MCB FEEDBACK (PAGE 547) and the position is the basic source of information for switching between island and parallel to mains operation. If MCB Feedback is not configured the state is automatically shared via intercontroller CAN.

Ramping the power

Power up

Ramp up starts when value **Required P Target (page 465)** is increased above value **Required P (page 466)**. The first phase of the parallel to mains operation is the ramp of the system up to the desired power level. Ramp starts when value **Required P Target (page 465)** rises. If the MGCB has been just closed, value **Required P (page 466)** is ramped from 0 kW up to the new value of **Required P Target (page 465)** based on **Load Ramp (page 343)**, otherwise is value **Required P (page 466)** ramped from **Total Running P (page 462)**. Setpoint **Load Ramp (page 343)** determines how long it shall take to ramp up from 0 kW to **Running Nominal Power Of All (page 463)**.

Examples	Description
<ul style="list-style-type: none">> Nominal Mains Import = 100 kW> Load Ramp = 10 s> #System Baseload = 50 kW	MGCB gets closed, Required P is ramped from 0 kW to 50 kW in 5 s.
<ul style="list-style-type: none">> Nominal Mains Import = 100 kW> Load Ramp = 10 s> #System Baseload = 70 kW	MGCB is closed, Total Running P = 50 kW, #System Baseload is changed to 70 kW. Required P is ramped from 50 kW To 70 kW in 2 s.

Power down

Ramp down starts when value **Required P Target (page 465)** drops, value **Required P (page 466)** is ramped from **Total Running P (page 462)** down to the new value of **Required P Target (page 465)** based on **Load Ramp (page 343)**. Setpoint **Load Ramp (page 343)** determines how long it shall take to ramp down from **Nominal DC Shore Power (page 258)** to 0 kW.

Soft unload

When MGCB is about to be opened (MGCB open command or stop command have been received), controller uses for ramping to **Generator Unload MGCB Open Level (page 342)**.

🔍 back to Parallel To Mains Operation

Load control

If **MCB FEEDBACK** (PAGE 547) is active (parallel to mains operation) the load of Gen-set group is controlled to reach the power defined by setpoint **#System Baseload** (page 241) or **Import Load** (page 242) or by Load Sharing line. If the setpoint **#System Load Control PTM** (page 239) = Load Shar the system load is regulated by the IntelliMains supervisor controller, otherwise the load is controlled locally in each controller by load control regulation loop. The regulation loop is adjusted via setpoints **Load Gain** (page 338) and **Load Int** (page 339).

System Baseload

System baseload ensures that the system keeps certain **Total Running P** (page 462), which is given by **Required P** (page 466). **Required P** (page 466) is ramped to **Required P Target** (page 465) using **Load Ramp** (page 343).

#System Load Control PTM (page 239) has to be adjusted to Load Shar, **Load Control PTM Mode** (page 240) has to be adjusted to Baseload and **Required P Target** (page 465) is given by:

- If **Load Request Source** (page 238) = Setpoint, **Required P Target** (page 465) = **#System Baseload** (page 241).
- If **Load Request Source** (page 238) = Analog External Value, **Required P Target** (page 465) is equal to value from **LAI LOAD CONTROL: ANEXT BASELOAD** (PAGE 596).

Note: *Required P Target* (page 465), (*Mains Import P* (page 439)) can be limited in case of applied *Import/Export Limitation* (page 241).

Note: *In case LAI LOAD CONTROL: ANEXT BASELOAD* (PAGE 596) is not configured or has *Invalid flag* (page 434), the setpoint source is used instead of AIN.

Import/Export

Import/Export ensures that the Gen-sets regulates their power to keep certain **Mains Import P** (page 439). **Total Running P** (page 462) is given by **Required P** (page 466) which is ramped to **Required P Target** (page 465) using **Load Ramp** (page 343).

#System Load Control PTM (page 239) has to be adjusted to Load Shar, **Load Control PTM Mode** (page 240) has to be adjusted to Import/Export and **Required P Target** (page 465) is given by:

- If **Load Request Source** (page 238) = Setpoint, **Mains Import P** (page 439) = **Import Load** (page 242).
- If **Load Request Source** (page 238) = Analog External Value, **Mains Import P** (page 439) is equal to value from **LAI LOAD CONTROL: ANEXT IMP/EXP LOAD** (PAGE 597).

Note: *In case LAI LOAD CONTROL: ANEXT IMP/EXP LOAD* (PAGE 597) is not configured or has *Invalid flag* (page 434), the setpoint source is used instead of AIN.

⬅ back to Parallel To Mains Operation

PF/Q control

PF Control	146
Q Control	146
Q(Um)	147
Q(P)	148
Qref/Ulim	149

If **MCB FEEDBACK (PAGE 547)** is active (Parallel To Mains Operation) the PF/Q of Gen-set is controlled to reach the PF/Q defined by setpoint **#System Power Factor (page 245)/#System Base Q (page 246)** or **Import Power Factor (page 247)/Import Q (page 247)**. Var Sharing line is used automatically if Load Sharing is active or while island operation. If the setpoint **#System PF Control PTM (page 244) = Var Shar** the system PF/Q is regulated by the IntelliMains supervisor controller, otherwise the load is controlled locally in each controller by var control regulation loop. The regulation loop is adjusted via setpoints **PF Gain (page 345)** and **PF Int (page 346)**.

IntelliMains controller offers 6 modes for controlling of PF/Q. PF/Q control ensures that the system keeps a certain **Total Running Power Factor (page 462)** or **Total Running Q (page 462)** (based on selected mode) in parallel to Mains operation(**Breaker state (page 473) = ParalOper**) and at least one Gen-set is excited.

Note: Mains controller plays active role in case of the PF/Q control only in case the setpoint **#System PF Control PTM (page 244)** is set to **Var Shar**, otherwise the PF/Q control is controlled by Gen-set controllers and their PF control loops.

PF Control

PF Control ensures that the system keeps certain **Total Running Q (page 462)**, which is given by **Required PF (page 467)**. To enable this control, adjust **#System PF Control PTM (page 244)** to **Var Shar** and **PF/Q Control PTM Mode (page 244)** to **PF Control**.

System Base PF

PF/Q Regulation Type (page 245) has to be adjusted to **Base PF/Q Control**. The **Required PF (page 467)** with **Required PF Character (page 467)** are based on:

- **System PF/Q Control (page 466) = PF Control BASE** and
 - **PF/Q Request Source (page 243) = Setpoint**, **Required PF (page 467)** is given by the Setpoint **#System Power Factor (page 245)** or
 - **PF/Q Request Source (page 243) = Analog External Value**, **Required PF (page 467)** is given by value from **LAI PF CONTROL: ANEXT BASE PF (PAGE 1)**.

PF/Q Regulation Type (page 245) has to be adjusted to **Import/Export PF/Q Control**. The **Required PF (page 467)** with **Required PF Character (page 467)** are based on:

Q Control

Total Running Power Factor (page 462) is adjusted to reach **Required Q (page 467)**. To enable this control, adjust **#System PF Control PTM (page 244)** to **Var Shar** and **PF/Q Control PTM Mode (page 244)** to **Q Control**.

System Base Q

PF/Q Regulation Type (page 245) has to be adjusted to **Base PF/Q Control**. The **Required PF (page 467)** with **Required PF Character (page 467)** are based on:

- **System PF/Q Control (page 466) = Q Control BASE and**
 - **PF/Q Request Source (page 243) = Setpoint, Required Q (page 467) is given by #System Base Q (page 246) or**
 - **PF/Q Request Source (page 243) = Analog External Value, Required Q (page 467) is given by value from LAI Q Control: ANEXT Base Q (page 1).**

Import/Export Q

PF/Q Regulation Type (page 245) has to be adjusted to Import/Export PF/Q Control. The **Required PF (page 467)** with **Required PF Character (page 467)** are based on:

- **System PF/Q Control (page 466) = Q Control IMP/EXP and**
 - **PF/Q Request Source (page 243) = Setpoint, Mains Import Q (page 439) is given by Import Q (page 247) or**
 - **PF/Q Request Source (page 243) = Analog External Value, Mains Import Q (page 439) is given by value from LAI Q CONTROL: ANEXT IMP/EXP Q (PAGE 1).**

Note: Alarm **Wrn PF/Q IMP/EXP Fail (page 663)** is activated if:

- **Mains Measurement P (page 250) = None**
- **Mains Measurement P (page 250) = Analog Input and LAI MAINS MEASUREMENT P (PAGE 597) is either not configured or has Invalid flag (page 434).**
- **Mains Measurement Q (page 251) = None**
- **Mains Measurement Q (page 251) = Analog Input and LAI MAINS MEASUREMENT Q (PAGE 597) is either not configured or has Invalid flag (page 434).**

🔍 back to PF/Q control

Q(Um)

Total Running Q (page 462) is automatically adjusted to correspond with predefined **Required Q (page 467)** upon change of relative Mains voltage. The predefined **Required Q (page 467)** is adjusted by application curve **Q(UM) (PAGE 1)**

Base Q(Um)

PF/Q Regulation Type (page 245) has to be adjusted to Base PF/Q Control. The **Required PF (page 467)** with **Required PF Character (page 467)** are based on:

- **System PF/Q Control (page 466) = Q(Um) BASE and**
 - **PF/Q Request Source (page 243) = Setpoint, Required Q (page 467) is given by Q(UM) (PAGE 1) curve. The curve can be offset horizontally by Q(um) 0 Reference (page 1) and in case of Mains Voltage changes too fast, there is Q(UM) Deadband (page 1). Actual value of the curve is stored in Q (Um) Curve (page 1). Or**
 - **PF/Q Request Source (page 243) = Analog External Value, Required Q (page 467) is still given by Q(UM) (PAGE 1) curve, but the horizontal offset is given by value of LAI Q(UM): 0 REF ANEXT BASE Q (PAGE 1) System PF/Q Control (page 466) Q(UM) Deadband (page 1) can also be applied. Actual value of the curve is stored in Q(UM) Curve (page 1).**

Note: Alarm **Wrn Q(Um) Fail (page 1)** is activated if **LAI Q(UM): 0 REF ANEXT BASE Q (PAGE 1)** is not configured or has **Invalid flag (page 434)**. Power is controlled as if **PF/Q Request Source (page 243) = Setpoint**.

Import/Export Q(Um)

PF/Q Regulation Type (page 245) has to be adjusted to Import/Export PF/Q Control. The **Required PF** (page 467) with **Required PF Character** (page 467) are based on:

- **System PF/Q Control** (page 466) = Q(Um) BASE and
 - **PF/Q Request Source** (page 243) = Setpoint, **Required Q** (page 467) is given by **Q(UM)** (PAGE 1) curve. The curve can be offset horizontally by **Q(um) 0 Reference** (page 1) and in case of Mains Voltage changes too fast, there is **Q(UM) Deadband** (page 1). Actual value of the curve is stored in **Q(Um) Curve** (page 1). Or
 - **PF/Q Request Source** (page 243) = Analog External Value, **Required Q** (page 467) is still given by **Q(UM)** (PAGE 1) curve, but the horizontal offset is given by value of **LAI Q(UM): 0 REF ANEXT BASE Q** (PAGE 1). **System PF/Q Control** (page 466) **Q(UM) Deadband** (page 1) can also be applied. Actual value of the curve is stored in **Q(UM) Curve** (page 1).

Note: Alarm **Wrn Q(Um) Fail** (page 1) is activated if **LAI Q(UM): 0 REF ANEXT BASE Q** (PAGE 1) is not configured or has **Invalid flag** (page 434). Power is controlled as if **PF/Q Request Source** (page 243) = Setpoint.

Note: Alarm **Wrn PF/Q IMP/EXP Fail** (page 663) is activated if:

- **Mains Measurement P** (page 250) = None
- **Mains Measurement P** (page 250) = Analog Input and **LAI MAINS MEASUREMENT P** (PAGE 597) is either not configured or has **Invalid flag** (page 434).
- **Mains Measurement Q** (page 251) = None
- **Mains Measurement Q** (page 251) = Analog Input and **LAI MAINS MEASUREMENT Q** (PAGE 597) is either not configured or has **Invalid flag** (page 434).

⬅ back to PF/Q control

Q(P)

Total Running Q (page 462) is automatically adjusted to correspond with predefined **Required Q** (page 467) based on **Total Running P** (page 462). The predefined **Required Q** (page 467) is adjusted by application curve **Q(P)** (PAGE 599). To enable this control, adjust **#System PF Control PTM** (page 244) to Var Shar and **PF/Q Control PTM Mode** (page 244) to Q(P).

Base Q(P)

PF/Q Regulation Type (page 245) has to be adjusted to Base PF/Q Control. The **Total Running Q** (page 462) is based on:

- **System PF/Q Control** (page 466) = Q(P) BASE and
 - **PF/Q Request Source** (page 243) = Setpoint, **Required Q** (page 467) is given by **Q(P)** (PAGE 599) curve in x-axe range 0 to 100 %. Or
 - **PF/Q Request Source** (page 243) = Analog External Value, alarm **Wrn Q(P) Fail** (page 664) is immediately activated because this control mode does not support external analog value. Power is controlled as if **PF/Q Request Source** (page 243) = Setpoint.

Import/Export Q(P)

PF/Q Regulation Type (page 245) has to be adjusted to Import/Export PF/Q Control. The **Required Q** (page 467) is based on:

- **System PF/Q Control (page 466)** = Q(P) IMP/EXP and
 - **PF/Q Request Source (page 243)** = Setpoint, **Mains Import Q (page 439)** is given by **Q(P) (PAGE 599)** curve in x-axe range -100 to 100 %. Or
 - **PF/Q Request Source (page 243)** = Analog External Value, alarm **Wrn Q(P) Fail (page 664)** is immediately activated because this control mode does not support external analog value. Power is controlled as if **PF/Q Request Source (page 243)** = Setpoint.

Note: Alarm **Wrn PF/Q IMP/EXP Fail (page 663)** is activated if:

- **Mains Measurement P (page 250)** = None
- **Mains Measurement P (page 250)** = Analog Input and **LAI MAINS MEASUREMENT P (PAGE 597)** is either not configured or has **Invalid flag (page 434)**.
- **Mains Measurement Q (page 251)** = None
- **Mains Measurement Q (page 251)** = Analog Input and **LAI MAINS MEASUREMENT Q (PAGE 597)** is either not configured or has **Invalid flag (page 434)**.

⬅ back to PF/Q control

Qref/Ulim

Total Running Q (page 462) is automatically adjusted to correspond with predefined **Required Q (page 467)** upon change of relative Mains voltage. The predefined **Required Q (page 467)** is adjusted by application curve **QREF/ULIM (PAGE 1)**. To enable this control, adjust **#System PF Control PTM (page 244)** to Var Shar and **PF/Q Control PTM Mode (page 244)** to Qref/Ulim.

Base Qref/Ulim

PF/Q Regulation Type (page 245) has to be adjusted to Base PF/Q Control. The **Required PF (page 467)** with **Required PF Character (page 467)** are based on:

⬅ back to Parallel To Mains Operation

Transfers of Load

Type of transfer of load between mains and bus and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 341)** and **Transfer Mains To Gen (page 340)**.

Types of transfers

Open	Transfer of the load from bus to mains and vice versa without parallel work and synchronization (one breaker opens and second is closed - checking feedbacks). The setpoint Open Transfer Min Break (page 339) sets the minimal duration of break.
Close Only	Transfer of the load from bus to mains and vice versa with synchronization and parallel work. The time of parallel work is given by setpoint Close Transfer Max Duration (page 339) . In case of synchronization fail, MCB stays closed and system start is deactivated.
Close Primarily	Transfer of the load from bus to mains and vice versa with synchronization and parallel work. The time of parallel work is given by setpoint Close Transfer Max Duration (page 339) . In case of synchronization fail, open transfer is done.
Soft Transfer	Transfer of the load from bus to mains and vice versa with parallel work and soft

	loading/unloading of the Gen-sets. This function is proceeded like the closed transfer, but there is time limitation of loading/unloading of the Gen-sets adjusted via setpoint Load Ramp (page 343) . The transfer is succeed only when the Gen-sets are fully loaded/unloaded (level of load when mains is considered as unloaded – Gen-sets are loaded is adjusted via setpoint Mains Unload MCB Open Window (page 342)), level of load when Gen-sets are considered as unloaded is adjusted via setpoint Generator Unload MGCB Open Level (page 342)).
--	---

Transition in MAN

Behavior of transfer of load in MAN mode is adjusted via setpoint **CB Control In MAN Mode (page 248)**.

Full Ctrl	No limitation of CB control in MAN mode (operator can close any breaker manually or evoke the synchronization and consequential operation in parallel to mains).
Aut Trans	Operator can control both MCB or MGCB breaker. However once synchronization is evoked the controller performs the automatic transfer of the load (depends on adjustment of setpoints Transfer Gen To Mains (page 341) and Transfer Mains To Gen (page 340)).
Islnd Disl	Behaves like the full manual control but the Island operation is disabled. <div style="margin-left: 20px;"> <div style="display: inline-block; width: 10px; height: 10px; background-color: #007bff; margin-right: 5px;"></div> Example: When MCB opened and MGCB pressed, controller don't go to island. <div style="display: inline-block; width: 10px; height: 10px; background-color: #007bff; margin-right: 5px;"></div> Example: In parallel operation when MCB button pressed, MCB is not opened. </div>

IMPORTANT: Control of MGCB is affected by SYSTEM START/STOP (PAGE 591) even in Controller mode (page 267) = MAN. SYSTEM START/STOP (PAGE 591) has to be active before MGCB can be closed. You can activate SYSTEM START/STOP (PAGE 591) for example by pressing the  Start Button.

Transition in AUTO

Behavior of transfer of load in AUTO mode is affected by binary inputs **FORCE ISLAND (PAGE 537)**, **FORCE PARALLEL (PAGE 538)** and **REMOTE START/STOP (PAGE 560)**.

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

- > **FORCE ISLAND (PAGE 537)** (highest priority).
- > **REMOTE START/STOP (PAGE 560)**.
- > **FORCE PARALLEL (PAGE 538)** (lowest priority).

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

Logical binary input	AUTO mode	TEST mode
FORCE ISLAND (PAGE 537)	<p>When activated:</p> <ul style="list-style-type: none"> > System Start/Stop is activated > the transfer of load from mains to Mains is done <p>When deactivated:</p> <ul style="list-style-type: none"> > the transfer of load from Mains to mains is done > System Start/Stop is deactivated 	<p>The System Start/Stop is activated anyway due to the TEST mode.</p> <p>When activated:</p> <ul style="list-style-type: none"> > the transfer of load from mains to Mains is done <p>When deactivated:</p> <ul style="list-style-type: none"> > the transfer of load from Mains to mains is done
REMOTE START/STOP (PAGE 560)	<p>When activated:</p> <ul style="list-style-type: none"> > System Start/Stop activated > if mains parameters ok - synchronize, run in parallel > if mains parameters not ok - run in island <p>When deactivated:</p> <ul style="list-style-type: none"> > unloading (if Gen-set was in parallel), System Start/Stop deactivated 	<p>The System Start/Stop is activated anyway due to the TEST mode.</p> <p>When activated:</p> <ul style="list-style-type: none"> > if mains parameters ok - synchronize, run in parallel <p>When deactivated:</p> <ul style="list-style-type: none"> > unloading, System Start/Stop is deactivated
FORCE PARALLEL (PAGE 538)	<p>When activated:</p> <ul style="list-style-type: none"> > check mains parameters - if not ok no action, if ok the procedure follows > System Start/Stop activated, synchronize, parallel operation > in case of mains fail - System Start/Stop is deactivated (if AMF function is disabled, otherwise it goes to island operation) <p>When deactivated:</p> <ul style="list-style-type: none"> > unloading, deactivated System Start/Stop 	<p>The System Start/Stop is activated anyway due to the TEST mode.</p> <p>When activated:</p> <ul style="list-style-type: none"> > check mains parameters - if not ok no action, if ok the procedure follows > synchronize, parallel operation <p>When deactivated:</p> <ul style="list-style-type: none"> > unloading, deactivated System Start/Stop

Type of transfer of load between mains and Gen-sets and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 341)** and **Transfer Mains To Gen (page 340)**.

5.4.22 Peak shaving

IMPORTANT: This chapter is relevant only for SPTM application.

The function compares the mains import with some certain limit and start the Gen-set when the load excised this limit to decrease the mains import for some certain time.

The Peak shaving function is active only in AUT mode in parallel to mains operation. Peak shaving is based on active power only. If load consumption increases over **Peak Shaving Start Level (page 252)** and for period longer than **Peak Shaving Start/Stop Delay (page 253)** the Gen-set is started. If load consumption decreases below **Peak Shaving Stop Level (page 252)** and period longer than **Peak Shaving Start/Stop Delay (page 253)** the Gen-set is stopped. The activation of the function is indicated by LBO:PEAK SHAVING ACTIVE (PAGE 589).

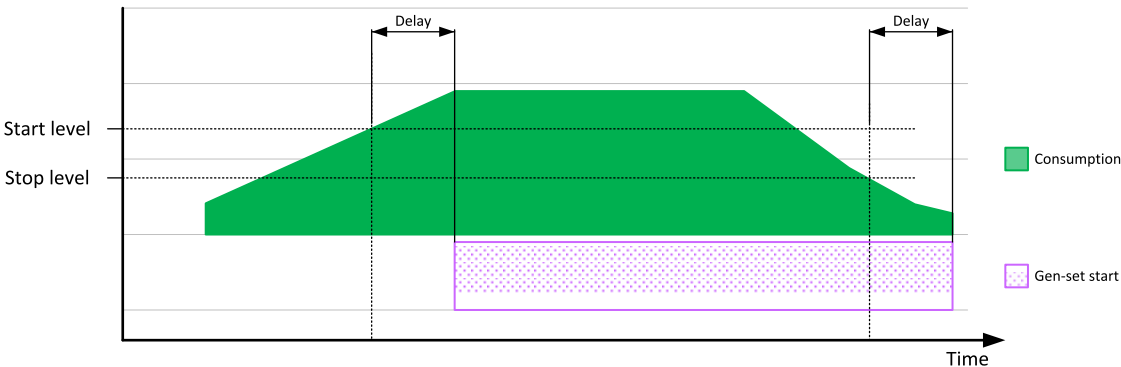


Image 5.92 Peak shaving

5.4.23 PLC - Programmable Logic Controller

List of available PLC blocks	154
PLC Editor	154
PLC logic execution rules	160
PLC monitor	161
Other functions	163

The Programmable Logic Controller (PLC) built into the ComAp controllers is generally a simple process unit used for the automation of processes. The major benefit of the PLC is you don't need any extra control devices in your control system. The PLC is tightly integrated with the standard line of controllers. That allows the PLC editor to be a seamless experience directly in the programming software. Flexibility is at the core of ComAp's software design and the PLC meets both simple and complex application requirements while using the same intuitive interface. PLC Editor is a powerful tool that helps you to create your own PLC scheme. It has a user-friendly graphical interface which makes it easy to use.

ComAp PLC Editor has been developed to help you deal with even the most demanding applications. It allows you to add control logic, additional alarm functions, or even new features to meet complex or unique requirements. This easy-to-use PLC Editor means you can customize the way the controller works to match the application precisely without compromise or limitation.

- Intuitive design, visual programming, and easy modification.
- All PLC function blocks can be moved both horizontally and vertically.
- Color-coded and linked to relevant functions.
- Blocks can be organized to reflect the real process flow.
- Groups of blocks can be separated on each sheet to form sub-sets within the design.
- Detailed descriptions of inputs and outputs come complete with useful hints

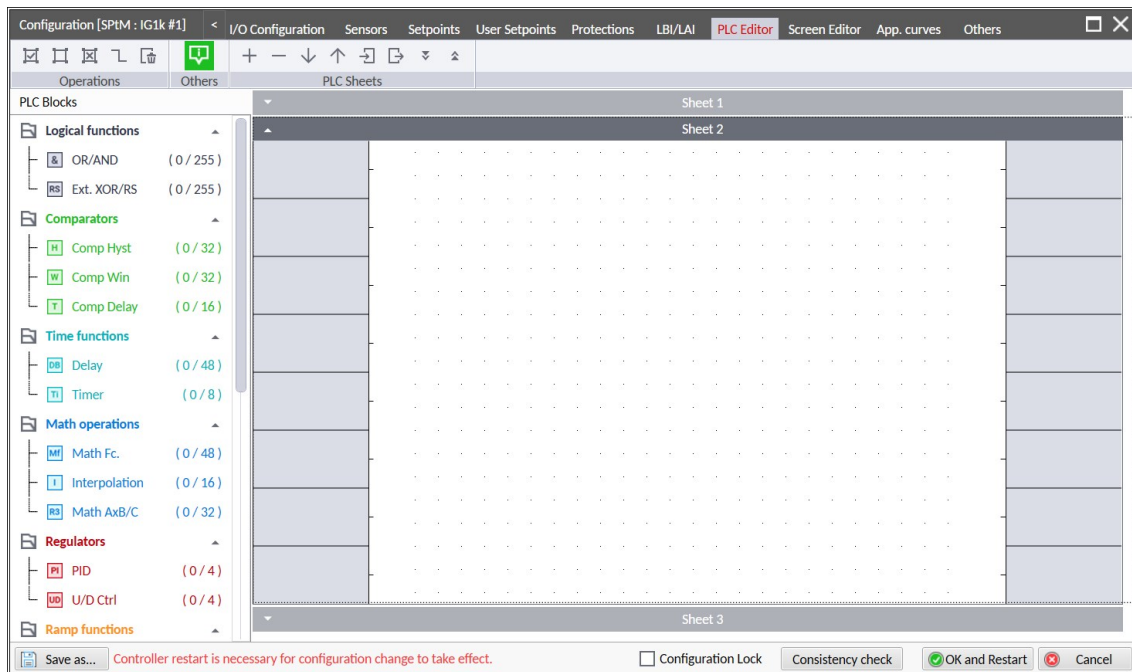


Image 5.93 PLC Editor - main page

List of available PLC blocks

In the table below you can find all available PLC blocks.

Group	PLC blocks	Number of blocks
Logical	OR/AND (page 608)	128
	XOR/RS (page 610)	128
Comparators	Comp Hyst (page 611)	16
	Comp Time (page 612)	8
	Comp Win (page 613)	16
Time functions	Delay (page 614)	16
	Timer (page 616)	4
Math Operations	Interpolation (page 619)	8
	Math Ax/B/C (page 620)	4
	Math Fc. (page 621)	16
Ramp functions	Inc/Dec (page 622)	2
	LowPassFilt (page 624)	2
	Ramp (page 624)	4
	Up/Down (page 625)	4
Others	Analog Switch (page 627)	8
	Analog Switch 8 (page 627)	8
	Convert (page 629)	8
	Counter (page 631)	4
	Decomp. 4 (page 632)	4

For more information about PLC blocks go to the chapter **PLC (page 607)**

🔍 back to PLC - Programmable Logic Controller

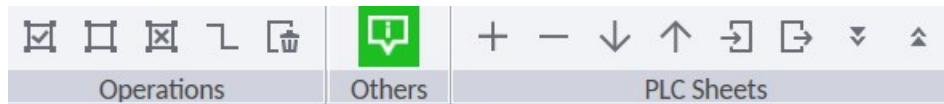
PLC Editor

Toolbar	154
Working with sheets	155
Blocks Selection Tree	155
Adding PLC blocks	156
PLC Block Configuration	157
Define inputs and outputs	158
Creating wires	159

The PLC Editor is available in IntelliConfig Control tab: use Control → Controller Configuration → PLC Editor.

Toolbar

In the upper part of the PLC editor panel there is a toolbar with buttons for working with PLC blocks and PLC sheets.



Operations

- > Select all elements in sheets
- > Unselect all selected elements
- > Delete all selected elements
- > Rotate selected items - wiring optimization
- > Delete whole content of currently selected sheet

PLC Sheets

- > Add and remove sheets
- > Move selected sheet down and up
- > Import sheet
- > Export selected sheet
- > Expand and Collapse all sheets

Others

- > Enable/Disable hints

🔍 back to PLC Editor

Working with sheets

PLC editor supports working with multiple sheets. You can add or delete sheets and move them up and down. Every sheet can be also renamed by double-click on sheet name "Sheet 1". Each sheet can be re-sized according to your needs by dragging the sheet edges. IntelliConfig also supports importing and exporting of the individual sheet.

Note: The number of PLC blocks on one PLC sheet is limited to 30 blocks.

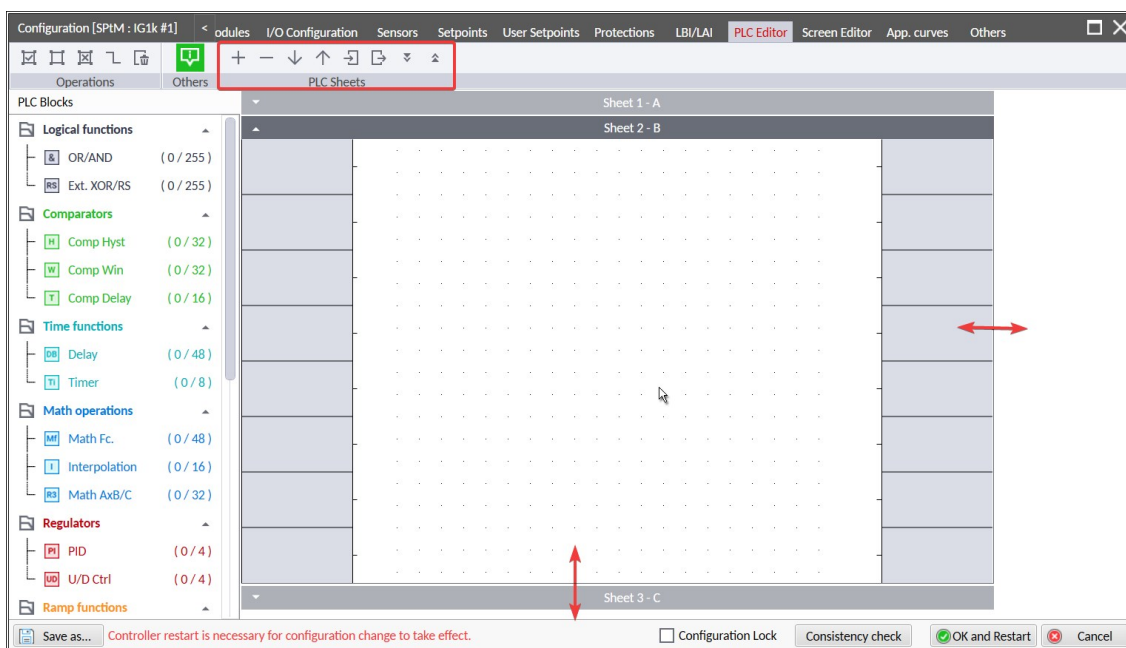


Image 5.94 Adjusting PLC sheet

🔍 back to PLC Editor

Blocks Selection Tree

On the left side of PLC Editor panel is available PLC blocks selection tree. Blocks are grouped into groups of similar functionality next to the name of each block the number of used /available blocks of that type is indicated in brackets.

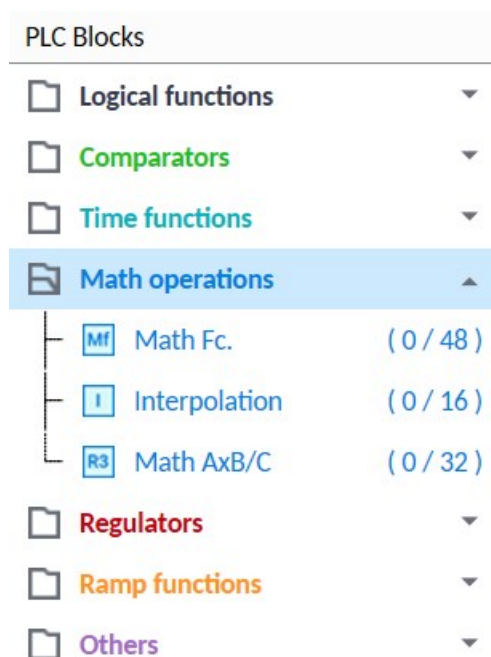


Image 5.95 Blocks selection tree

back to PLC Editor

Adding PLC blocks

Adding PLC block is using simple and intuitive drag and drop system. Follow the procedure below to add PLC block.

- Select required PLC block by LMB (left mouse button) from the list of available PLC blocks on the left side and drag it into the sheet.
- Connect the block inputs and outputs by drawing wires in the sheet. It is also possible to connected inputs and outputs via properties of selected PLC block.

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

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

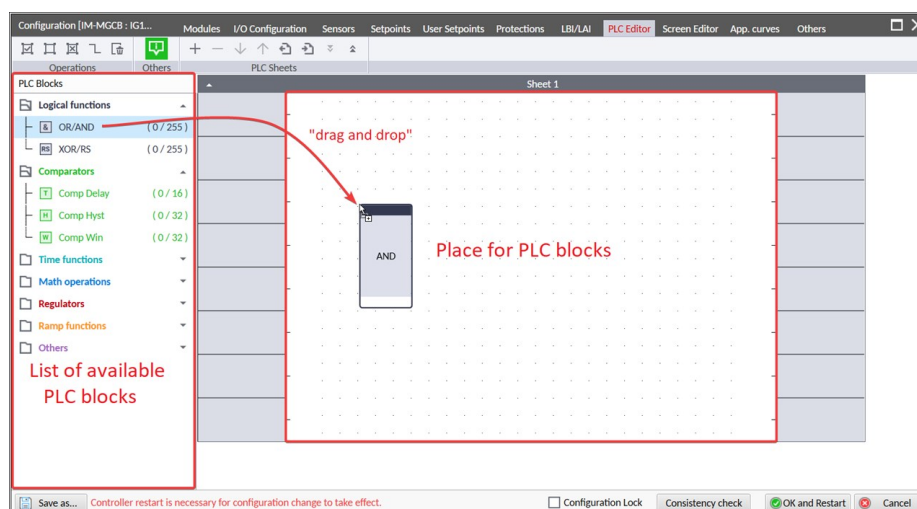


Image 5.96 Adding PLC blocks

⬅ back to PLC Editor

PLC Block Configuration

Double-click on the block by LMB (left mouse button) to invoke the configuration panel specific for each block type. In general, the definition of the block inputs and outputs is accompanied by some settings of block properties. See **PLC (page 607)** for more information about blocks.



PLC Editor: Function block

• Input run: [] [X] ☐ Inverted input

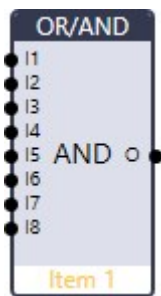
• Input reload: [] [X] ☐ Inverted input

• Input reload val: [] [X] [s] ☐ Inverted output

• Output: PLC-BOUT 1.5 ☐ First down

Timer mode: ComAp

OK Cancel



PLC Editor: Function block

No.	Input	Inv.
1	[] [X]	<input type="checkbox"/>
2	[] [X]	<input type="checkbox"/>
3	[] [X]	<input type="checkbox"/>
4	[] [X]	<input type="checkbox"/>
5	[] [X]	<input type="checkbox"/>
6	[] [X]	<input type="checkbox"/>
7	[] [X]	<input type="checkbox"/>
8	[] [X]	<input type="checkbox"/>

• Output: PLC-BOUT 1.8 ☐ Inverted output

Function type: AND

OK Cancel

- Selecting the **Inverted input** check box means using negated input when evaluating the block.
- Selecting the **Inverted output** check box means issuing a negated output value after the block has been internally evaluated.
- The binary values can be either controller Values, Setpoints or PLC binary outputs.
- The analog values can be either controller Values, Setpoints, PLC analog outputs or entered as direct constant block values. Non-numeric Setpoint values (e.g. IP address) cannot be used.
- If a variable (binary signal) is connected via wire, the connection appears directly in the field - otherwise the variable (binary signal) can be set using the dialog invoked by the '...' button.
- Specific properties of the block (e.g. function type, mode of operation, etc.) can be set in the corresponding panel object (list box, check box).
- If the block has a variable number of inputs, the '+' button (in the upper left corner) adds an additional input (channel) up to the maximum number of channels. Use 'X' button to remove a channel.

Note: If the constants are used (i.e. set by block configuration dialog) they cannot be changed dynamically during PLC execution.

⬅ back to PLC Editor

Define inputs and outputs

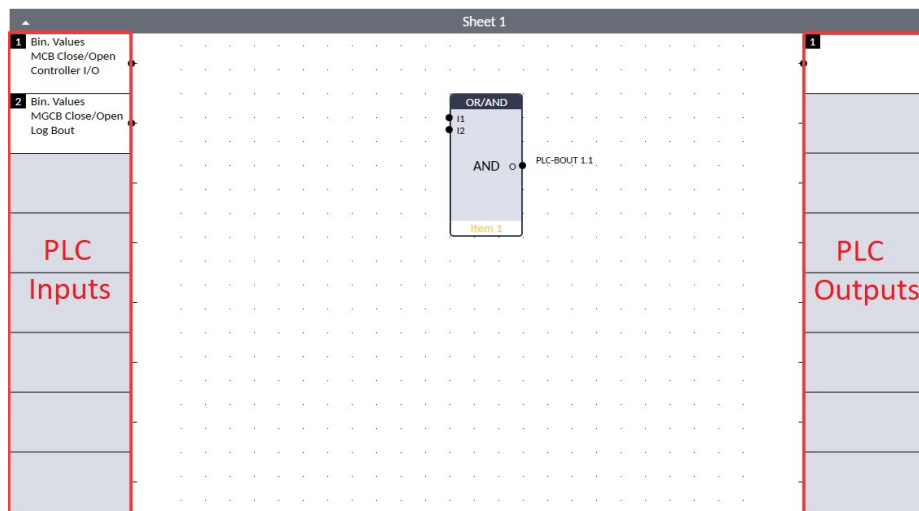


Image 5.97 PLC Inputs and Outputs

Inputs

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

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

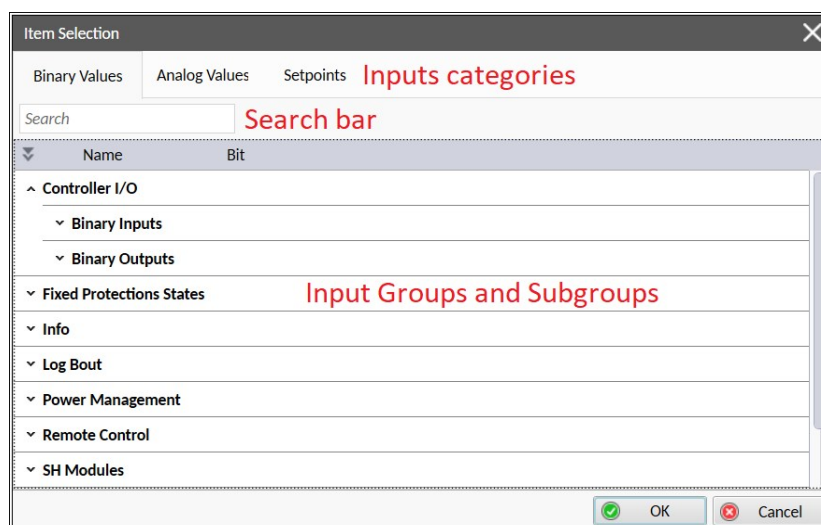


Image 5.98 PLC Inputs

Outputs

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

- Double-click on a free output position to add new sheet output (binary or analog).
- Draw the wire from the PLC block output to the PLC output on the right side of the sheet.
- Doubleclick on an already created output to open it's configuration.
- Use the button **+ Connect** to connect the PLC output onto a controller output terminal or a logical binary input.
- Use the button **- Disconnect** to disconnect the PLC output from a controller output terminal or a logical binary input.

Note: PLC block output has to be connected to the PLC output to enable configuration of the PLC output.

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

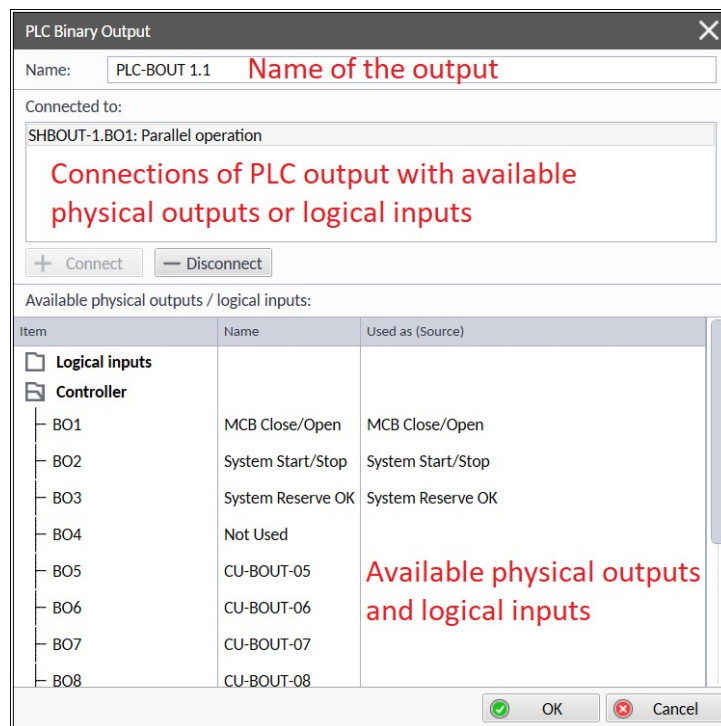


Image 5.99 PLC Outputs

[back to PLC Editor](#)

Creating wires

Wires can be created between PLC inputs and PLC block inputs, PLC block outputs nad PLC block inputs, or PLC block outputs and PLC outputs.

Follow the procedure below to create wire.

- Locate the mouse pointer over the starting point of the wire (dot). If the area under the mouse pointer is a connection point, the connection point changes to bold dot.
- Press and hold the left mouse button and drag the wire to the destination of required connection point (from dot to dot connection). If you point over a valid connection point, the connection point changes to bold dot.

- Release the left mouse button to create a wire between the two points (dots). The wire is routed automatically.

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

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

IMPORTANT: In case that values on inputs have different decimal numbers than the values are converted and the name of block is displayed as red in the PLC Monitor. It is strongly recommended to fix the configuration = use the signals/values with the same range and decimal numbers.

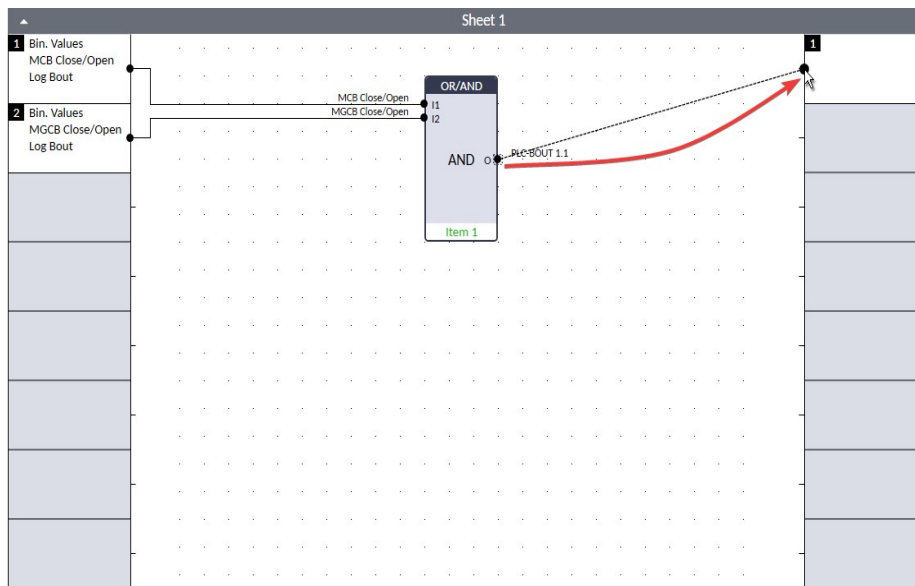


Image 5.100 Wiring PLC blocks

⬅ back to PLC Editor

⬅ back to PLC - Programmable Logic Controller

PLC logic execution rules

The PLC program is executed every 100 ms (this time is given by the PLC controller system integration) and cannot be changed. PLC execution starts automatically after the ComAp controller is powered on and the firmware initialization is completed.

The initial values for PLC inputs are given by the respective signals (e.g. actual power value) or determined by the specific PLC block settings.

PLC blocks are executed in the order of the block numbers (Item numbers), that appear in each block. Block numbers are assigned automatically according to the block position on the sheet based on the following scheme.

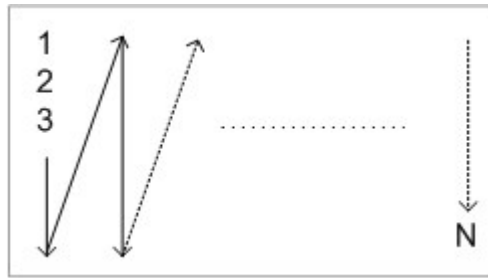
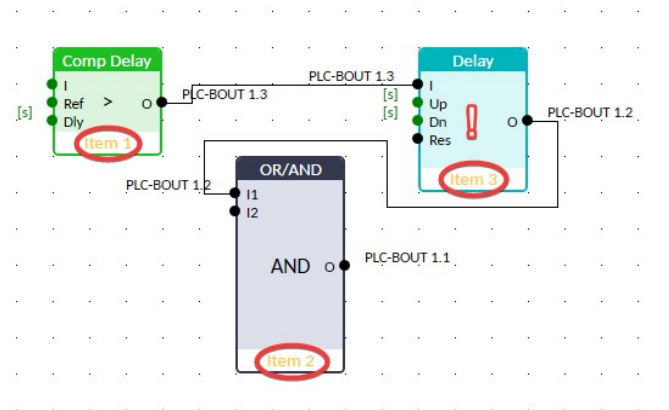
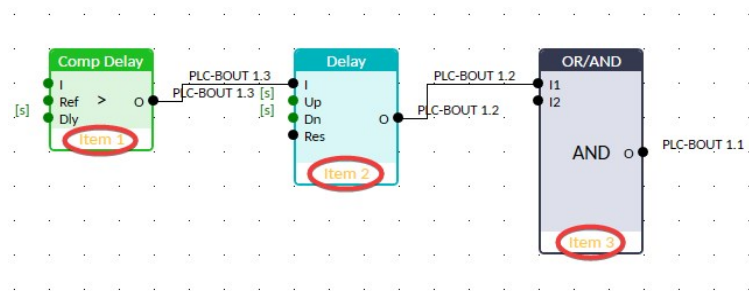


Image 5.101 PLC execution logic

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



The execution order is Item 1 → Item 2 → Item 3, so in the second case the AND block evaluation will use Timer block output before the update.

PLC monitor

PLC monitor is a powerful tool for monitoring your PLC. Just click on PLC Monitor button on main IntelliConfig page to see you PLC in the run time. The refresh rate is given by the system integration. The PLC Monitor is available in IntelliConfig Control tab.

PLC monitor supports working with multiple controllers - on the left side of the panel there is a selection tree for choosing the desired controller for PLC monitoring.

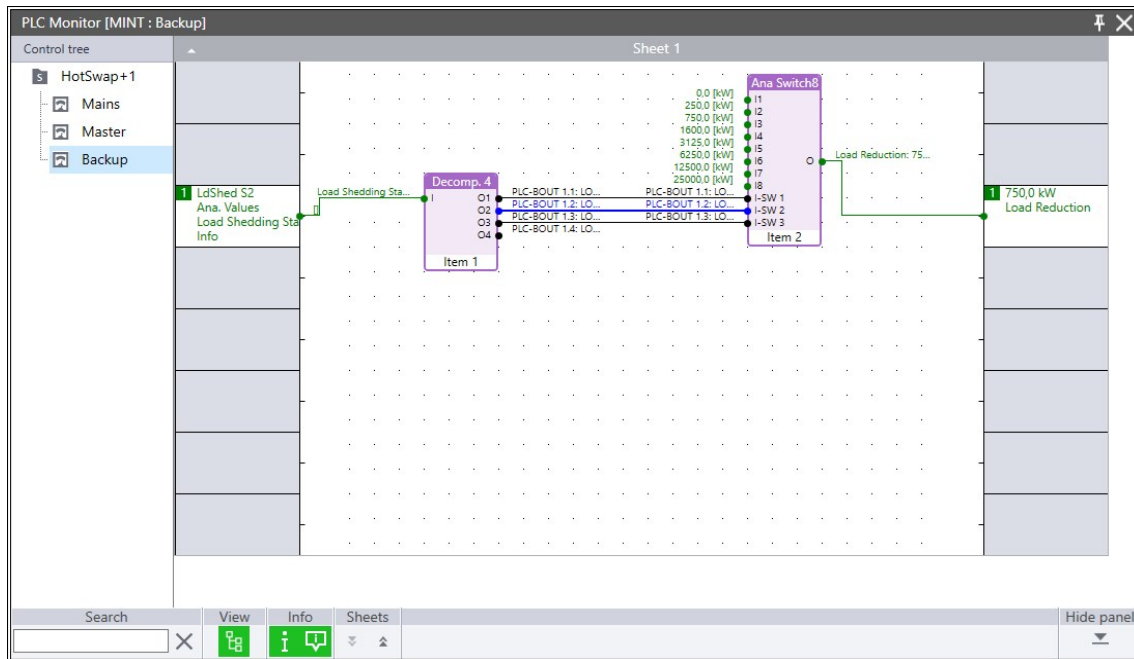


Image 5.102 PLC Monitor panel with multiple controllers

Note: In the PLC Monitor it is not possible to modify the PLC, not even the position of the blocks.

Active binary inputs, outputs and wires are blue, analog inputs, outputs and values are green. The values of analog signals (as well as constants set in the blocks configuration) are also visible.

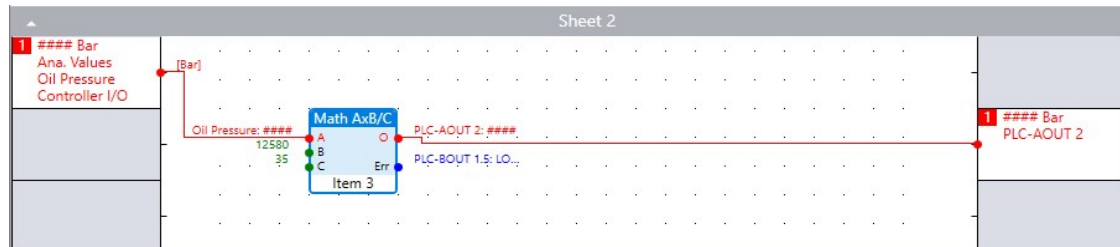
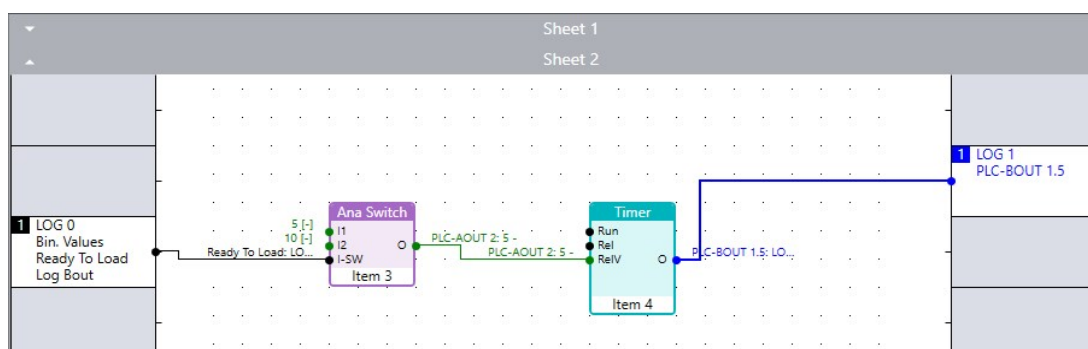


Image 5.103 PLC Monitor sheet with invalid value

Note: If the analog signal have an invalid value, the red "####" string is displayed and the connecting wire is also red.

The PLC monitor also supports multi-sheet monitoring - individual sheets can be hidden/expanded using the button in the top title bar.



⬅ back to PLC - Programmable Logic Controller

Other functions

Consistency check

This performs a check of the PLC schematic

- for the validity of the block interconnection = all inputs that are in internal design rules marked as mandatory are connected and/or configured
- for the consistency of the dimensions (setting attribute Dimension) and the number of decimal place (setting attribute Resolution) at both ends of the interconnection wire

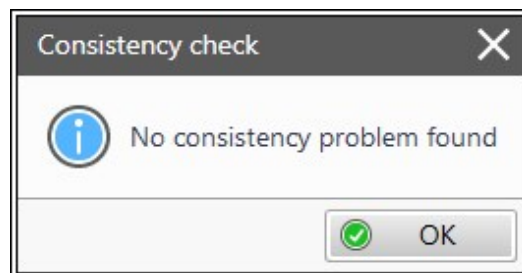


Image 5.105 Consistency Check valid output

Use this function during the design phase to check if all inputs and outputs of PLC block are connected properly, and the design is consistent. The check is also performed automatically when the configuration may be written to controller.

If the Consistency Check detect any problems, all findings will be displayed in the message window.

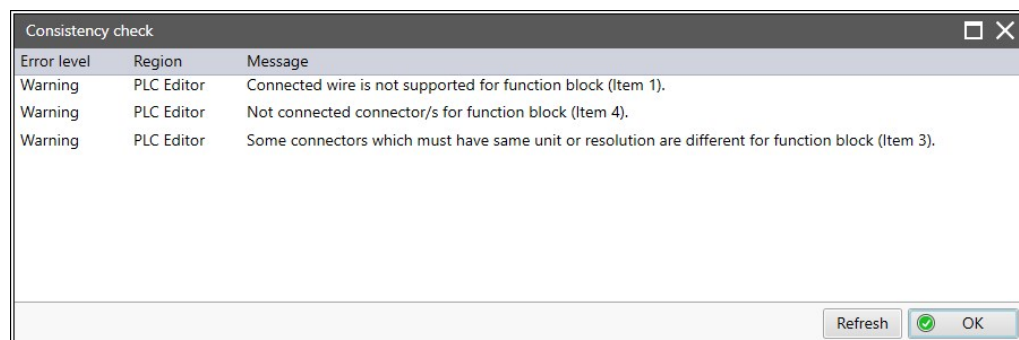


Image 5.106 Consistency Check report output

Message	Meaning	Remedy
Connected wire is not supported for function block (Item X)	Probably Resolution and/or Dimension mismatch on the wire	Use correct Resolution and/or Dimension on both ends of wire
Not connected connector/s for function block (item X)	Mandatory inputs of the block are not connected / configured	Connect and/or configure all mandatory inputs
Some connectors which must have same unit or resolution are different for function block (Item X)	Probably Resolution and/or Dimension mismatch on the wire or on Inputs and/or Output	Use correct Resolution and/or Dimension on both ends of wire of between block inputs and output

Note: The Consistency Check checks whole configuration so it can report findings outside the PLC configuration.

Delete whole content of sheet

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

IMPORTANT: The sheet content is deleted immediately, without confirmation dialog (and there is not any Undo or Redo button)!

Hints

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

Note: Each PLC block has help which is opened by selecting the block and pressing "F1".

5.4.24 Power Formats And Units

InteliMains 510 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

Small	0.1 kW / kVA / kVA _r	1 V
Standard	1 kW / kVA / kVA _r	1 V
Large HV	0.01 MW / MVA / MVA _r	0.01 kV
Large LV	0.01 MW / MVA / MVA _r	1 V

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

5.4.25 Power Management

Basic power management	165
Principle of power management	166
Load reserve	167
Starting sequence	168
Stopping sequence	169
Absolute power management	170
Relative power management	173
Priorities	175
Priority auto swap	176
Minimal running power	183
Dynamic Spinning Reserve	184

IMPORTANT: The Controller will take part of the power management (will be active) only if the controller is in AUTO mode!

The Power management function decides how many Controllers should run and selects particular Controllers to run. The power management is applicable in cases multiple Controllers run in parallel to mains or in the island operation. The function is based on the load evaluation in order to provide enough of available running power. Since it allows the system to start and stop Controllers based on the load demand, it can vastly improve the system fuel efficiency. In other words, an additional Controller starts when the load of the system raises above certain level. The additional Controller stops, when the load of the system drops down below a certain level. The process of determining Controller start and stop is done in each controller; there is no "master slave" system. Therefore, the system is very robust and resistant to failures of any unit in the system. Each of the controllers can be switched off without influencing the whole system. Except the situation the respective Controller is not available for the power management.

The power management evaluates so called **Load reserve (page 167)**. The load reserve is calculated as difference between actual load and nominal power of running Controllers. The reserve is calculated as absolute value (in kW / kVA) or relatively to the nominal power of Controller(s) (in %). The setpoint **#Power Management Mode (page 315)** is used to select the absolute or relative mode.

The Load Reserve can be influenced by the **Dynamic Spinning Reserve (page 184)** which is used to provide the system with extra power (running Controllers) in case of anticipated output drop of a renewable source of energy.

The function **Priority auto swap (page 176)** focuses on efficient run of Controller in regards to running hours and Controller size (power).

IMPORTANT: The function of the controller is designed to handle the maximum sum of nominal power at 32000 kW (or 3200,0 with decimal number).

Example: There are 20 Controllers each with 1000 kW of nominal power. The sum of the nominal power is 20000 kW. Therefore the decimal power format in 0.1 kW cannot be used because the sum exceeds 32000. Therefore power format in kW needs to be chosen.

Basic power management

The Logical binary input **REMOTE START/STOP (PAGE 560)** requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 317)** after the input has been deactivated and will not start again if in AUTO mode. If the input is activated again, the delay **#System Start Delay (page 317)**

starts to count down. Once the delay elapsed, the system is activated and can be started by the power management. In other words, the power management is activated only if the Logical binary inputs **REMOTE START/STOP (PAGE 560)** is activated.

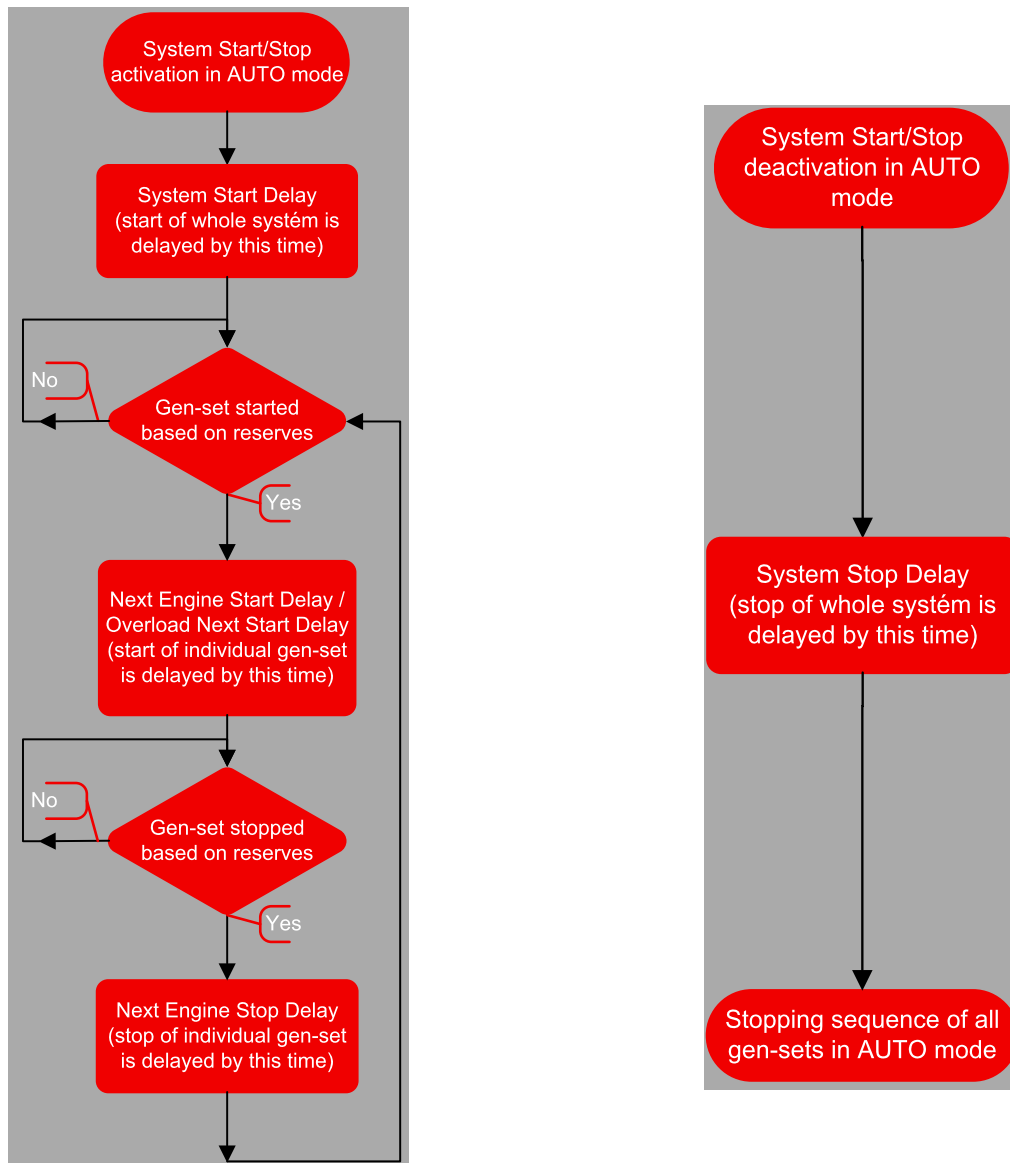
Note: *The Controller performs load and VAR sharing whenever it is connected to the bus bar i.e. it is independent on whether the controller is in AUTO or MAN mode or whether the power management is active or not.*

Function of power management can be temporarily blocked after **REMOTE START/STOP (PAGE 560)** activation a count down of **#System Start Delay (page 317)**. The delay is given by setpoint Power Management Delay. In this delay all Controllers where power management is enabled are running. After this period elapses, only the Controllers needed according to the Power Management calculation stay running and the rest is stopped.

🔍 back to Power Management

Principle of power management

Internal conditions based on remaining load reserves and priorities are evaluated once a delay is elapsed. If the load reserve is insufficient the Controller is started after delay given by the setpoint **#Next Engine Start Delay (page 332)** is elapsed. Once the Controller runs the controller evaluates stopping conditions based on load reserves and priorities. If the reserve is sufficient enough to stop a particular Controller, it is stopped after delay given by the setpoint **#Next Engine Stop Delay (page 333)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs **REMOTE START/STOP (PAGE 560)** deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 317)** has elapsed all Controllers in AUTO mode are stopped. Following figure depicts the system activation and deactivation logic.



Setpoint **#Overload Next Start Delay (page 335)** is used in case that **#Overload Next Start Protection (page 334)** is enabled and Controllers are running at **#Overload Next Start Level (page 334)** or more of their nominal power.

⬅ back to Power Management

Load reserve

The power management is based on the load reserve concept. The load reserve is defined as a difference of the running nominal power of the group within power management and the total load of the system. There are two ways how to determine the load reserve. The absolute power management allows the system to keep the load reserve higher or equal to value in kW given by a relevant setpoint. The relative power management assures that load reserve is kept higher or equal to relative portion in % of the nominal power of the group given by a relevant setpoint. Depending of the situation, load reserves are calculated differently in two cases:

Island operation

Reserve	Actual Reserve	Start condition	Stop condition
Absolute kW	$AR_{strt} = \sum Pg_{Nom} - \sum Pg_{Act}$ $AR_{stp} = \sum Pg^*_{Nom} - \sum Pg_{Act}$	$AR_{strt} < \#LoadResStrt$	$AR_{stp} > \#LoadResStop$
Relative %	$RR_{strt} = [(\sum Pg_{Nom} - \sum Pg_{Act}) / \sum Pg_{Nom}] \cdot 100\%$ $RR_{stp} = [(\sum Pg^*_{Nom} - \sum Pg_{Act}) / \sum Pg^*_{Nom}] \cdot 100\%$	$RR_{strt} < \# \%LdResStrt$	$RR_{stp} > \# \%LdResStop$

Parallel to mains operation

Reserve	Actual Reserve	Start condition	Stop condition
Absolute kW	$AR_{strt} = \sum Pg_{Nom} - BaseLoad$ $AR_{stp} = \sum Pg^*_{Nom} - BaseLoad$	$AR_{strt} < \#LoadResStrt$	$AR_{stp} > \#LoadResStop$
Relative %	$RR_{strt} = [(\sum Pg_{Nom} - BaseLoad) / \sum Pg_{Nom}] \cdot 100\%$ $RR_{stp} = [(\sum Pg^*_{Nom} - BaseLoad) / \sum Pg^*_{Nom}] \cdot 100\%$	$RR_{strt} < \# \%LdResStrt$	$RR_{stp} > \# \%LdResStop$

List of abbreviations:

- AR_{strt} .. Actual Absolute reserve in kW or kVA - for System start calculation.
- AR_{stp} .. Actual Absolute reserves in kW or kVA - for System stop calculation.
- RR_{strt} .. Actual Relative reserve in % - for System start calculation.
- RR_{stp} .. Actual Relative reserves in % - for System stop calculation.
- $\sum Pg_{Nom}$.. Sum of Nominal power of all Controller on the bus.
- $\sum Pg^*_{Nom}$.. Sum of Nominal power of all Controller on the bus apart of the one, which is going to be stopped.
- $\sum Pg_{Act}$.. Sum of Actual power of all Controller on the bus = system load.
- $BaseLd$.. Baseload is given by the setpoint **#System Baseload (page 241)**

Note: System starting sequences may be very different due to their complexity (i.e. Controller which do not take part in power management, various nominal powers etc.). Each system should be considered individually.

 **back to Power Management**

Starting sequence

As written above, the power management is based on the load evaluation in order to provide enough of available running power. An additional Controller starts when the load of the system raises above certain level to keep the load reserve big enough. Following figure depicts the situation when an additional Controller is requested to join the already running Controller(s) to the bus.

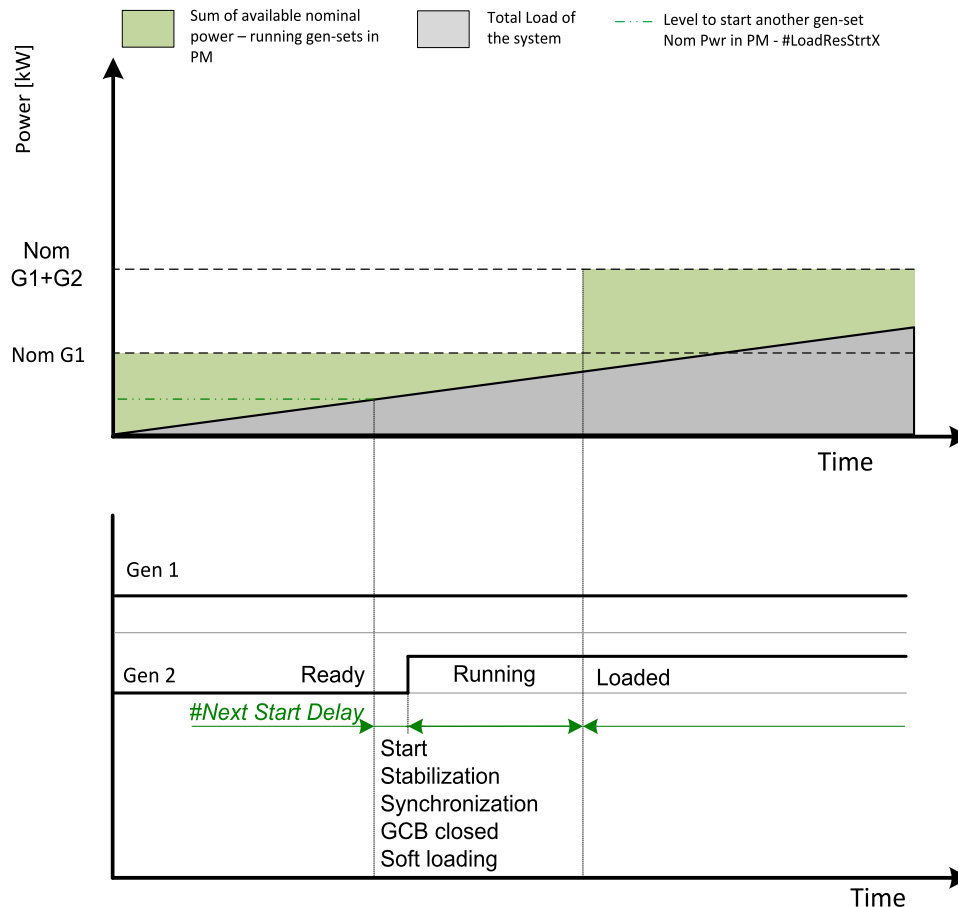


Image 5.107 Start sequence of power management

As shown above, the load of the system has increased above the level defined by the start condition – i.e. the load reserve is not sufficient as required by the appropriate setpoint. Further explanation is provided in chapters **Absolute power management (page 170)** and **Relative power management (page 173)**.

The level is illustrated by the green dashed line. If the load reserve keeps insufficient for longer time than defined by the setpoint **#Next Engine Start Delay (page 332)**, the next Controller is actually started. The standard starting sequence follows. Once the synchronization procedure is done, the MGCB breaker is closed and the Controller power is ramping up. Once loaded, the system load reserve is raised and becomes sufficient again. Please note the sum of nominal power of all Controllers on the bus is increased by the nominal power of the additional Controller.

[back to Power Management](#)

Stopping sequence

As it is written above, the power management is based on the load evaluation in order to provide enough of available running power. An additional Controller stops when the load of the system drops below certain level to avoid inefficient run of the Controller. Following figure depicts the situation when a Controller is requested to stop due to the power management.

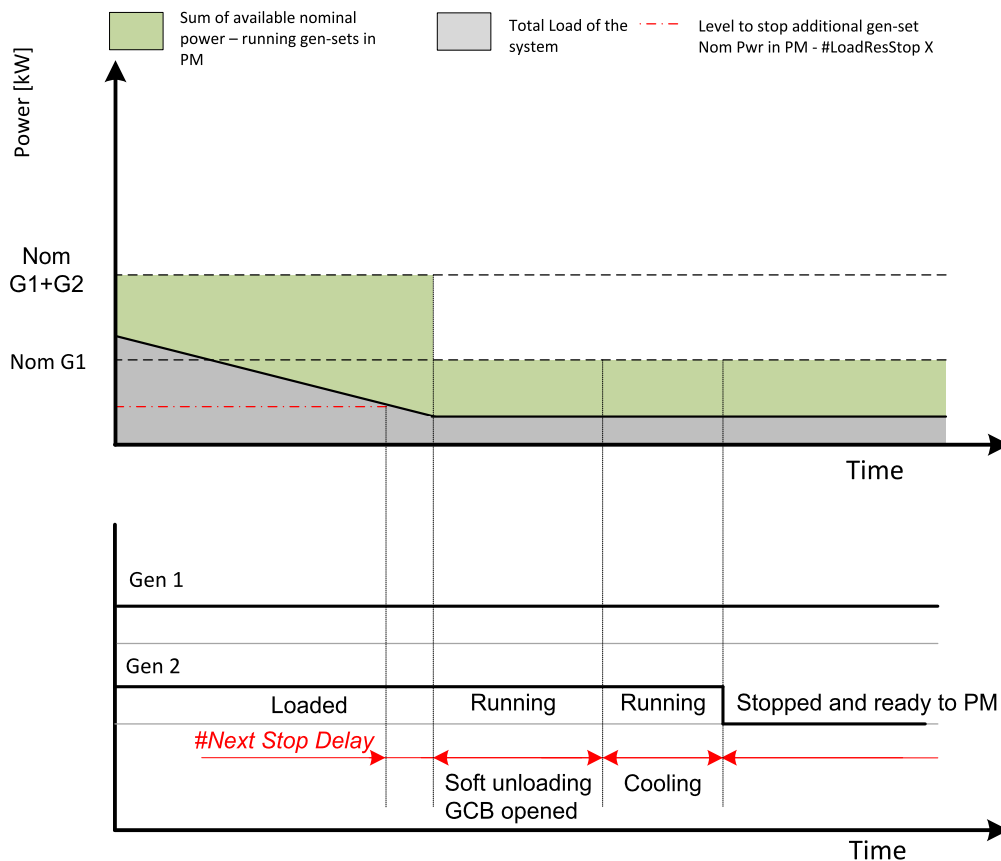


Image 5.108 Stopping sequence of power management

As shown above, the system load has decreased below the level defined by the stop condition – i.e. the load reserve is over a limit given by the appropriate setpoint. Further explanation is provided in chapters **Absolute power management (page 170)** and **Relative power management (page 173)**.

The level is illustrated by the red dashed line. If the load reserve keeps over this limit for longer time than defined by setpoint **#Next Engine Stop Delay (page 333)**, the next Controller is actually requested to stop. Once the Controller is unloaded, the MGCB breaker is opened. Please note the sum of nominal power of all Controllers on the bus is decreased by the nominal power of the stopped Controller. The cooling sequence follows before the Controller is actually stopped. The Controller is ready to be started if the system load increases again.

[back to Power Management](#)

Absolute power management

The power management based on absolute load reserves can be successfully used in cases the load portions are similar to the Controller capacity or even bigger. The goal of the absolute reserve mode is to provide the same load reserve all the time independently on how many Controllers are currently running. The mode perfectly fits for industrial plants with large loads.

The absolute power management guarantees adjustable load reserve in kW. This mode is active when **#Power Management Mode (page 315)** is set to ABS [kW] mode.

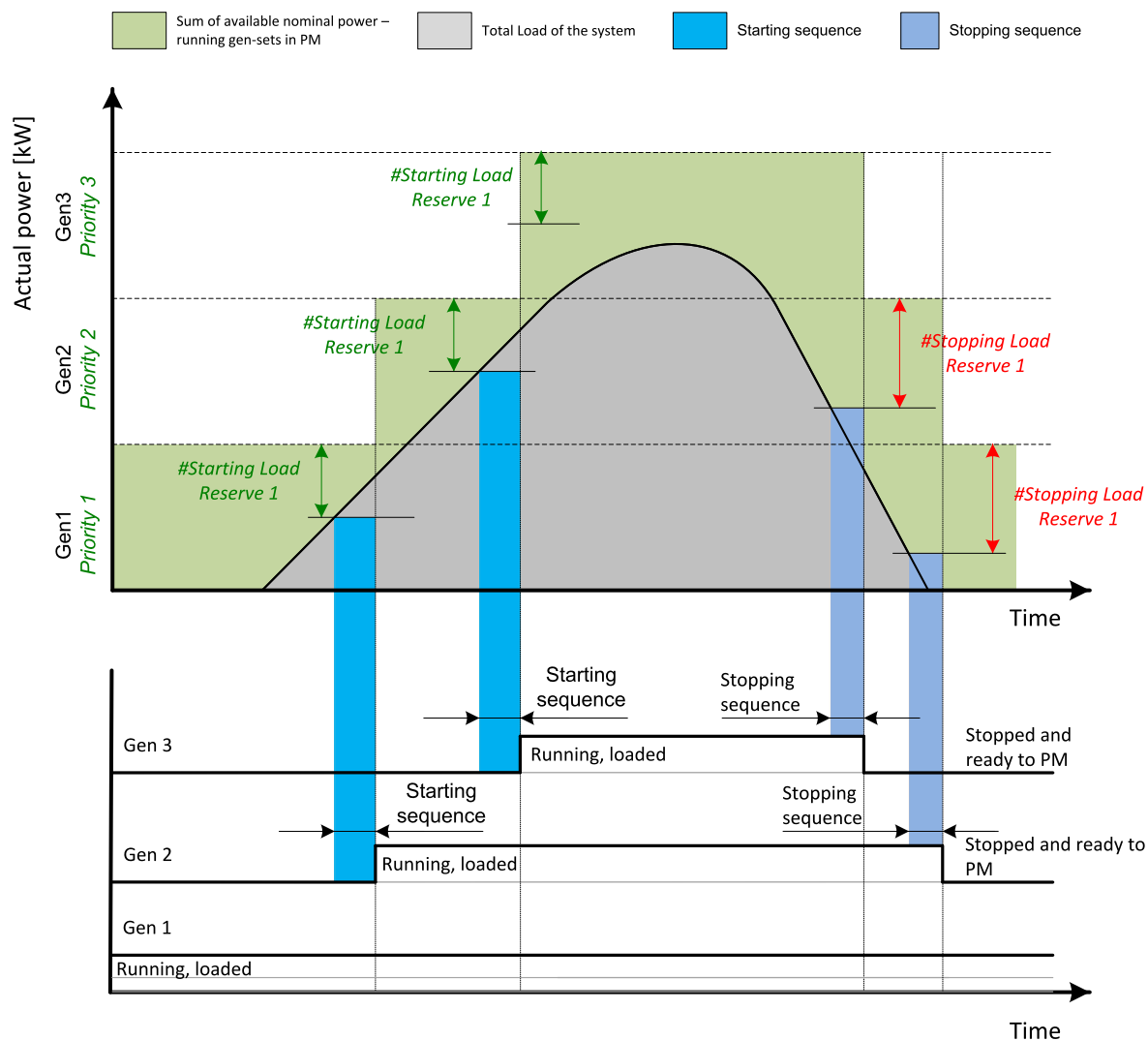


Image 5.109 Power management based on absolute load reserve

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

Controller	Nominal power	Power management	#Power management mode	Priority	#Priority Auto Swap	#Starting Load Reserve X	#Stopping Load Reserve X
Controller #1	200 kW	Enabled	ABS (kW)	1	Disabled	100 kW	125 kW
Controller #2	500 kW	Enabled	ABS (kW)	2	Disabled	100 kW	125 kW
Controller #3	1 000 kW	Enabled	ABS (kW)	3	Disabled	100 kW	125 kW

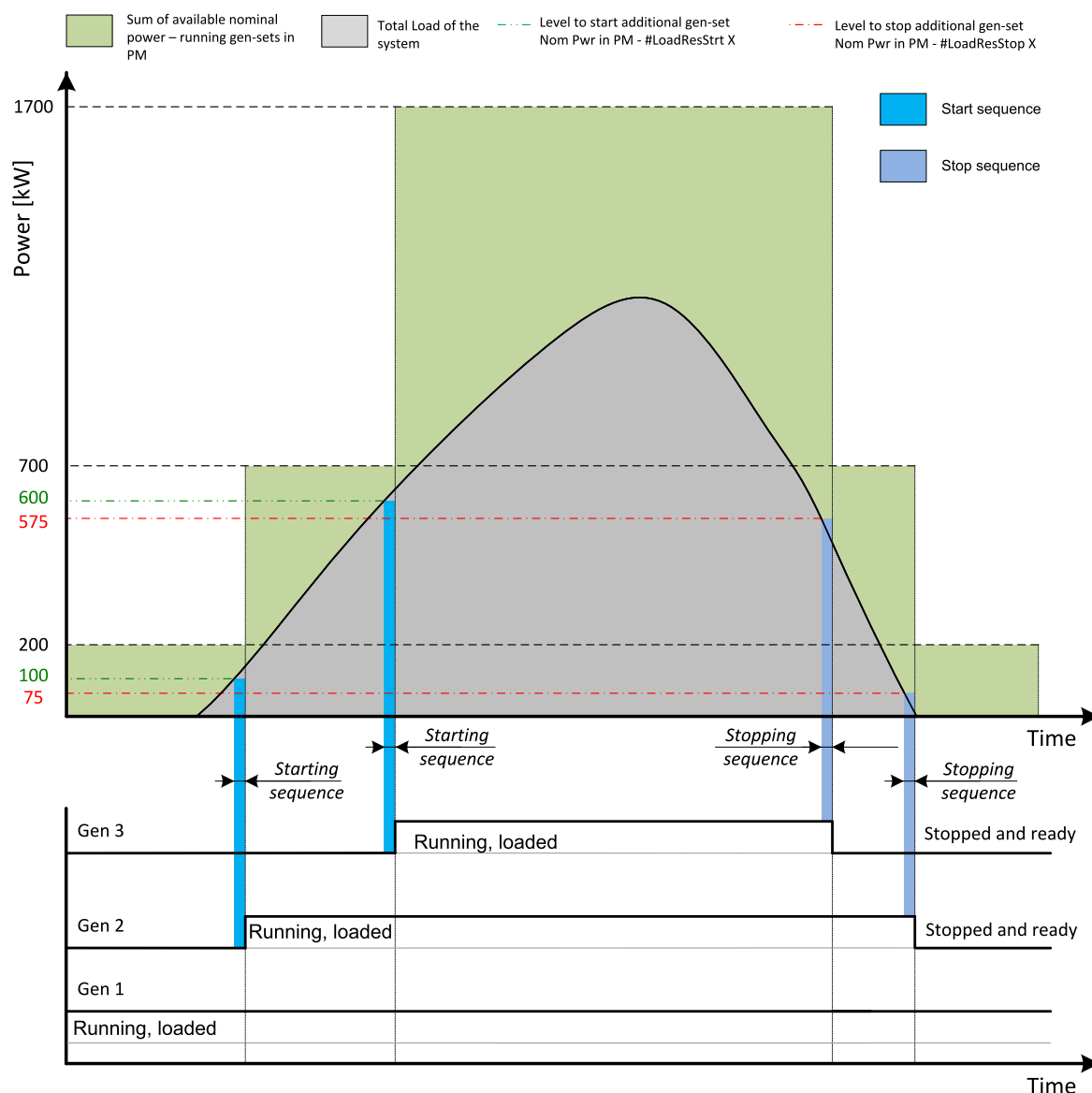


Image 5.110 Absolute power management example

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

The green dashed line depicts the value of load at which the additional Controller is requested to start. This value of the load value is linked with the setpoint **#Starting Load Reserve 1 (page 319)** (or other selected reserve set) in following way:

Sum of nominal power for start - **#Starting Load Reserve 1 (page 319)** (or other selected reserve set) = value of load when additional Controller requested to start (e.g.: 700 kW – 100 kW = 600 kW).

The red dashed line depicts the value of load at which the additional Controller is requested to stop. This value of the load value is linked with the setpoint **#Stopping Load Reserve 1 (page 320)** (or other selected reserve set) in following way:

Sum of nominal power for stop - **#Stopping Load Reserve 1 (page 320)** (or other selected reserve set) = value of load when additional Controller requested to stop (e.g.: 700 kW – 125 kW = 575 kW).

There are 4 sets of setpoints for starting and stopping Controllers in absolute power management.

- > **#Starting Load Reserve 1 (page 319) and #Stopping Load Reserve 1 (page 320)**
- > **#Starting Load Reserve 2 (page 322) and #Stopping Load Reserve 2 (page 323)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 543)** is activated
- > **#Starting Load Reserve 3 (page 325) and #Stopping Load Reserve 3 (page 326)** considered if binary input **LOAD RES 3 ACTIVE (PAGE 544)** is activated
- > **#Starting Load Reserve 4 (page 328) and #Stopping Load Reserve 4 (page 329)** considered if binary input **LOAD RES 4 ACTIVE (PAGE 545)** is activated

Note: All controllers cooperating together in Power management must have the same load reserve set selected.

Relative power management

The power management based on relative load reserves perfectly fits to those applications with such load portions connected to the group at once are much lower than the Controller nominal power. This mode helps to achieve the maximal lifetime of the Controllers, as they can be operated within optimal load range. The maximal size of the load connected at once depends on number of actually working Controllers. The more Controllers are connected to the bus bar the bigger load portion can be connected at once.

The relative power management guarantees that the engines are not continuously loaded more than to a certain level. This mode is active when **#Power Management Mode (page 315)** is set to REL [%] mode.

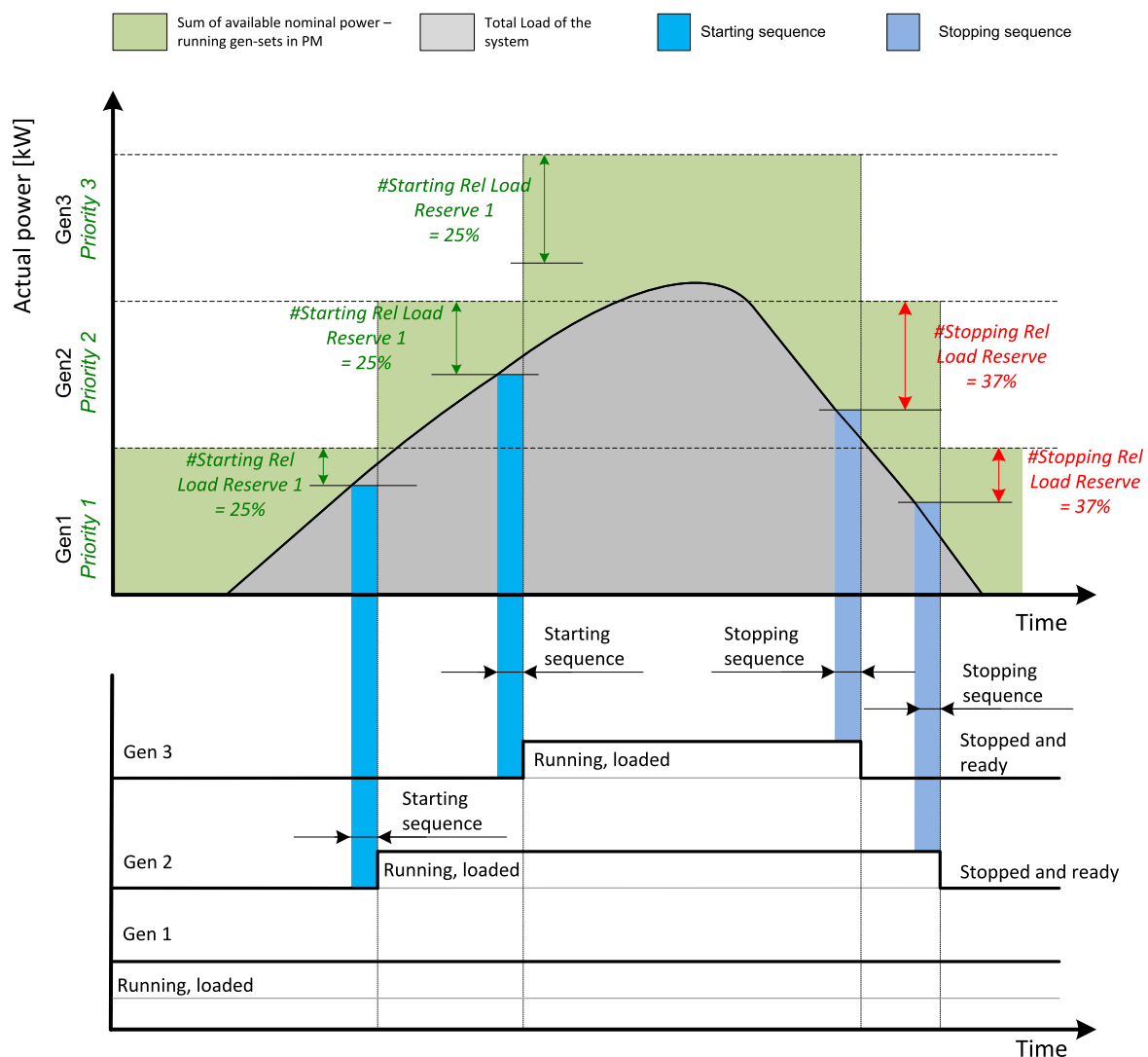


Image 5.111 Power management based on relative load reserve

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

Controller	Nominal power	Power management	#Power management mode	Priority	#Priority Auto Swap	#Starting Rel Load Reserve X	#Stopping Rel Load Reserve X
Controller #1	200 kW	Enabled	REL (%)	1	Disabled	35 %	40 %
Controller #2	500 kW	Enabled	REL (%)	2	Disabled	35 %	40 %
Controller #3	1 000 kW	Enabled	REL (%)	3	Disabled	35 %	40 %

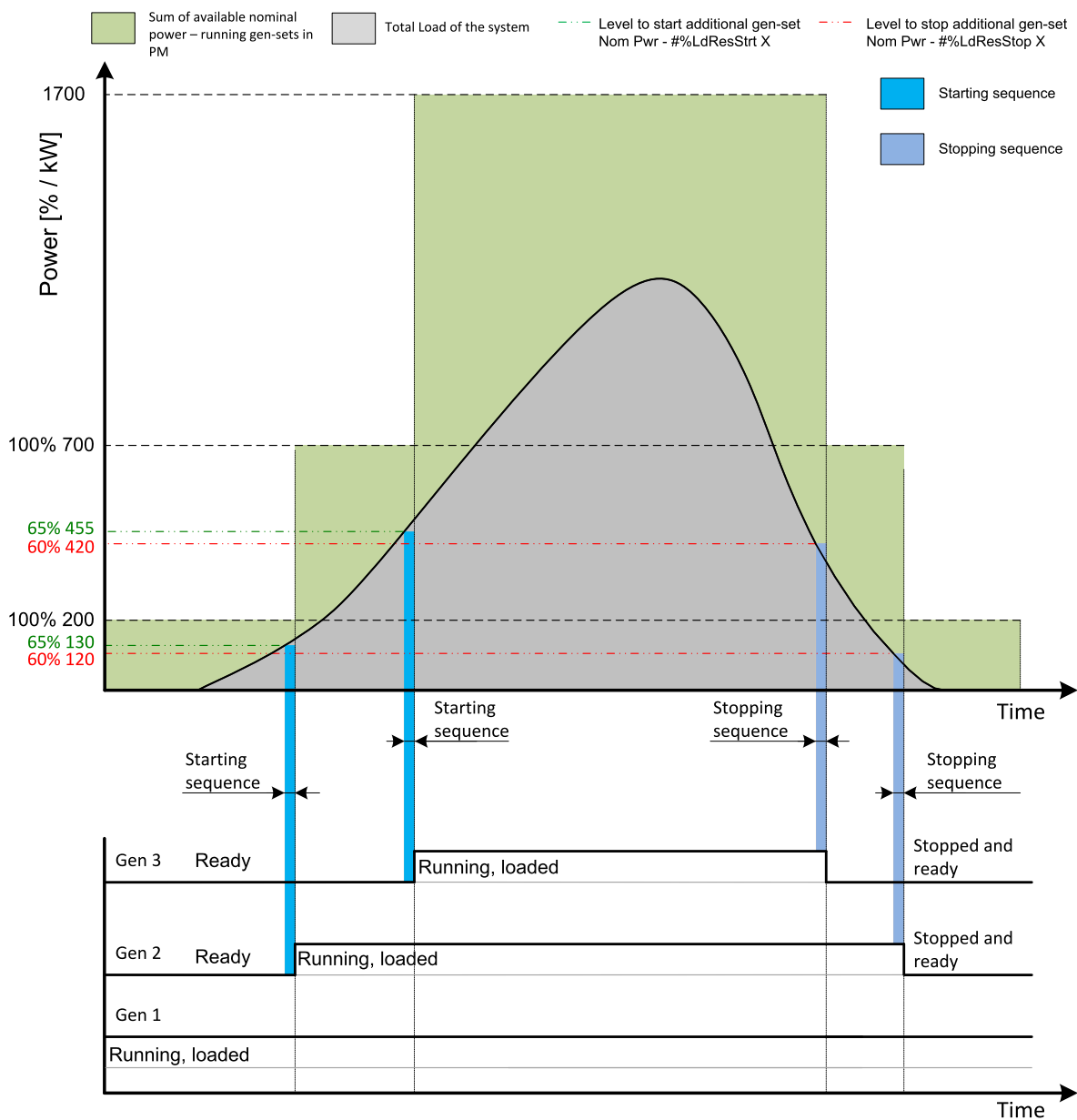


Image 5.112 Relative power management example

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

The green dashed line depicts the value of load at which the additional Controller is requested to start. This value of the load value is linked with the setpoint **#Starting Rel Load Reserve 1 (page 321)** (or other selected reserve set) in following way:

$(100\% - \text{\#Starting Rel Load Reserve 1 (page 321) (or other selected reserve set)}) \times \text{Sum of Nominal power} =$
Value of load when additional Controller requested to start in kW (in % of nominal power), e.g.: $(100\% - 35\%) \times 700 \text{ kW} = 455 \text{ kW}$ (65 % of nominal power).

The red dashed line depicts the value of load at which the additional Controller is requested to stop. This value of the load value is linked with the setpoint **#Stopping Rel Load Reserve 1 (page 321)** (or other selected reserve set) in following way:

$(100\% - \text{\#Stopping Rel Load Reserve 1 (page 321) (or other selected reserve set)}) \times \text{Sum of Nominal power} =$
Value of load when additional Controller requested to stop in kW (in % of nominal power), e.g.: $(100\% - 40\%) \times 700 \text{ kW} = 420 \text{ kW}$ (60 % of nominal power).

There are 4 sets of setpoint for starting and stopping Controllers in relative power management.

- **#Starting Rel Load Reserve 1 (page 321) and #Stopping Rel Load Reserve 1 (page 321)**
- **#Starting Rel Load Reserve 2 (page 324) and #Stopping Rel Load Reserve 2 (page 324)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 543)** is activated
- **#Starting Load Reserve 3 (page 325) and #Stopping Load Reserve 3 (page 326)** considered if binary input **LOAD RES 3 ACTIVE (PAGE 544)** is activated
- **#Starting Load Reserve 4 (page 328) and #Stopping Load Reserve 4 (page 329)** considered if binary input **LOAD RES 4 ACTIVE (PAGE 545)** is activated

Note: All controllers cooperating together in Power management must have the same load reserve set selected.

[🔍 back to Power Management](#)

Priorities

The priority of the Controller within the group is given by the setpoint Priority. Lower number represents "higher" priority, i.e. a Controller with lower number starts before another one with higher number. In other words, the setpoint Priority means order in which Controllers are started and connected to the bus. An example is shown on the figure below. There are four Controllers with following choice of setpoints:

Controller	Nominal power	Power management	#Power management mode	Priority	#Priority Auto Swap	#Starting Load Reserve X	#Stopping Load Reserve X
Controller #1	200 kW	Enabled	ABS (kW)	4	Disabled	50 kW	70 kW
Controller #2	200 kW	Enabled	ABS (kW)	3	Disabled	50 kW	70 kW
Controller #3	200 kW	Enabled	ABS (kW)	2	Disabled	50 kW	70 kW
Controller #4	200 kW	Enabled	ABS (kW)	1	Disabled	50 kW	70 kW

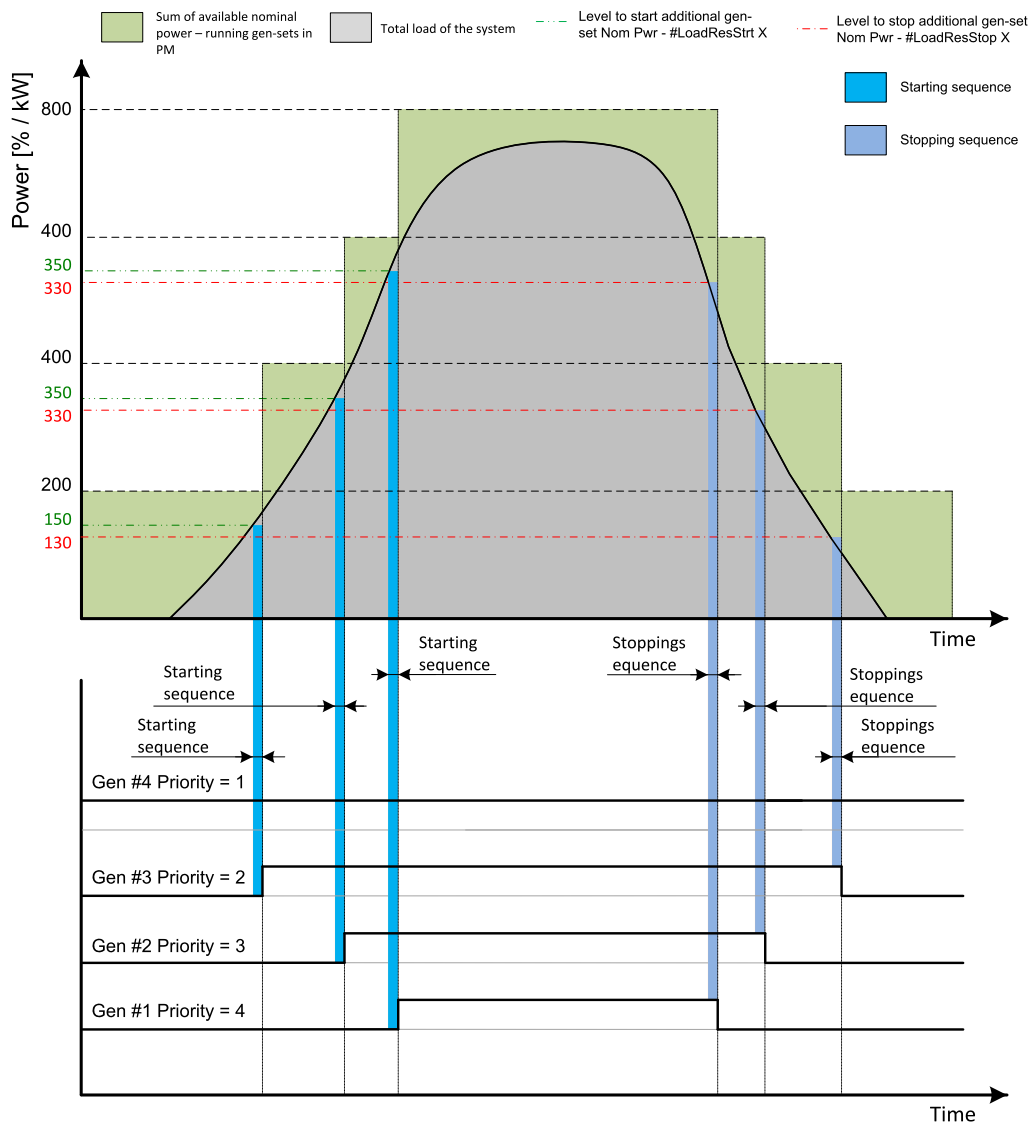


Image 5.113 Example of priorities in power management

By choosing the setpoint Priority = 1, the Controller #4 is running all the time in the example shown on the figure above (AUTO mode selected, Power management enabled and LBI **REMOTE START/STOP (PAGE 560)** activated).

The LBI Top Priority can be used to force priority 0 into the setpoint Priority. Priority 0 is the "highest" one, which means the Controller will be running all the time while the power management is switched on.

If more than one Controller have the same priority, they will act as "one big" Controller. There are methods of automatic optimization of the priorities to achieve specific behavior of the group such as equalizing engine hours of the Controllers or selection of optimal Controllers to run according to their size and current load demand.

🔍 back to Power Management

Priority auto swap

As stated in the chapter **Priorities (page 175)**, the operator is able to select the order of Controller starting. There is also the option of automatic priority selection. The controllers are sharing data concerning the running hours and all important information relevant to the actual load. Thanks to the Automatic priority swapping function the controllers choose the Controller(s) to be running with consideration of their running hours and the actual load.

The running hours equalization function keeps a constant maximal difference of Controller's running hours. The efficient function keeps running only the Controllers with suitable nominal power to avoid inefficient fuel consumption or Controller overload.

Note: The Automatic priority swapping function does not change the setpoint Priority. The function sets the order of Controllers by virtual values "engine priority".

Run hours equalization

The Controllers engine priorities are automatically swapped to balance engine running hours. In other words, the controllers compare running hours of each Controller and select Controller(s) to run in order to maintain constant maximal difference of running hours. Up to 32 controllers are supported. This function is activated via setpoint **#Priority Auto Swap (page 316) = RUN HOURS**.

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

$$\text{RHE} = \text{Running Hours} - \text{Run Hours Base}$$

RHE is considered value for running hours equalization, Running Hours is a cumulative sum of run hours available in statistic values of the controller, Run Hours Base is a setpoint. This setpoint may be used in the case of Controllers with different runs hours are intended to be set at the same initial point (e.g. a new Controller and a used Controller after retrofit maintenance inspection).

The Running hours equalization function compares RHE value of each controller in the group. Once the difference between RHE of individual controllers is higher than **#Run Hours Max Difference (page 335)** (i.e. **#Run Hours Max Difference (page 335) + 1**), the Controller(s) with the lowest RHE is/are started.

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

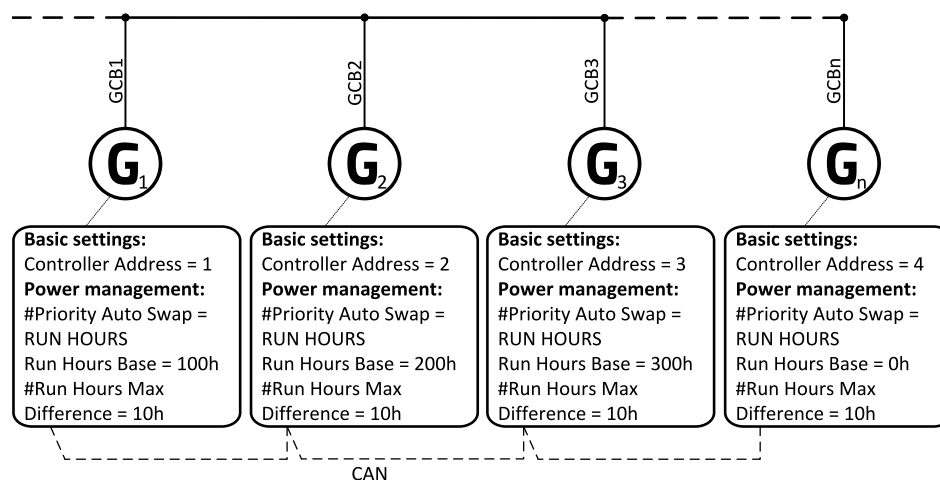


Image 5.114 Example of the system

3 cases are considered:

- > Case #1: 2 Gen-sets available
- > Case #2: 3 Gen-sets available with same initial RHE.
- > Case #3: 3 Gen-sets available with different initial RHE.

Case #1:

- > Controller 1 running hours = 250 -> running hours considered in RHE = 100 (150 - Run Hours Base)
- > Controller 2 running hours = 450 -> running hours considered in RHE = 200 (250 - Run Hours Base)

Both Controllers have the same nominal power of 700 kW. Originally, priority of Controllers was G1 = 2, G2 = 1. Load demand in this example is constant and it is 500 kW (i.e. only one engine is running at any time). In this case, the controllers set the engine priority of the Controller 1 to 1 because it has the lowest considered RHE and the difference between RHE2 (i.e. considered RHE of Controller 2) and RHE1 is higher than **#Run Hours Max Difference (page 335)** that is set to 10h.

	Run hours	#RunHoursBase	RHE
Controller #1	250	150	100
Controller #2	450	250	200

The Controller 1 runs for 100 hours to equalize the RHE of both Controllers. The Controller 1 keeps running until the difference between RHE1 and RHE2 exceeds **#Run Hours Max Difference (page 335)** (i.e. 10h). The Controller 1 runs $100 + \text{\#Run Hours Max Difference (page 335)} + 1 = 100 + 10 + 1 = 111$ hours. After 111 hours the Controller 2 has the lowest RHE and the difference between RHE1 and RHE2 is higher than **#Run Hours Max Difference (page 335)**. The Controller 2 runs 11 hours to equalize the RHE of both Controllers and then additional **#Run Hours Max Difference (page 335) + 1** hours (i.e. $11 + 10 + 1 = 22$ hours). The evaluation of RHE1 and RHE2 is shown on the figure below.

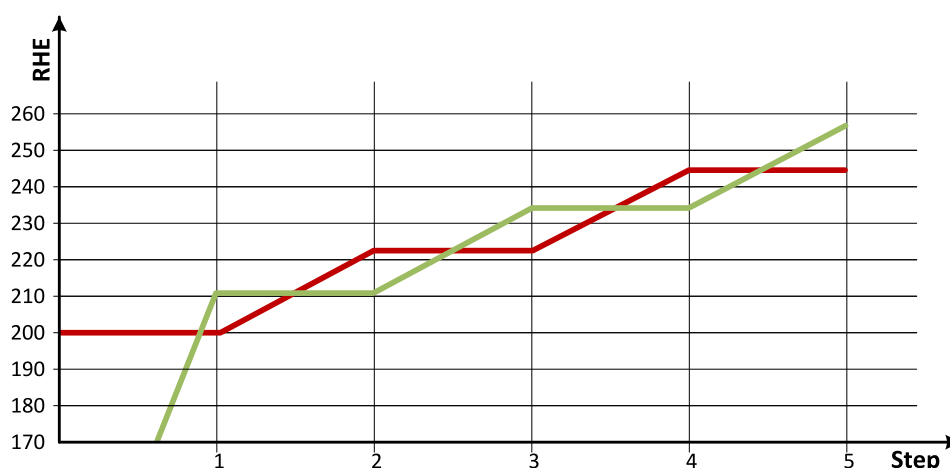


Image 5.115 Run hours equalization - case #1

Step	0	1	2	3	4	5
RHE1	100	211	211	233	233	255
RHE2	200	200	222	222	244	244
Run G1 (Δ RHE1)	0	111	0	22	0	22
Run G2 (Δ RHE2)	0	0	22	0	22	0

From the example of the case #1, it can be concluded that the Controllers are swapped after the duration determined by following formula:

SwapTime = Second lowest considered running hours – Current lowest considered running hours + #Run Hours Max Difference (page 335) + 1

Case #2:

- Controller 1 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)
- Controller 2 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)
- Controller 3 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)

Each Controller has the same RHE = 0 h. By applying the SwapTime formula, we get the run time of Controller 1 before next swapping:

$$\text{SwapTimeG1} = 0 - 0 + 10 + 1 = 11$$

Similar way, we get the run time of Controller 2 before next swapping:

$$\text{SwapTimeG2} = 11 - 11 + 10 + 1 = 11$$

Finally, we get the run time of Controller 3 before next swapping:

$$\text{SwapTimeG2} = 11 - 0 + 10 + 1 = 22$$

Please refer to figure below to understand the evaluation of RHE of Controllers in this particular case.

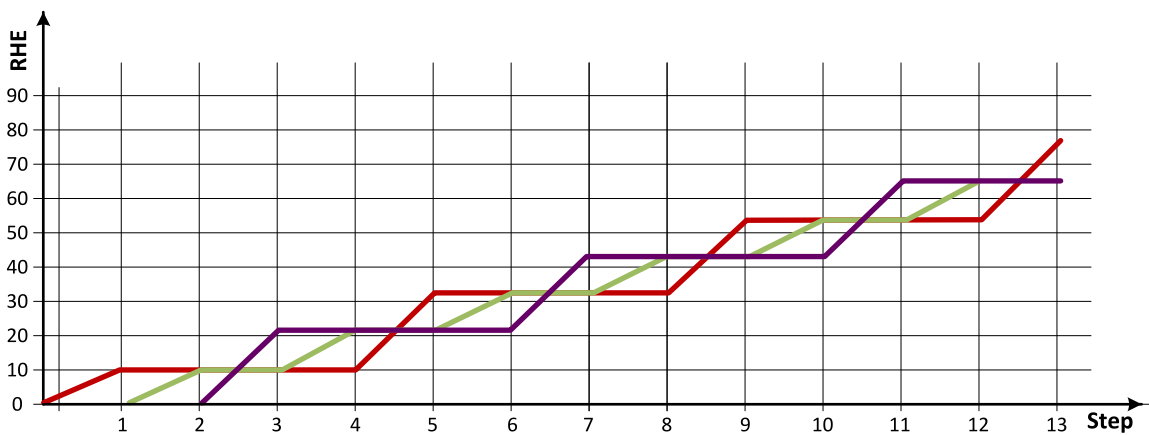


Image 5.116 Run hours equalization - case #2

step	0	1	2	3	4	5	6	7	8	9	10	11	12	13
RHE1	0	11	11	11	11	33	33	33	33	55	55	55	55	77
RHE2	0	0	11	11	22	22	33	33	44	44	55	55	66	66
RHE3	0	0	0	22	22	22	22	44	44	44	44	66	66	66
Run G1 (ΔRHE1)	0	11	0	0	0	22	0	0	0	22	0	0	0	22
Run G2 (ΔRHE2)	0	0	11	0	11	0	11	0	11	0	11	0	11	0
Run G3 (ΔRHE3)	0	0	0	22	0	0	0	22	0	0	0	22	0	0

Case #3:

- Controller 1 running hours = 250 -> running hours considered in RHE = 100 (150-RunHoursBase)
- Controller 2 running hours = 450 -> running hours considered in RHE = 200 (250-RunHoursBase)
- Controller 3 running hours = 750 -> running hours considered in RHE = 250 (500-RunHoursBase)

The Controller 1 has the lowest RHE1 = 100 h. By applying the SwapTime formula, we get the run time of Controller 2 before next swapping:

$$\text{SwapTimeG1} = 200 - 100 + 10 + 1 = 111$$

Till the step 5, the evaluation of the Controller swapping is the same as in the case #1, just Controller 1 and Controller 2 involve. In the step 6 the Controller 2 can run only 17 hours (previously 22 hours) because the Controller 3 involves. The evaluation of RHE1, RHE2 and RHE3 is shown on the figure below.

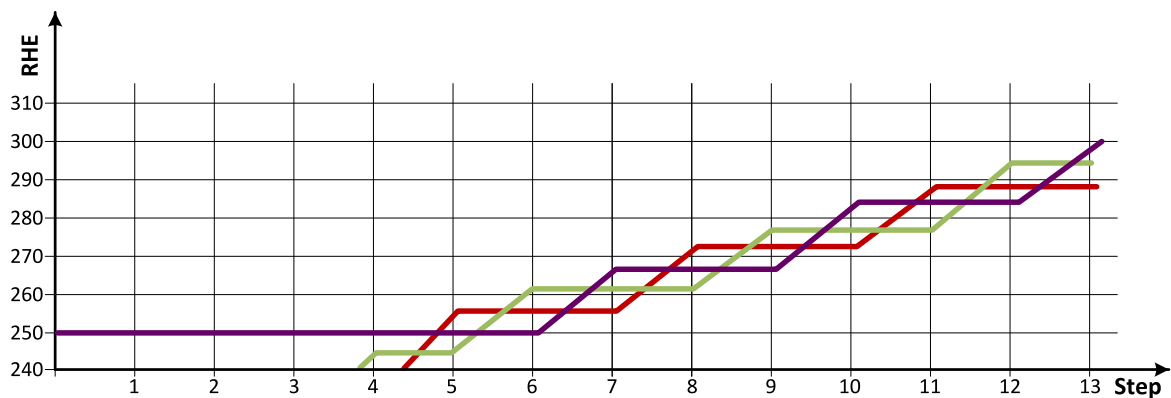


Image 5.117 Run hours equalization - case #3

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

Note: Setting #Run Hours Max Difference (page 335) = 5 does not mean that Controllers swap every 5 hours. The Swap time is determined by the formula stated above. Please read the entire chapter Running hours equalization for better understanding.

Note: In the case #Run Hours Max Difference (page 335) is set to 0 and all Controller in the group are at the same initial point (RHE are equal), the Controller swapping happens every hour.

Efficiency

The Controllers engine priorities are automatically swapped to best fit to the actual load demand (load demand swap - LDS). Also engine running hours are taken to the calculation (run hours equalization - RHE). This function is activated via setpoint #Priority Auto Swap (page 316) = Efficiency.

Algorithm of function:

- In the first step, the Controllers are sorted according to their nominal power.
- In the second step, the Controllers with the same nominal power are sorted according to their RHE
- The Controller(s) with nominal power which fits the most actual load demand are chosen. From those with same nominal power, the Controller(s) with lowest RHE are chosen. Selection formula:
 - **#Power Management Mode (page 315) = ABS (kW)**
 - Nominal power of Controller > actual load demand + **#Starting Load Reserve 1 (page 319)**
 - **#Power Management Mode (page 315) = REL (%)**
 - Nominal power of Controller > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 321)**)
- If two or more Controllers are available for taking over the load always the one with the lowest CAN address is chosen.
- If load demand is higher than nominal power of the biggest Controller, this one is fixed and the whole process repeats from point the third bullet.

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

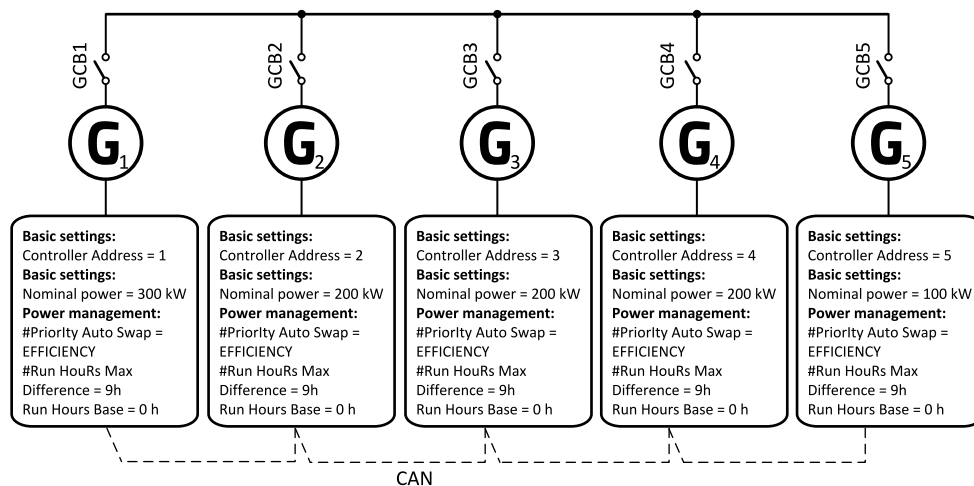


Image 5.118 Example of the system

Following table provide an example of Controller selection in function of system load evaluation. The table is an example of Efficiency priority optimization function (**#Power Management Mode (page 315) = ABS (kW)** and **#Starting Load Reserve 1 (page 319) = 20 kW**).

System Load [kW]	Running Controllers		Description	Total Running power within PM [kW]	Relative load of Controllers [%]
40	5			100	40
60	5			100	60
80	5 2 [0h]	2 start 5 stop	LDS	300	26
100	2 [10h]			200	50
120	2 [20h]			200	60
120	2 [30h]	3 start	RHE Swap	400	30

System Load [kW]	Running Controllers		Description	Total Running power within PM [kW]	Relative load of Controllers [%]
	3 [10h]	2 stop			
120	3 [20h]			200	60
140	3 [30h]			200	70
180	3 [40h] 1	1 start 3 stop	LDS	500	36
200	1			300	67
240	1			300	80
280	1 5	5 start	Gen#5 joins (LDS)	400	70
340	1 5			400	85
380	1 5 4 [20h]	4 start 5 stop	LDS + RHE Swap	600	63
400	1 4			500	80
440	1 4			500	88
480	1 4 5	5 start	Gen#5 joins (LDS)	600	80
540	1 4 5			600	90
580	1 4 5 2 [30h]	2 start 5 stop	LDS	800	73
600	1 4 2			700	86
640	1 4 2			700	91
680	1 4 2 5	5 start	Gen#5 joins (LDS)	800	85
740	1			800	93

System Load [kW]	Running Controllers		Description	Total Running power within PM [kW]	Relative load of Controllers [%]
	4				
	2				
	5				
780	1 4 2 5 3 [40h]	3 start 5 stop	LDS	1000	78
800	1 4 2 3			900	89
840	1 4 2 3			900	93
880	1 4 2 3 5	5 start	Gen#5 joins (LDS)	1000	88
940	1 4 2 3 5			1000	94

[⬅ back to Power Management](#)

Minimal running power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running Controllers. If the function is active, then the Controllers would not be stopped, although the reserve for stop is fulfilled. Function is activated via logical binary input **MIN RUN POWER ACT 1 (PAGE 554)**, **MIN RUN POWER ACT 2 (PAGE 554)** and **MIN RUN POWER ACT 3 (PAGE 555)**.

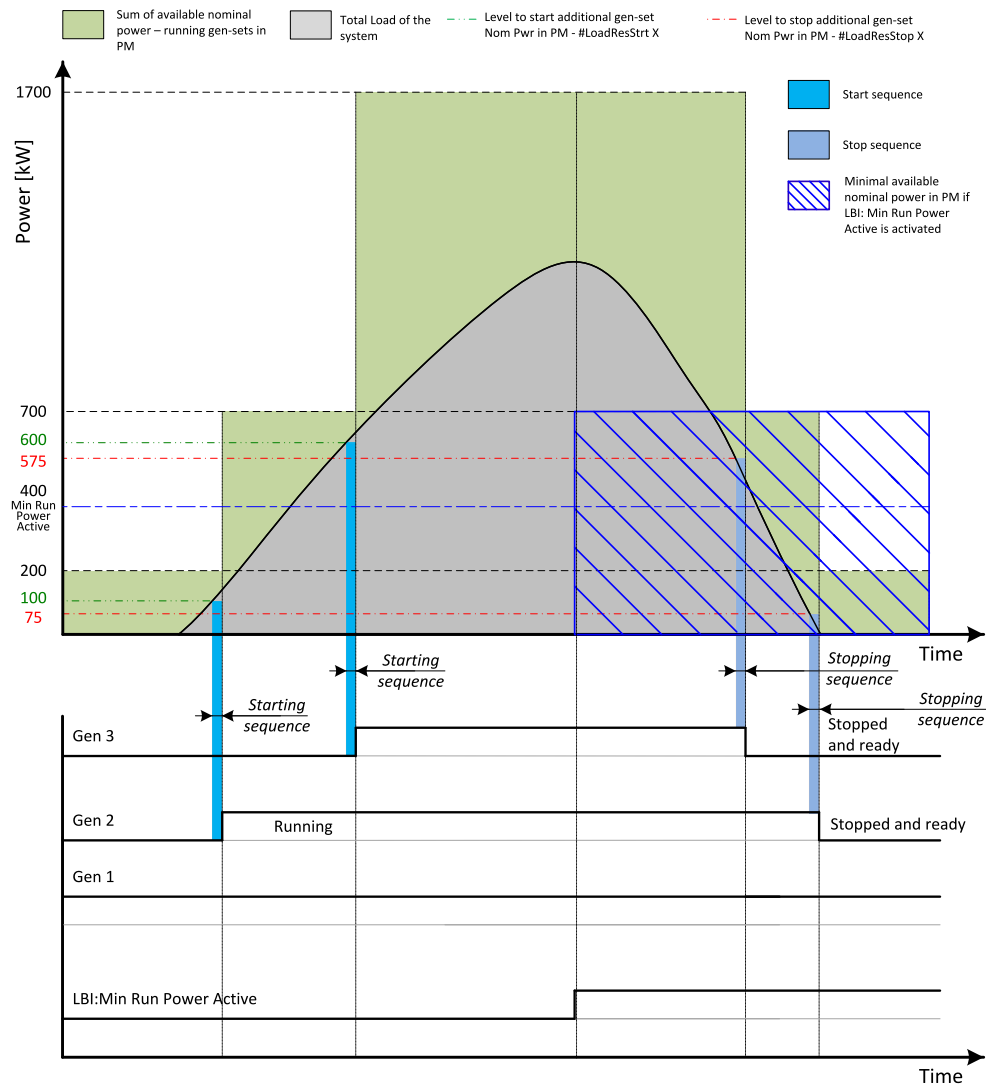


Image 5.119 Minimal running power

Setpoints **#Min Run Power 1** (page 331), **#Min Run Power 2** (page 331) or **#Min Run Power 3** (page 332) are adjusted to 400 kW. Once the **#Min Run Power 1** (page 331), **#Min Run Power 2** (page 331) or **#Min Run Power 3** (page 332) is activated, the available nominal running power has to be equal or higher to 400 kW. Even if the load reserve is big enough to stop the Controller #2 (nominal power 500 kW), the Controller keeps running as at least 400 kW has to be available. The Controller #1 (nominal power 200 kW) is not enough.

[back to Power Management](#)

Dynamic Spinning Reserve

The values **Dynamic Spinning Reserve** (page 461) and **Dynamic Spinning Reserve Offset** (page 461) are used to affect power management operation in case of anticipated output drop of a renewable source of energy. It enables to shift the load reserve start level and load reserve stop level for power management. The value **Dynamic Spinning Reserve** (page 461) is added to required load reserve given by setpoints **#Starting Load Reserve 1** (page 319) and **#Stopping Load Reserve 1** (page 320) (according to actual load reserve set 1, 2, 3 or 4). The value **Dynamic Spinning Reserve Offset** (page 461) is added only to required stopping load reserve given by setpoints **#Stopping Load Reserve 1** (page 320) (according to actual load reserve set 1, 2, 3 or 4) to create some dynamic offset between starting and stopping load reserve.

[back to Power Management](#)

5.4.26 Protections

Protection types	186
Protection activation	187
Protection blocking	187
Fixed protections	187
User protections	189
Protection states	194

InteliMains 510 combines **Fixed protections (page 187)** with **User protections (page 189)** which allows users to configure their own protections to any analog or binary input. Multiple protections can be configured on each analog input, number of configured protections are not limited. Only **one** protection of **1st level** and/or **one** protection of **2nd level** can be configured on logical binary output. The maximum number of configured **User protections (page 189)** is limited to 200. The maximum number of configured **fast User protections (page 189)** is limited to 50.

Protection types

Level 1 Protections

- ✓ LBO COMMON ALARM LEVEL 1 (PAGE 569)
- ✓ LBO COMMON ALARM ACTIVE LEVEL 1 (PAGE 569)
- ✗ Action: CB open

Name	Warning	Alarm Only	History Record Only	Alarm List Indication	Alarm List + History Record Indication
Abbreviation	Wrn	Al	Hst	ALI	AHI
Alarm List indication	✓	✓	✗	✓	✓
History record	✓	✗	✓	✗	✓
Fault Reset needed	✓	✓	✗	✗	✗
LBO Alarm activation	✓	✓	✗	✗	✗
LBO Horn activation	✓	✓	✗	✗	✗
Common LBO	COMMON WARNING (PAGE 571)	COMMON ALARM ONLY (PAGE 570)	COMMON HISTORY RECORD (PAGE 570)	✗	✗

Level 2 Protections

- ✓ LBO COMMON ALARM LEVEL 2 (PAGE 569); except **Mains Protection**
- ✓ LBO COMMON ALARM ACTIVE LEVEL 2 (PAGE 569) ; except **Mains Protection**

Name	Mains Protection	Mains Protection + FltRes	System Stop
Abbreviation	MP	MPR	Stp
Alarm List indication	✗	✓	✓
History record	✓	✓	✓
Fault Reset needed	✗	✓	✓
Action: CB open	✓	✓	✓
LBO Alarm activation	✗	✓	✓
LBO Horn activation	✗	✓	✓
Common LBO	COMMON MAINS PROTECTION (PAGE 570)	COMMON MAINS PROTECTION + FLTRES (PAGE 570)	COMMON SYSTEM STOP (PAGE 571)

🔍 back to Protections

Protection activation

The table below shows the availability of conditions for analog and binary values

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

* Fault state can occur if there is loss of communication with configured CAN module.

[back to Protections](#)

Protection blocking

It is possible to configure one Protection Blocking to any **User protections (page 189)**. 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.

The blocking conditions can be also applied on the **Fixed protections (page 187)**.

General protections

Each of the LBI Protection Force Disable 1 is paired with an option of protection condition "Force Block 1–3" and can be used for Blocking / Disabling of protections, however on user defined protections the option causes protection Blocking instead of Disabling.

[back to Protections](#)

Fixed protections

Some selected fixed protections has an option to DISABLE the protection.

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

Setpoint options

Alarms	Fixed Protection States
Enable	Protection is enabled
Disable	Protection is disabled
PROTECTION FORCE DISABLE 1 (PAGE 556) PROTECTION FORCE DISABLE 2 (PAGE 557) PROTECTION FORCE DISABLE 3 (PAGE 557)	Disabling of the protection can be forced by LBI

Table 5.1 Bus protections

Mains protections

	Protection	Alarms / Protection name	Fixed Protection States
Voltage	Bus <>V Protection (page 299)	MP Mains Overvoltage L1-N (page 678)	FIXED PROTECTIONS STATES 1 (PAGE 601) FIXED PROTECTIONS STATES 2 (PAGE 602)
		MP Mains Overvoltage L2-N (page 678)	
		MP Mains Overvoltage L3-N (page 679)	
		MP Mains Overvoltage L1-L2 (page 679)	
		MP Mains Overvoltage L2-L3 (page 680)	
		MP Mains Overvoltage L3-L1 (page 680)	
	Mains Voltage Unbalance Protection (page 298)	MP Mains Voltage Unbalance Ph-N (page 685) MP Mains Voltage Unbalance Ph-Ph (page 684)	FIXED PROTECTIONS STATES 1 (PAGE 601)
Frequency	Bus <>f Protection (page 302)	MP Mains Overfrequency (page 686)	FIXED PROTECTIONS STATES 2 (PAGE 602)
	Short Circuit (page 278)	MPR Short Circuit (page 687)	FIXED PROTECTIONS STATES 2 (PAGE 602)
	IDMT Mains Overcurrent Protection (page 293)	MPR IDMT Mains >A (page 687)	FIXED PROTECTIONS STATES 2 (PAGE 602)
	Current Unbalance Protection (page 295)	MPR Current Unbalance (page 687)	FIXED PROTECTIONS STATES 1 (PAGE 601)
Power	Overload Protection (page 292)	Hst IDMT Overload (page 687)	FIXED PROTECTIONS STATES 2 (PAGE 602)
Others	Vector Shift Protection (page 305)	Hst Vector Shift (page 676)	FIXED PROTECTIONS STATES 2 (PAGE 602)
	ROCOF Protection (page 306)	Hst ROCOF (page 676)	-

Table 5.2 Mains protections

Bus protections

	Protection	Alarms / Protection name	Fixed Protection State
Voltage	Bus <>V Protection (page 299) <i>Note: This protection can not be disabled.</i>	MP Mains Overvoltage L1-N (page 678)	FIXED PROTECTIONS STATES 2 (PAGE 602) FIXED PROTECTIONS STATES 3 (PAGE 603)
		MP Mains Overvoltage L2-N (page 678)	
		MP Mains Overvoltage L3-N (page 679)	
		MP Mains Overvoltage L1-L2 (page 679)	
		MP Mains Overvoltage L2-L3 (page 680)	
		MP Mains Overvoltage L3-L1 (page 680)	
Frequency	Bus <>f Protection (page 302) <i>Note: This protection can not be disabled.</i>	MP Mains Overfrequency (page 686)	FIXED PROTECTIONS STATES 3 (PAGE 603)

Table 5.3 Bus protections

User protections

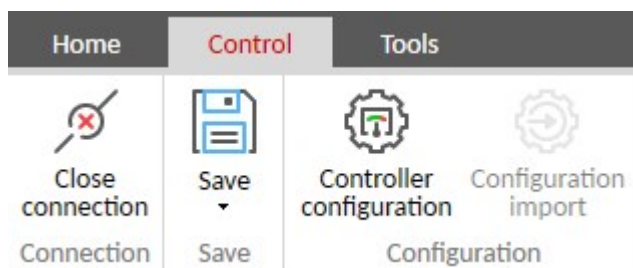
Source upon which the protection is configured can be selected. It can be any analog value or binary state.

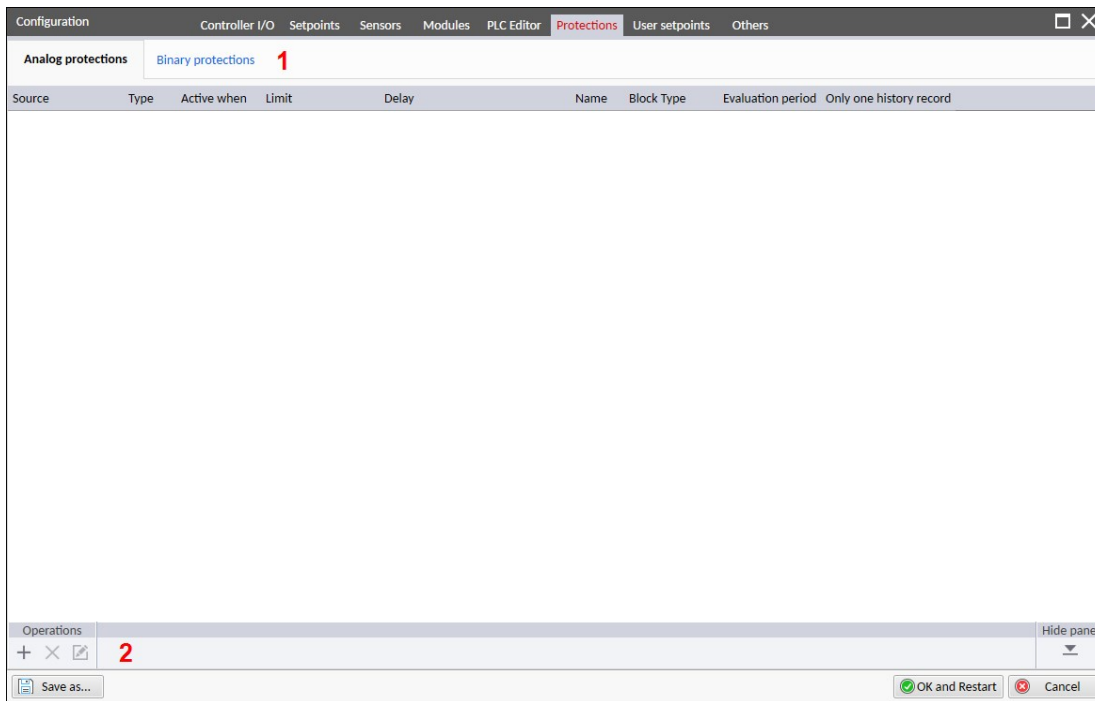
Source




Analog values	Binary states
<ul style="list-style-type: none"> > Analog inputs <ul style="list-style-type: none"> >> Controller, Modules > Values <ul style="list-style-type: none"> >> Measured values, Application, PLC, Shared I/O >> Modbus server, Modbus Master > Statistics 	<ul style="list-style-type: none"> > Binary inputs <ul style="list-style-type: none"> >> Controller, Modules, Shared I/O >> Modbus server, Modbus Master > Binary outputs <ul style="list-style-type: none"> >> PLC > Protection states > LBOs

Configuration of protections in IntelliConfig

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





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

Adding analog protection

The screenshot shows the 'Analog Protection' dialog box with the following fields and callouts:

- 1**: Source Value input field.
- 2**: Type / Level dropdown menu, currently set to 'Warning'.
- 3**: Custom Name input field, containing 'Wrn'.
- 4**: Active When dropdown menu, currently set to 'Over Limit'.
- 5**: Block Type dropdown menu, currently set to 'All the time'.
- 6**: History Record dropdown menu, currently set to 'Always'.
- 7**: Evaluation Period dropdown menu, currently set to 'Standard (0.1 s)'.
- 8**: Protection State checkbox, currently unchecked.
- 9**: Limit Source input field.
- 10**: Delay Source input field.

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

1	Selecting the input source see User protections on page 189
2	Selecting the protection type see Protection types on page 186
3	Text input for Alarm / History message
4	Selecting the protection activation see Protection activation on page 187
5	Selecting the block type see Protection blocking on page 187
6	Selecting if the occurrence of a protection is recorded every time or only once after a Fault Reset.
7	Selecting the evaluation period

8	If Protection State is checked the protection is then shown in the Values in the group User Protection States .
9	<p>Selecting the input for limit.</p> <p>Setpoints must have the correct resolution and dimension as protection source value.</p> <ul style="list-style-type: none"> ➤ Existing setpoint ➤ New user setpoint ➤ Existing user setpoint <p>Prefix is added to the name based on protection type / level</p>
10	<p>Selecting the input for delay.</p> <p>Setpoints must have the correct resolution 0.1 and dimension [s]</p> <ul style="list-style-type: none"> ➤ Existing setpoint ➤ New user setpoint ➤ Existing user setpoint <p>Prefix is added to the name based on protection type / leve</p>

Adding binary protection

The screenshot shows a 'Binary Protection' dialog box with the following fields and annotations:

- Source Value:** A text input field containing '1'.
- Type / Level:** A dropdown menu showing 'Warning' with a yellow triangle icon, annotated with '2'.
- Custom Name:** A text input field containing 'Wrn', annotated with '3'.
- Active When:** A dropdown menu showing 'True', annotated with '4'.
- Block Type:** A dropdown menu showing 'All the time', annotated with '5'.
- History Record:** A dropdown menu showing 'Always', annotated with '6'.
- Protection State:** A checkbox that is currently unchecked, annotated with '7'.
- Delay:** A section containing a 'Source' text input field with '8' inside, and several icons (dots, square, circular arrow, question mark) to its right.

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

1	Selecting the input source see User protections on page 189
2	Selecting the protection type see Protection types on page 186
3	Text input for Alarm / History message
4	Selecting the protection activation see Protection activation on page 187
5	Selecting the block type see Protection blocking on page 187

6	Selecting if the occurrence of a protection is recorded every time or only once after a Fault Reset.
7	If Protection State is checked the protection is then shown in setpoints under the group User setpoints .
8	<p>Selecting the input for delay.</p> <p>Setpoints must have the correct resolution 0.1 and dimension [s]</p> <ul style="list-style-type: none"> > Existing setpoint > New user setpoint > Existing user setpoint

🔍 back to Protections

Protection states

Protection states is a new feature introduced in IntelliMains 510, which helps with better management of alarms. Until now, you could only use LBO **ALARM** (PAGE 566) which did not specify what is going on. Protection states work in similar way, like any other LBO. The difference is, that protection state gets active only when there is specific alarm present in the alarm list. Thanks to this, you can create PLC logic, which will react to specific alarms only.

Fixed protection states

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

> Protection states groups:

- >> **FIXED PROTECTIONS STATES 1** (PAGE 601)
- >> **FIXED PROTECTIONS STATES 2** (PAGE 602)
- >> **FIXED PROTECTIONS STATES 3** (PAGE 603)

User protections states

During the **Configuration of protections in IntelliConfig** (page 189), you can decide whether you want to add user protection state for the protection. The name is exactly same as the alarm's message.

When you're adding user protection state, it will try to fill in gaps (if there are any present) in an actual list of **User Protection States** (page 604), if there is no gap, it will be automatically added to the end. User protection states are in a group of 32 with maximally 10 groups i.e. 320 user protection states are available.

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

🔍 back to Protections

5.4.27 Pulse Counters

IntelliMains 510 has 2 "slow" pulse counters which are using LBIs. Value of the each pulse counter is increased by one step whenever the number of pulses counted reaches the value of setpoint Conversion Coefficient Pulse. The "slow" pulse counters are able to count reliably pulses longer than 200 ms ON / 200 ms OFF.

Conversion setpoint	Value	Binary Input
Conversion Coefficient Pulse 1 (page 271)	Pulse Counter 1 (page 471)	PULSE COUNTER 1 (PAGE 558)
Conversion Coefficient Pulse 2 (page 271)	Pulse Counter 2 (page 471)	PULSE COUNTER 2 (PAGE 558)

Note: Value of the internal counters remains even if the controller is unplugged from power.

Note: Counter counts leading edges.

5.4.28 Regulation Loops

Regulation loops overview

Regulation loops overview

Loop type	Related applications	Related setpoints	Related Operation
Frequency	MCB, MGCB	Frequency Gain (page 351) Frequency Int (page 352)	Synchronization Island
Voltage	MCB, MGCB	Voltage Gain (page 353) Voltage Int (page 353)	Synchronization Island
Angle regulation	MCB, MGCB	Angle Gain (page 352)	Phase Match Synchronization
Load	MCB, MGCB	Load Gain (page 338) Load Int (page 339)	Parallel To Mains
PF control	MCB, MGCB	PF Gain (page 345) PF Int (page 346)	Parallel To Mains

Frequency, Load sharing, Load regulation loops have one common output = **Loadsharing Output (page 467)** which is sent to controllers through CAN. The value of this output is always composed from the contribution of each of the regulation loops.

Voltage, PF, VAr sharing have one common output = **Varsharing Output (page 468)** which is sent to controllers through CAN. The value of this output is always composed from the contribution of each of the regulation loop.

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

Loop type	Description
Frequency	The frequency loop is active in the first phase of synchronization when the bus frequency is regulated to match the mains frequency and in island operation. The loop is deactivated when the system start/stop is deactivated.
Voltage	The voltage loop is active in the first phase of synchronization when the bus voltage is regulated to match the mains voltage and in island operation.
Angle regulation	The differential angle control loop is active during the second phase of synchronization to match the mains/bus angle when phase match synchronization type is used.
Load	The load regulation loop is active when the system is running in parallel with mains and during

Loop type	Description
	load transfers from mains to bus or vice versa.
PF control	The PF control loop is active when the system is running in parallel with mains and during load transfers from mains to bus or vice versa.

Adjustment of regulation loops

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

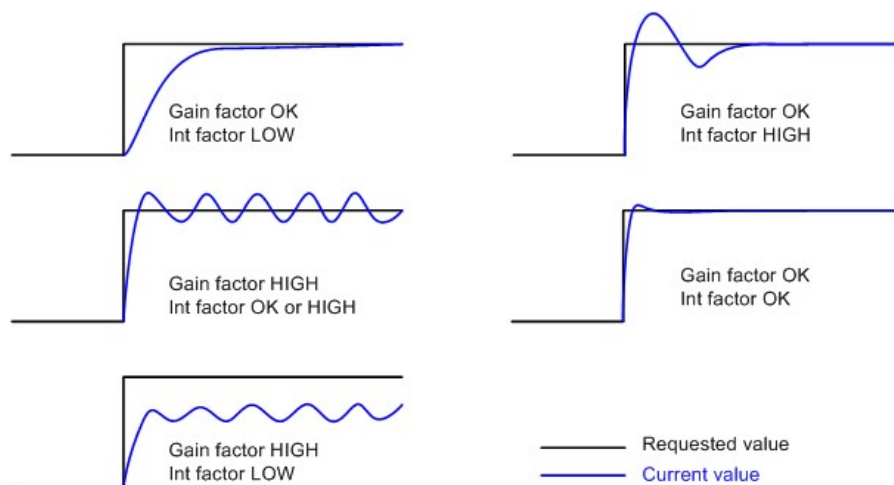


Image 5.120 Typical responses of PI regulator

For manual tuning of a control loop use following method:

- Set both the I-factor and P-factor to 0.
- Increase the P-factor slightly until the system starts to oscillate.
- Adjust the P-factor back to approx. one half of the value where the oscillations started.
- Increase the I-factor slightly to achieve optimal resulting response.

IMPORTANT: Be ready to press emergency stop button in case the regulation loop would start to behave unacceptable while it is being adjusted.

5.4.29 Sensor Curves

IMPORTANT: The functionality requires to install and configure extern CAN modules with analog inputs (Inteli AIO9/1, IS-AIN8).

Default sensor curves

There are 16 default resistive curves available. The following table provides information on minimum/maximum values of respective sensors. Actual values especially of temperature curves may differ.

Curve	Min X [Ω]	Max X [Ω]	Min Y	Max Y	Units Y
General line 1	0	1	0	1	Ω
General line 2	0	1	0	1	Ω
General line 3	0	1	0	1	Ω
General line 4	0	1	0	1	Ω
General line 5	0	1	0	1	Ω
General line 6	0	1	0	1	Ω
General line 7	0	1	0	1	Ω
General line 8	0	1	0	1	Ω
General line 9	0	1	0	1	Ω
General line 10	0	1	0	1	Ω
General line 11	0	1	0	1	Ω
General line 12	0	1	0	1	Ω
General line 13	0	1	0	1	Ω
General line 14	0	1	0	1	Ω
General line 15	0	1	0	1	Ω
General line 16	0	1	0	1	Ω

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

Sensor curve HW configuration

InteliMains 510 analog inputs allows you to select Input HW type. Three HW configuration options are available:

- > 0-15 k Ω
- > 0-10 V
- > 0-20 mA passive

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

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

Configuration Setpoints Controller I/O **Sensors**

Sensors Add line Delete line Open Save

StarterKit OilPress	■	HW configuration
StarterKit CoolTemp	■	0-10 V
StarterKit FuelLev	■	
General line 1		
General line 2		
General line 3		
General line 4		
General line 5		

Sensor Name StarterKit OilPress

Resolution 0,1 Dim Bar

	0-10 V	Bar
0	0,000	0,0
1	1,000	10,0

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.

Configuration Setpoints **Controller I/O** Sensors Modules PLC Editor Others

Binary Inputs

Binary Outputs

Analog Inputs

Analog Input 1

Function: Oil Pressure

History abbreviation: OilP

Sensor: StarterKit OilPress

Bargraph 0%: 0,0

Bargraph 100%: 10,0

Input HW type: 0-10 V

Protection type: Wrn+Sd

Oil Pressure Delay 3 s

Oil Pressure Sd 1,0 Bar

Oil Pressure Wrn 2,0 Bar

Protection active: Under Limit

Engine running only: ☒

5.4.30 Soft unload

This function is designed for systems with multiple IntelliMains 510 controller with MGCB application, it means with multiple load nodes. In situation when more than one load node is supplied from the group of the gen-sets the soft unload only based on the actual power of the group of gen-sets can not be performed. It is necessary to know the real value of power flowing through MGCB. IntelliMains 510 can measure this value using the auxiliary measurement. The power is measured on one phase CT transformer connected to the 4th CT meas terminals. The Aux Current CTs have to be located at the phase L1 for correct calculation of the **Aux Power (page 450)**.

The **Aux Current (page 450)** measurement settings are done via setpoint **Mains CT Ratio Prim (page 261)** and **Mains CT Ratio Sec (page 261)**. The selection of unloading method of MGCB is to be done via setpoint **Soft Unload (page 344)**.

5.4.31 System Start/Stop

The LBO **SYSTEM START/STOP** (PAGE 591) reflects whether the System (Gen-sets) shall be started or stopped. There is a LBI **REMOTE START/STOP** (PAGE 560) that is used to start and stop System remotely in AUT or TEST mode.

In case of using System Start/Stop functionality with multiple controllers proper configuration of the system is necessary to ensure correct operation. For the system using just CAN wiring no physical wiring of binary logic is needed to share the starting and stopping signal into all controllers in the same group. LBI **REMOTE START/STOP** (PAGE 560) should be configured in one "master" controller which will be used to control starting and stopping of other controllers in the group. All controllers with configured LBI **REMOTE START/STOP** (PAGE 560) will be started only if their LBI is activated.

5.4.32 User Buttons

User Buttons can be used to assign function of user's choice to button on the internal display or like remote switch. There are 16 user buttons and the behavior of each of them can be adjusted by it's relative setpoint.

Each setpoint has these options:

Option	Description
COMMAND	The relative User Button is controlled by command from internal display.
MAN OFF	The relative User Button is controlled manually via the setpoint. Value of the user button is still 0.
MAN ON	The relative User Button is controlled manually via the setpoint. Value of the user button is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button will be 1 until command is received.

Commands

If relative setpoint is set to COMMAND, the User Button will react to commands sent via button from internal display. Type of command is selected during controller configuration in Screen Editor.

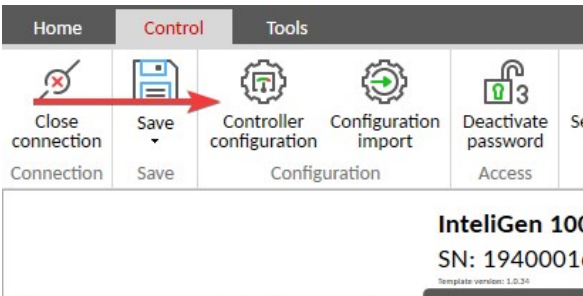
There are following commands:

Command	Description
ON/OFF	While this command is selected, pressing the button negate the actual value of the user button
ON	While this command is selected, pressing the button sets the actual value of the user button to 1. Note: Will not have any effect if the value is already 1.
OFF	While this command is selected, pressing the button sets the actual value of the user button to 0. Note: Will not have any effect if the value is already 0.
Pulse ON	While this command is selected, pressing the button sets the actual value of the user button to 1 for 200 ms. Note: The command reacts only to rising edge of the button.

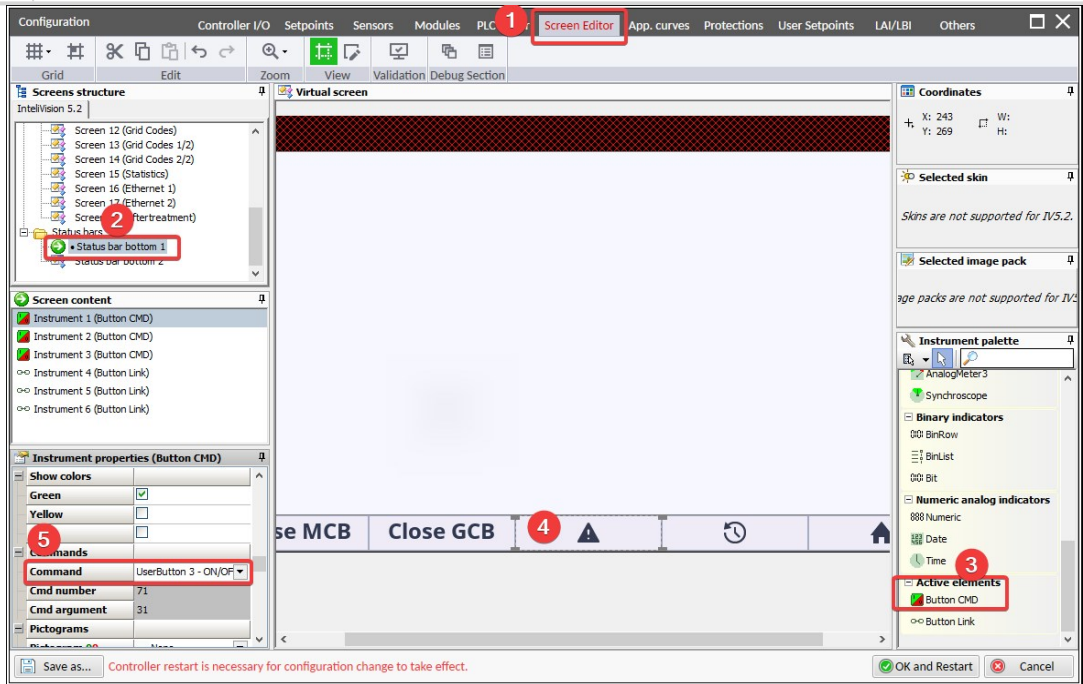
See list of MODBUS comands in chapter **List of commands and arguments (page 219)**.

Configuration of user button command

To configure Command on User Button, navigate to Configuration in IntelliConfig



1	Select Screen Editor tab
2	Select Status bar
3	Add "Button CMD", for example to position 4
5	Select required user button and COMMAND



5.4.33 User management and data access control

- Accessing, monitoring or controlling the device via any communication interface requires a user to be logged-in.
- When a task (read data, write data , control) is to be performed the access level of the user who is currently logged-in must be higher or equal to the access level required for the particular task.
- User must have their user account defined by the administrator of the controller before the user can log-in into the controller and perform monitoring, control or configuration tasks.

Note: For trusted interfaces there is an "implicit user"(see **Implicit account on page 202**) automatically logged in always while no other explicit user is logged in.

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 202)** 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.

User accounts

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

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 IntelliVision display when connected via Ethernet).
PIN	4-digit "password" to be used together with UID.
Access level	Determines Access to controller data (page 205)

Implicit account

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

- The implicit account is fixedly defined in the firmware.
- The implicit account has fixed access level 0, unless production mode is activated (**see Production mode on page 202**).
- 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 19)**, **WebSupervisor (page 19)**).

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 205**.

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

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

There is active alarm **Wrn Production Mode (page 664)** in the alarm list any time production mode is active. To turn off the Production mode go to User management and uncheck the checkbox Production mode or go to Production Mode display screen and select disable.

Factory default accounts

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

Username: "administrator"

Password: <serial number of the controller>

Example: 12345678

User ID: "0001"

User PIN: "0000"

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

IMPORTANT: Adjust the backup e-mail address before you delete the default administrator account. This address is used as second authentication factor in password reset request and the password reset action code will be sent to this and only this e-mail address.

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

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

Reset accounts to factory default

If credentials (username and/or password) for administrator account are lost, it is possible to reset all user accounts to the factory default state. For more information see **Resetting the administrator password on page 1**.

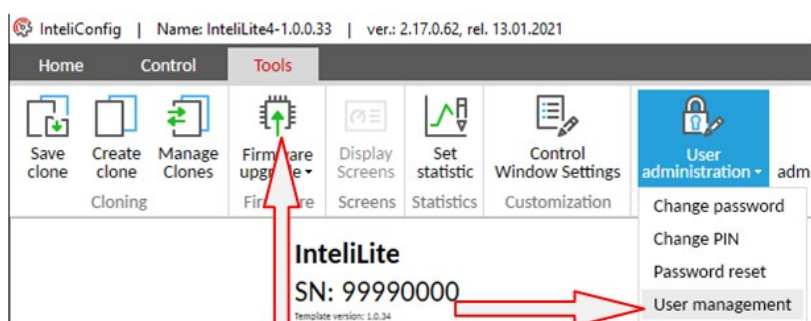
After reset procedure user accounts are in factory default state.

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

Managing accounts

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

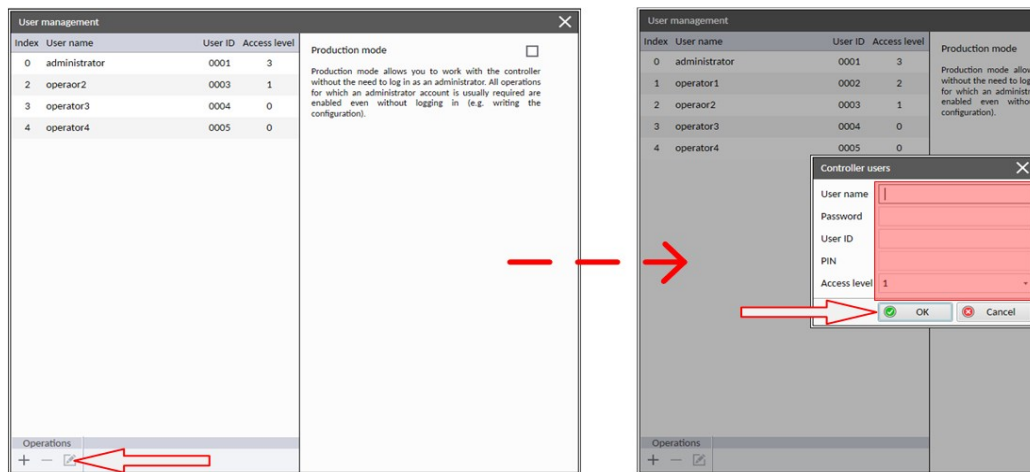
IMPORTANT: The total available number of accounts in the controller is 10.



Adding an account

Click on the "+" button in the lower left corner of the user management window, then provide the account properties as described in **User accounts (page 201)**.

Note: Rules for the **User accounts (page 201)** credentials apply and some items are optional



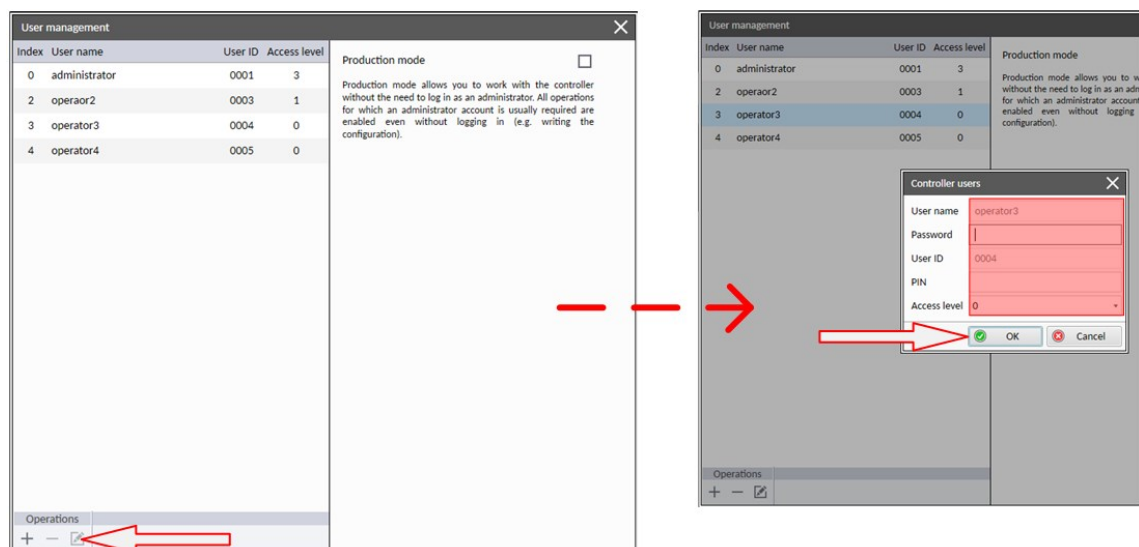
Deleting an account

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

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

Changing account properties

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



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

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 638)** 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.

Access to controller data

Every request for reading data from the controller or writing data into it requires a user to be logged. **This user must have an access level higher or equal to the access level defined for the particular object and operation.**

There are 4 access levels available (level 0 to level 3). **Level 3 is administrator level** and users who have this level have full control over the controller.

Reading data

The access level required for reading data from controller is fixedly adjusted to 0. That means **reading of data** (except some system objects) **is available for any user.**

Writing data

The access level required to **write** (modify) **application setpoints or invoke application commands is configurable** via IntelliConfig.

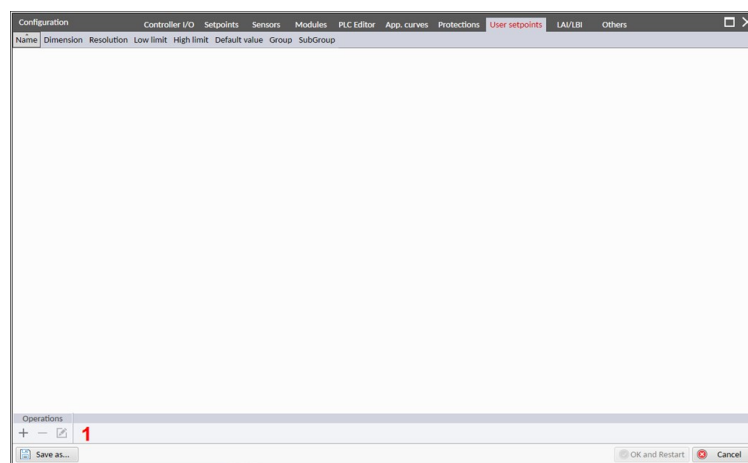
Special situations

There are several operations that require administrator level:

- Programming firmware
- Programming configuration
- Managing user accounts

5.4.34 User Setpoints

Controller allows user to create their own setpoints, edit and delete the created setpoints and choose a group in which the setpoint will be located. Number of setpoints created by user is limited to 2047. All setpoints created by user are located in setpoint group "User setpoints". The Comm. object number (**CO**) can be found via IntelliConfig (Tools tab → Generate Cfg image (COM)). User setpoints can be used to manage User protections and PLC.



Add User setpoint



1

Delete selected User setpoint



Edit selected User setpoint



Image 5.121 User setpoints tab in IntelliConfig

The image shows a 'User setpoint' dialog box with the following fields and values:

- Name:** (empty text box)
- Dimension:** %
- Resolution:** 1
- Low Limit:** -2 147 483 647
- High Limit:** 2 147 483 647
- Default Value:** 0
- Group:** User Setpoints
- Subgroup:** User Setpoints

Buttons: OK, Cancel

Image 5.122 Setting parameters of an user setpoint

Contents of the user setpoint

Name	Max. 32 characters <i>Note: Does not consider duplicities (It is possible to have setpoints with the same name, but it is not recommended.)</i>
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.
Subgroup	SubGroup in which setpoint will be shown.

Available groups and subgroups

The user setpoint can be put into some selected groups and subgroups.

***Note:** Setpoint is always added as last in selected subgroup.*

List of available groups and it's subgroups:

Group	Subgroup
Process control	User setpoints
Basic Settings	User setpoints

Protections	User setpoints
Power Management	User setpoints
User setpoints	User setpoints

5.4.35 Voltage Phase Sequence Detection

Controller detects phase sequence on both voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. The phase sequence is adjusted via setpoint **Phase Rotation** (page 266).

 **back to General Functions**

6 Communication

6.1 PC	209
6.2 Connection to 3rd party systems	213

🔍 back to Table of contents

6.1 PC

6.1.1 Direct communication	209
6.1.2 Remote communication	211

6.1.1 Direct communication

A RS232, USB, RS485 or ethernet interface can be used for direct cable connection to a PC.

Connection via RS232

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

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 55**.

RS232 interface uses **COM1 Mode (page 391)** port of the controller. Use a cross-wired serial communication cable with DB9 female connectors and signals Rx, Tx, GND.

Note: Also USB-RS232 convertor can be used.

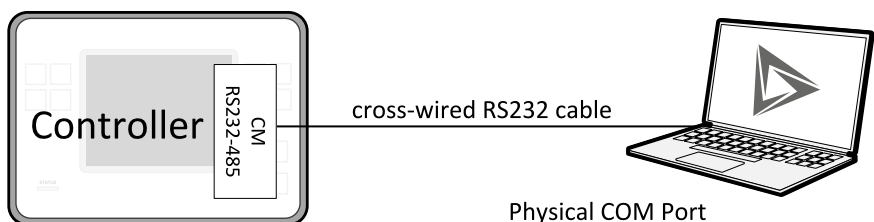


Image 6.1 Cross-wired RS232 cable is used

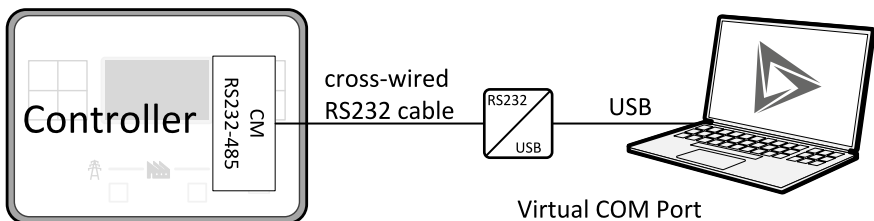


Image 6.2 Cross-wired RS232 cable and USB is used

Connection via RS485

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

If you use CM-RS232-485 module, make sure the module is correctly inserted and **COM2 Mode (page 393)** setpoint is set to the option Direct. To find more information about installation of the modules **see Plug-in module installation on page 55**.

Note: Also USB-RS485 convertor can be used.

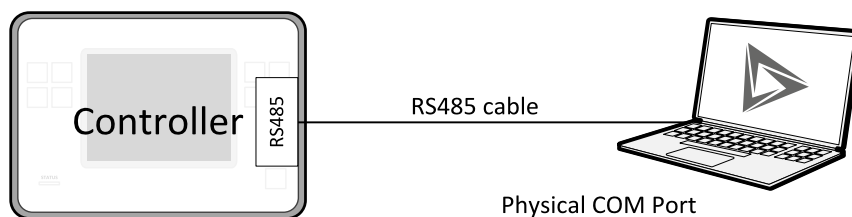


Image 6.3 Built-in RS485 is used

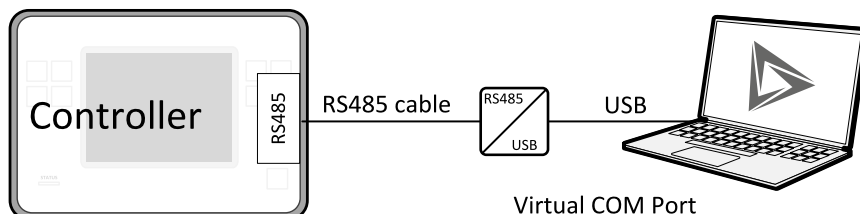


Image 6.4 RS485 and USB is used

Connection via Ethernet

There are two options how to connect PC tool (InteliConfig, Winscope1000, etc.) to the controller via Ethernet.

- > Onboard Ethernet interface
- > Plug-in communication module CM3-Ethernet interface (**see Plug-in module installation on page 55**).

Onboard Ethernet offers 6 clients to be connected at the same time by direct IP or AirGate.

CM3-Ethernet offers 6 clients to be connected at the same time by direct IP or AirGate.

The controller considers both interfaces as untrusted therefore correct userID and PIN or username and password has to be filled in.

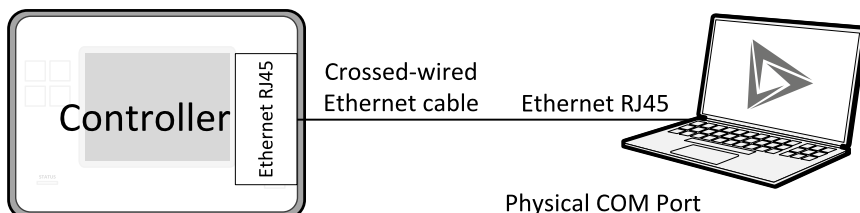


Image 6.5 Ethernet cable is used

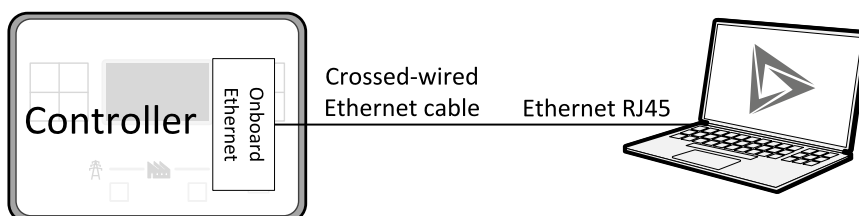


Image 6.6 Onboard Ethernet cable is used

Connection via USB

USB interface uses HID profile.

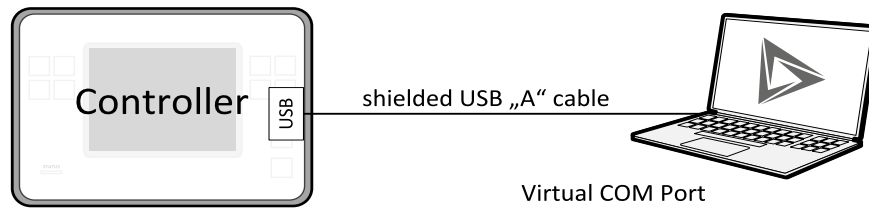


Image 6.7 Shielded USB type A cable is used

🔍 back to Communication

6.1.2 Remote communication

Ethernet LAN connection

Direct IP LAN connection is intended to be used if the onboard ethernet or CM3-Ethernet module is reachable from the client computer by specifying the IP address at which the module can be contacted.

- If direct IP connection is to be used within a local network the onboard ethernet or CM3-Ethernet must have static IP address in the respective local network.

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

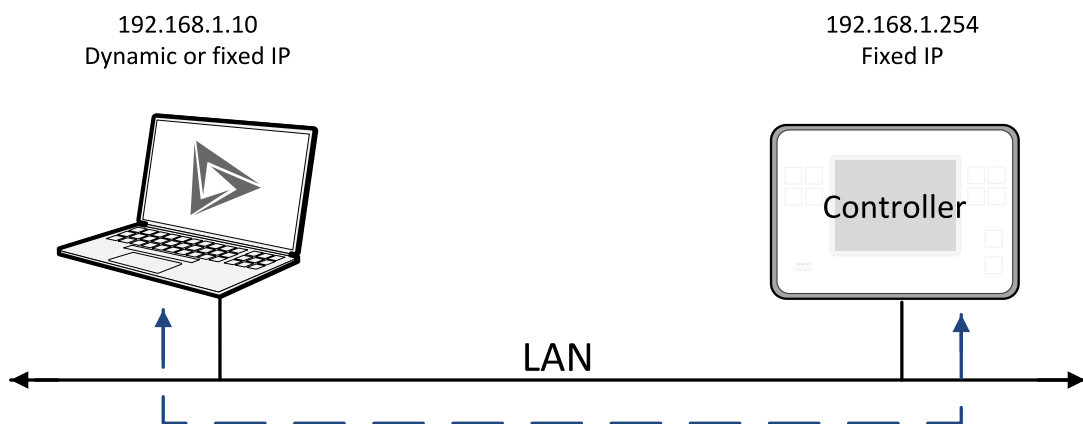


Image 6.8 Ethernet LAN connection

Onboard Ethernet setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint group Ethernet.

All actual operational values like actual IP address etc. are available in controller values in a group Ethernet.

CM3-Ethernet module setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint group CM-Ethernet.

All actual operational values like actual IP address etc. are available in controller values in a group CM-Ethernet.

Setting-up static IP address

This settings is related to **Group: Ethernet (page 377)**.

There are two basic ways how to setup static IP address for remote ethernet connection. The first way is to switch the Ethernet to manual IP address mode. Adjust the setpoint IP Address Mode to Manual option. In this moment values for related Ethernet port are immediately changed to the default or previously setup values of setpoints IP Address, Subnet Mask, Gateway IP, DNS IP, etc. If you are using this Ethernet port for connection to the controller you will lost the connection.

If this method is used several basic rules should be kept to avoid conflicts with the remaining network infrastructure:

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

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

The second way is to switch the Ethernet to manual IP address mode. Adjust the setpoint IP Address Mode to Manual option. In this moment values for related Ethernet port are immediately changed to values given by the DHCP server for the LAN. If you are using this Ethernet port for connection to the controller you will lost the connection. It is possible to configure the DHCP server to assign always the same IP address (i.e. static IP address) to the particular controller according to it's MAC address.

Internet WAN connection

WAN connection is intended to be used to connect the controller using the internet. It is recommended to use Ethernet 2 (untrusted interface) for remote connection using internet.

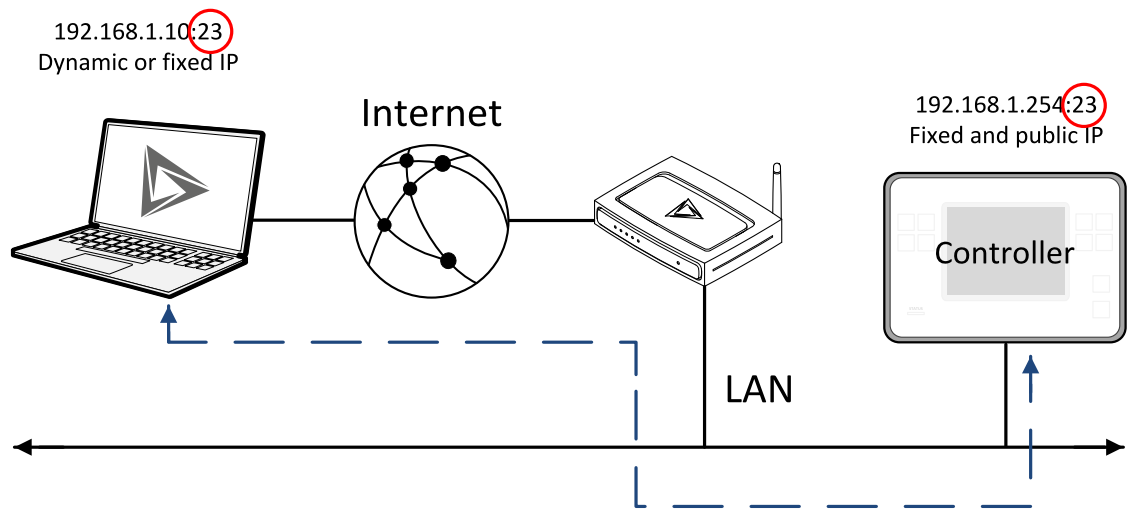


Image 6.9 Ethernet WAN connection

Public static IP

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

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

🔍 back to Communication

6.2 Connection to 3rd party systems

6.2.1 SNMP	213
6.2.2 Modbus-RTU, Modbus/TCP	214

🔍 back to Communication

6.2.1 SNMP

SNMP is an UDP-based client-server protocol used for providing data and events into a supervisory system (building management system). The controller plays the role of a "SNMP Agent" while the supervisory system plays the role of a "SNMP Manager".

➤ Supported versions – SNMP v1 and SNMP v2c

The SNMP Agent function is to be enabled by the setpoint **SNMP Agent (page 383)**. The setpoints **SNMP RD Community String (page 423)** and **SNMP WR Community String (page 424)** in the same group can be used to customize the "community strings" for the read and write operations which have function like "passwords". All requests sent from the SNMP Manager have to contain community string which match with the community string adjusted in the controller otherwise the controller refuses the operation.

MIB table

The "MIB table" (Management Information Base) is a table which gives to the Manager description of all objects provided by the Agent.

- The MIB table is specific for each controller type and configuration
- The MIB table is to be exported from the controller configuration using IntelliConfig
- Controllers with identical firmware and configuration share also identical MIB table, however if the configuration and/or firmware is not identical the MIB table is different and must be exported separately for each controller.

The root node of the MIB table of IntelliLite controller is enterprises.comapProjekt.il, which is 1.3.6.1.4.1.28634.14. Under this node there are following sub-nodes :

- Notifications group (SMI v2 only) contains definitions of all notification-type objects that the Agent may send to the Manager.
- GroupRdFix contains read-only objects that exist in all controller regardless of the firmware version/type and configuration.
- GroupRdCfg contains read-only objects that depend on the firmware version/type and configuration.
- GroupWrFix contains read-write objects that exist in all controller regardless of the firmware version/type and configuration.
- GroupWrCfg contains read-write objects that depend on the firmware version/type and configuration.
- GroupW contains write-only objects.
- NotificationData group contains objects that are accessible only as bindings of the notification messages.

SMI version

In IntelliConfig the MIB table may be exported in two different formats – SMI v1 and SMI v2. The format which shall be used for export depends on the SNMP Manager and SMI version that it does support.

Typically, SMI v1 is used for SNMP v1 and vice versa, but it is not a rule and SMI v2 may be also used for SNMP v1.

SNMP reserved objects

Name	OID	Access	Data type	Meaning
pfActionArgument	groupWrFix.24550	read,write	Gauge32	Writing: command argument Reading: command return value
pfActionCommand	groupW.24551	write	Integer32	Command code 1)
pfPassword	groupW.24524	write	Integer32	Password

1) For list of commands, arguments and description of the procedure of invoking commands see the description of the MODBUS protocol.

6.2.2 Modbus-RTU, Modbus/TCP

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

- Modbus-RTU can be used via **Terminal Diagram (page 33)** . The serial speed for Modbus-RTU communication is adjusted by the setpoint **RS485 Modbus Speed (page 274)** and the serial mode is adjusted by the setpoint **RS485 Modbus Mode (page 273)**. Only 1 client can be connected at once through this type of connection.
- Modbus/TCP (Modbus server) can be used with the **Ethernet (page 17)**. Up to 2 clients can be connected simultaneously through each Ethernet port. The Modbus Server must be activated by the appropriate setpoint **Modbus Server** related to the respective Ethernet interface. Timeout after which controller would terminate an inactive connection (when client is not sending any requests) is set by setpoint **ComAp Client Inactivity Timeout (page 421)**.

Note: The IP address of each device in the same network must vary.

Address space

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

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

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 216)**.

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 216)**.

Note: Setpoint must be configured with access level 0 to allow writing it via MODBUS.

Mapping data types to registers

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

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

Data type	Meaning	Number of registers	Data mapping
ShortStr	Zero-terminated string of max 15 ASCII characters.	8	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character ...
LongStr	Zero-terminated string of max 31 ASCII characters.	16	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character ...
Date	Date (dd-mm-yy)	2	MSB1 = BCD (dd) LSB1 = BCD (mm) MSB2 = BCD (yy) LSB2 = 0
Time	Time (hh-mm-ss)	2	MSB1 = BCD (hh) LSB1 = BCD (mm) MSB2 = BCD (ss) LSB2 = 0
Alarm	An item of the Alarmlist	27	MSB1 = reserved for future use LSB1 = reserved for future use MSB2 = Alarm level *) LSB2 = Alarm status **) MSB3 = alarm string ***) LSB3 = alarm string MSB4 = alarm string LSB5 = alarm string ...

*) 1 .. level 1 (yellow), 2 .. level 2 (red)

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

***) String encoding is UTF-8

Error codes (exception codes)

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

The controller responds with the error codes in as follows:

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

- 02 – illegal address is returned if the client tries to perform an operation with a object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be consequently obtained by reading the registers 4205 – 4206.

Reserved registers

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

Register addresses	Number of registers	Access	Data type	Meaning
4200 - 4201	2	read/write	Time	RTC Time in BCD code
4202 - 4203	2	read/write	Date	RTC Date in BCD code
4204	1	read/write	Unsigned8	Index of the language that is used for text data provided by Modbus (e.g. alarmlist messages).
4205 - 4206	2	read	Unsigned32	Last application error. To be read after the device returns the exception code 04. It contains specific information about the error.
4207 - 4208	2	read/write	Unsigned32	Writing: command argument Reading: command return value
4209	1	write	Unsigned16	Command code
4010	1	-	-	Not implemented
4211	1	write	Unsigned16	Password
4212 - 4213	2	read	Unsigned32	Communication status
4214	1	read/write	Unsigned8	Reading: Number of items in the Alarmlist Writing: Required record format, 0 = text (default), 1 = binary
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

Register addresses	Number of registers	Access	Data type	Meaning
4512 - 4538	27	read	Alarm	12. record in alarm list
4539 - 4565	27	read	Alarm	13. record in alarm list
4566 - 4592	27	read	Alarm	14. record in alarm list
4593 - 4619	27	read	Alarm	15. record in alarm list
4620 - 4646	27	read	Alarm	16. record in alarm list
4700	1	write	Bool	Remote start/Stop: Supplements the set of starting requests in AUTO mode (e.g. Remote Start/Stop, AMF Start, Peak Shaving). Set the coil to log1 to start the System, set the coil to log0 to stop the System. There are no conditions in relation to user access settings.

List of commands and arguments

IMPORTANT: Only commands configured with access level 0 can be invoked via Modbus.

"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 can not be closed in the specific situation etc.)

Command code	Action	Argument
Breaker cmd 0x02	MCB toggle*	0x12ED 0000
	MCB on	0x12EE 0000
	MCB off	0x12EF 0000
Mode cmd 0x03	OFF Mode	0x0000 0000
	MAN Mode	0x0001 0000
	AUTO Mode	0x0003 0000
	TEST Mode	0x0004 0000
Access lock 0x197	Remove Access lock	0x0010 0000
	Set Access lock	0x0020 0000

User Buttons 1 .. 8 0x0047	User Button 1: Pulse	0x000A 0000
	User Button 1: ON/OFF	0x000B 0000
	User Button 1: ON	0x000C 0000
	User Button 1: OFF	0x000D 0000
	User Button 2: Pulse	0x0014 0000
	User Button 2: ON/OFF	0x0015 0000
	User Button 2: ON	0x0016 0000
	User Button 2: OFF	0x0017 0000
	User Button 3: Pulse	0x001E 0000
	User Button 3: ON/OFF	0x001F 0000
	User Button 3: ON	0x0020 0000
	User Button 3: OFF	0x0021 0000
	User Button 4: Pulse	0x0028 0000
	User Button 4: ON/OFF	0x0029 0000
	User Button 4: ON	0x002A 0000
	User Button 4: OFF	0x002B 0000
	User Button 5: Pulse	0x0032 0000
	User Button 5: ON/OFF	0x0033 0000
	User Button 5: ON	0x0034 0000
	User Button 5: OFF	0x0035 0000
	User Button 6: Pulse	0x003C 0000
	User Butto 6: ON/OFF	0x003D 0000
	User Button 6: ON	0x003E 0000
	User Button 6: OFF	0x003F 0000
	User Button 7: Pulse	0x0046 0000
	User Button 7: ON/OFF	0x0047 0000
	User Button 7: ON	0x0048 0000
	User Button 7: OFF	0x0049 0000
	User Button 8: Pulse	0x0050 0000
	User Button 8: ON/OFF	0x0051 0000
	User Button 8: ON	0x0052 0000
	User Button 8: OFF	0x0053 0000

User Buttons 9 .. 16 0x0048	User Button 9: Pulse	0x005A 0000
	User Button 9: ON/OFF	0x005B 0000
	User Button 9: ON	0x005C 0000
	User Button 9: OFF	0x005D 0000
	User Button 10: Pulse	0x0064 0000
	User Button 10: ON/OFF	0x0065 0000
	User Button 10: ON	0x0066 0000
	User Button 10: OFF	0x0067 0000
	User Button 11: Pulse	0x006E 0000
	User Button 11: ON/OFF	0x006F 0000
	User Button 11: ON	0x0070 0000
	User Button 11: OFF	0x0071 0000
	User Button 12: Pulse	0x0078 0000
	User Button 12: ON/OFF	0x0079 0000
	User Button 12: ON	0x007A 0000
	User Button 12: OFF	0x007B 0000
	User Button 13: Pulse	0x0082 0000
	User Button 13: ON/OFF	0x0083 0000
	User Button 13: ON	0x0084 0000
	User Button 13: OFF	0x0085 0000
	User Button 14: Pulse	0x008C 0000
	User Butto 14: ON/OFF	0x008D 0000
	User Button 14: ON	0x008E 0000
	User Button 14: OFF	0x008F 0000
	User Button 15: Pulse	0x0096 0000
	User Button 15: ON/OFF	0x0097 0000
	User Button 15: ON	0x0098 0000
	User Button 15: OFF	0x0099 0000
	User Button 16: Pulse	0x00A0 0000
	User Button 16: ON/OFF	0x00A1 0000
	User Button 16: ON	0x00A2 0000
	User Button 16: OFF	0x00A3 0000

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

Modbus RTU examples

> Reading of Battery voltage

» Export table of values from IntelliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
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

» Export table of values from InteliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01228	9018	Nominal Mains Import	kW	Integer	2	0	0	32767	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	MCB Feedback	Controller I/O
00001	Value	8235	Binary Inputs	1	Remote Start/Stop	Controller I/O
00002	Value	8235	Binary Inputs	2	Remote TESTCU-BIN-3	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).

> Nominal Power – writing

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

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

Response: (Numbers in Hex)							
01	06	0B	C0	00	00	8B	D2
Controller address	Modbus function	Register address 0BC0 _{hex} = 3008 _{dec}		Allways zero		CRC	

Written setpoint nominal power is 100 kW.

> CRC calculation

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

Online CRC calculator: <http://www.lammertbries.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 Connection to 3rd party systems

7 Technical data

Power supply

Power supply range	8-36 V DC
Power consumption	5 W
RTC battery	Replaceable (3 V)
Fusing power	5 A / 6 × 0.5 A BOUT
Max. Power Dissipation	7 W

Operating conditions

Operating temperature	-20 °C to +70 °C
Storage temperature	-30 °C to +80 °C
Operating humidity (norm 60068-2-30)	95 % non-condensing (EN 60068-2-30)
Protection degree	IP65
Vibration	5-25 Hz, ± 1.6 mm 25-100 Hz, a = 4 g
Shocks	a = 500 m/s ²
Surrounding air temperature rating 70 °C.	
Suitable for pollution degree 2.	

Current measurement

Measurement inputs	3ph Mains/Bus-L, 1ph Aux
Measurement range	5 A
Maximum continuous current	10 A
Accuracy	±20 mA for 0-2 A; 1 % of value for 2-5 A
Input impedance	<0.1 Ω

Voltage measurement

Measurement inputs	3ph-n Mains/Bus-L, 3ph-n Bus/Bus-R
Measurement range (L-N / L-L)	10-277 V AC / 10-480 V AC (EU) 10-346 V AC / 10-600 V AC (US/Canada)
Linear measurement and protection range	350 V AC Ph-N; 660 V AC Ph-Ph
Accuracy	1 %
Frequency range	30-70 Hz (accuracy 0.1 Hz)
Input impedance	0.72 MΩ ph-ph , 0.36 MΩ ph-n

Display

Type	Build-in colour TFT 5"
Resolution	800 × 480 px

Binary inputs

Number	8, non-isolated
Close/Open indication	0-2 V DC close contact 6-36 V DC open contact

Binary outputs

Number	8, non-isolated
Max. current	BO 1-8 = 0.5 A
Switching to	Positive supply terminal

Communications

USB Device	Non-isolated type B connector
USB Host	Non-isolated type A connector
RS 485	Isolated
ETH	10/100 Mbit
CAN 1	Isolated, 250 / 50 kbps,
CAN 2	Nominal impedance 120 Ω

8 Appendix

- 8.1 Controller objects 229
- 8.2 Alarms 633
- 8.3 Modules 688

 [back to Table of contents](#)

8.1 Controller objects

8.1.1 List of controller objects types

- 8.1.2 Setpoints 230
- 8.1.3 Values 434
- 8.1.4 Logical binary inputs 534
- 8.1.5 Logical binary outputs 564
- 8.1.6 Logical analog inputs 593
- 8.1.7 Application Curves 599
- 8.1.8 Fixed Protection States 600
- 8.1.9 User Protection States 604
- 8.1.10 PLC 607

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 FRAM memory, which is designed to withstand up to 10^{14} read/write cycles without risk of damage or data loss, but it may become damaged, when the allowed number of reading/writing cycles is exceeded.

For full list of setpoints go to the chapter **List of setpoints (page 231)**.

List of group of setpoints

Group: Process Control	237
Group: Basic settings	257
Group: Communication Settings	272
Group: Mains Settings	274
Group: Protections	292
Group: Generator settings	307
Group: Load Shedding	311
Group: Power Management	315
Group: Load Control	338
Group: PF Control	345
Group: Synchronization	347
Group: User Buttons	354
Group: Scheduler	362
Group: Plug-In Modules	376
Group: Ethernet	377
Group: CM-RS232-485	391
Group: CM-4G-GPS	395
Group: CM-Ethernet	414

List of setpoints

Group: Process Control	237	Attempts To Close Breaker	255
Subgroup: Application Selector	237	Delay Between Closing Attempts	256
Application Mode Select	237	Subgroup: Controller Redundancy	257
Subgroup: Load Control	238	Watched Controller	257
Load Request Source	238	Group: Basic settings	257
#System Load Control PTM	239	Subgroup: Name	257
Load Control PTM Mode	240	Controller Name	257
Import/Export Limitation	241	Subgroup: Power settings	258
#System Baseload	241	Nominal DC Shore Power	258
Import Load	242	Subgroup: Current settings	258
Subgroup: PF/Q Control	243	Nominal Current	258
PF/Q Request Source	243	Mains CT Ratio Prim	259
#System PF Control PTM	244	Mains CT Ratio Sec	259
PF/Q Control PTM Mode	244	Aux Current Ratio Prim	260
PF/Q Regulation Type	245	Aux Current Ratio Sec	260
#System Power Factor	245	Mains CT Ratio Prim	261
#System Base Q	246	Mains CT Ratio Sec	261
Import Power Factor	247	Subgroup: Voltage settings	261
Import Q	247	Connection type	261
Subgroup: Mains Coupling	248	Gen AC Bus Nominal Voltage Ph-N	263
Mains Coupling	248	Gen Nominal Voltage Ph-Ph	263
Subgroup: Process Limitation	248	MainsAC Shore Nominal Voltage Ph-N	263
CB Control In MAN Mode	248	Mains/Bus Nominal Voltage Ph-PhMains	
Subgroup: Mains Import Measurement	250	Nominal Voltage Ph-Ph	264
Mains Measurement P	250	Mains VT Ratio	264
Mains Measurement Q	251	Bus VT Ratio	264
Subgroup: Peak Shaving	251	Bus Dead Level	265
Peak Shaving	251	Subgroup: Phase Rotation	266
Peak Shaving Start Level	252	Phase Rotation	266
Peak Shaving Stop Level	252	Subgroup: Frequency settings	266
Peak Shaving Start/Stop Delay	253	Nominal Frequency	266
Subgroup: Breaker Control Mode	253	Subgroup: Controller settings	267
MCB Control Mode	253	Controller mode	267
GCB Control Mode	254	Power On Mode	267
MGCB Parallel Close	254	Backlight Timeout	268
Multi Soft Start	255	Horn Timeout	268
		Fail Safe Binary State	269

User Logging Record	269	Mains Voltage Unbalance	284
Subgroup: Battery Protections	270	Mains Voltage Unbalance Delay	284
Battery Undervoltage	270	Subgroup: Mains Frequency Protection	285
Battery Overvoltage	270	Mains Overfrequency	285
Battery Under And Overvoltage Delay	270	Mains Overfrequency Hys	285
Subgroup: Pulse counters	271	Mains Underfrequency	285
Conversion Coefficient Pulse 1	271	Mains Underfrequency Hys	286
Conversion Coefficient Pulse 2	271	Mains <>f Delay	286
Group: Communication Settings	272	Subgroup: AMF Timers	286
Subgroup: Controller Address	272	AMF Start	286
CAN Controller Address	272	Emergency Start Delay	287
Subgroup: RS485 Settings	272	Mains Return Delay	287
RS485 Mode	272	MCB Close Delay	288
RS485 Communication Speed	273	Subgroup: AMF Settings	288
RS485 Modbus Mode	273	Return From Island	288
RS485 Modbus Speed	274	Return to Mains in TEST Mode	289
Subgroup: Intercontroller Settings	274	MCB Logic	289
CAN Intercontroller Empty Check	274	MCB Opens On	290
Group: Mains Settings	274	Subgroup: Loss of Mains Protections	291
Subgroup: Overload Protection	274	Vector Shift Limit	291
Overload MPR	274	ROCOF Windows Length	291
Overload Wrn	276	ROCOF df/dt	292
Overload Delay	276	Vector Shift/ROCOF CB Selector	292
Subgroup: Underload Protection	277	Group: Protections	292
Minimal Power PTM	277	Subgroup: Overload Protection	292
Minimal Power PTM Protection Del	278	Overload Protection	292
Subgroup: Current Protection	278	Subgroup: Current Protection	293
Short Circuit	278	IDMT Mains Overcurrent Protection	293
Short Circuit Delay	278	Current Unbalance Protection	295
IDMT Mains Overcurrent Delay	279	Short Circuit Protection	296
Current Unbalance	280	Subgroup: Voltage Protection	296
Current Unbalance Delay	280	Mains <>V Protection	296
Subgroup: Mains Voltage Protections	281	Mains Voltage Unbalance Protection	298
Mains Overvoltage	281	Bus <>V Protection	299
Mains Overvoltage Delay	281	Bus Voltage Unbalance Protection	299
Mains Overvoltage Hys	282	Subgroup: Frequency Protection	301
Mains Undervoltage	282	Mains <>f Protection	301
Mains Undervoltage Delay	283	Bus <>f Protection	302
Mains Undervoltage Hys	283	Subgroup: Minimal Power PTM Protection	303

Minimal Power PTM Protection	303	#Stopping Rel Load Reserve 1	321
Subgroup: Bus Meas Error Protection	304	Subgroup: Load Reserve Set 2	322
Bus Meas Error Protection	304	#Starting Load Reserve 2	322
Subgroup: Loss of Mains Protections	305	#Stopping Load Reserve 2	323
Vector Shift Protection	305	#Starting Rel Load Reserve 2	324
ROCOF Protection	306	#Stopping Rel Load Reserve 2	324
Subgroup: Phase Rotation Protection	306	Subgroup: Load Reserve Set 3	325
Phase Rotation Protection	306	#Starting Load Reserve 3	325
Group: Generator settings	307	#Stopping Load Reserve 3	326
Subgroup: Bus Voltage Protection	307	#Starting Rel Load Reserve 3	327
Bus Undervoltage	307	#Stopping Rel Load Reserve 3	327
Bus Overvoltage	307	Subgroup: Load Reserve Set 4	328
Bus <>V Delay	308	#Starting Load Reserve 4	328
Bus V Unbalance	308	#Stopping Load Reserve 4	329
Bus V Unbalance Delay	308	#Starting Rel Load Reserve 4	330
Subgroup: Bus Frequency Protection	309	#Stopping Rel Load Reserve 4	330
Bus Overfrequency	309	Subgroup: Minimal Running Power	331
Bus Underfrequency	309	#Min Run Power 1	331
Bus <>f Delay	310	#Min Run Power 2	331
Group: Load Shedding	311	#Min Run Power 3	332
Subgroup: Load Shedding	311	Subgroup: Start/Stop Timing	332
Load Shedding Active	311	#Next Engine Start Delay	332
Load Shedding Based On	312	#Next Engine Stop Delay	333
Load Shedding Level	312	Subgroup: Slow Stop Protection	333
Load Shedding Delay	313	#Slow Stop Delay	333
Load Reconnection Level	313	Subgroup: Over Load Next Start Protection	334
Load Reconnection Delay	313	#Overload Next Start Protection	334
Auto Load Reconnection	314	#Overload Next Start Level	334
Group: Power Management	315	#Overload Next Start Delay	335
Subgroup: Power Management Control	315	Subgroup: Run Hours Equalization	335
#Power Management Mode	315	#Run Hours Max Difference	335
#Priority Auto Swap	316	Subgroup: Efficient Mode	336
#System Start Delay	317	#Power Band Change Up Delay	336
#System Stop Delay	317	#Power Band Change Down Delay	336
Dynamic Spinning Reserve	318	Subgroup: Group Settings	337
Ignore Load Reserve For Island	318	Control Group	337
Subgroup: Load Reserve Set 1	319	Group Link L	337
#Starting Load Reserve 1	319	Group Link R	338
#Stopping Load Reserve 1	320	Group: Load Control	338
#Starting Rel Load Reserve 1	321		

Subgroup: Regulation Loops	338	User Button 3	355
Load Gain	338	User Button 4	355
Load Int	339	User Button 5	356
Subgroup: Load Transfer	339	User Button 6	356
Close Transfer Max Duration	339	User Button 7	357
Open Transfer Min Break	339	User Button 8	357
Transfer Mains To Gen	340	User Button 9	358
Transfer Gen To Mains	341	User Button 10	358
Generator Unload MGCB Open Level	342	User Button 12	359
Mains Unload MCB Open Window	342	User Button 13	360
Load Ramp	343	User Button 14	360
Soft Unload Ramp	343	User Button 15	361
Soft Unload	344	User Button 16	361
Group: PF Control	345	Group: Scheduler	362
Subgroup: Regulation Loops	345	Subgroup: Time & Date	362
PF Gain	345	Time	362
PF Int	346	Date	362
Group: Synchronization	347	Time Stamp Period	362
Subgroup: Synchronization	347	Time Zone	363
Synchronization Type	347	DST Switching Mode	363
Synchronization Timeout	348	Time Mode	364
Voltage Window	348	DST Period Rule	364
Phase Window	349	Subgroup: Timer 1	365
Bus to Mains Phase Shift	349	Timer 1 Function	365
Dwell Time	349	Timer 1 Setup	366
Slip Frequency	350	Subgroup: Timer 2	367
Slip Frequency Window	350	Timer 2 Function	367
MGCB Latency	350	Timer 2 Setup	368
MCB Latency	351	Subgroup: Timer 3	369
Subgroup: Frequency Regulation Loop	351	Timer 3 Function	369
Frequency Gain	351	Timer 3 Setup	370
Frequency Int	352	Subgroup: Timer 4	371
Angle Gain	352	Timer 4 Function	371
Subgroup: Voltage Regulation Loop	353	Timer 4 Setup	372
Voltage Gain	353	Subgroup: Timer 5	373
Voltage Int	353	Timer 5 Function	373
Group: User Buttons	354	Timer 5 Setup	374
Subgroup: User Buttons	354	Subgroup: Timer 6	375
User Button 1	354	Timer 6 Function	375
User Button 2	354		

Timer 6 Setup	376	MPR Message	389
Group: Plug-In Modules	376	Stp Message	389
Subgroup: Slot A	376	Wrn Message	389
Slot A	376	Subgroup: RTC Synchronization	390
Subgroup: Slot B	376	NTP Clock Synchronization	390
Slot B	376	NTP Server	390
Group: Ethernet	377	Time Zone	391
Subgroup: TCP/IP Settings	377	Group: CM-RS232-485	391
IP Address Mode	377	Subgroup: COM1 Setting	391
DNS Mode	378	COM1 Mode	391
IP Firewall	378	COM1 Communication Speed	392
Subgroup: AirGate Settings	379	COM1 Modbus Mode	392
AirGate Connection	379	COM1 MODBUS Communication Speed	393
AirGate Address	379	Subgroup: COM2 Setting	393
AirGate Port	380	COM2 Mode	393
Subgroup: ComAp Client Settings	380	COM2 Communication Speed	393
ComAp Client Inactivity Timeout	380	COM2 Modbus Mode	394
Direct Connection	381	COM2 MODBUS Communication Speed	394
Direct Connection Port	381	Group: CM-4G-GPS	395
Subgroup: Modbus Server Settings	382	Subgroup: Cellular Interface	395
Modbus Server	382	Internet Connection	395
Modbus Client Inactivity Timeout	382	Network Mode	395
Subgroup: SNMP Settings	383	Access Point Name	395
SNMP Agent	383	Connection Check IP1	396
SNMP Traps IP Address 1	383	Connection Check IP2	397
SNMP Traps IP Address 2	384	Connection Check IP3	398
Subgroup: E-mail Settings	384	Subgroup: TCP/IP Settings	399
SMTP Server Address	384	DNS Mode	399
SMTP Sender Address	385	DNS IP Address 1	399
SMTP User Name	385	DNS IP Address 2	400
SMTP User Password	386	IP Firewall	400
SMTP Encryption	386	Subgroup: AirGate Settings	401
E-mail Address 1	387	AirGate Connection	401
E-mail Address 2	387	AirGate Address	401
E-mail Address 3	387	Airgate Port	402
E-mail Address 4	388	Subgroup: ComAp Client Settings	402
Subgroup: Messages Settings	388	Direct Connection	402
E-mail/SMS Language	388	Direct Connection Port	403
Event Message	388	ComAp Client Inactivity Timeout	403

Subgroup: E-mail Settings	404	AirGate Port	419
SMTP Server Address	404	Subgroup: ComAp Client Settings	420
SMTP Sender Address	404	Direct Connection	420
SMTP User Name	405	Direct Connection Port	420
SMTP User Password	405	ComAp Client Inactivity Timeout	421
SMTP Encryption	406	Subgroup: MODBUS Settings	421
E-mail Address 1	406	MODBUS Server	421
E-mail Address 2	407	MODBUS Client Inactivity Timeout	422
E-mail Address 3	407	Subgroup: SNMP Settings	422
E-mail Address 4	407	SNMP Agent	422
Subgroup: Messages Settings	408	SNMP Trap Format	422
Telephone Number 1	408	SNMP Traps IP Address 1	423
Telephone Number 2	408	SNMP Traps IP Address 2	423
Telephone Number 3	409	SNMP RD Community String	423
Telephone Number 4	409	SNMP WR Community String	424
E-mail/SMS Language	410	Subgroup: E-mail Settings	424
Event Message	410	SMTP Server Address	424
MPR Message	410	SMTP Sender Address	425
Wrn Message	411	SMTP User Name	425
Subgroup: GPS Settings	411	SMTP User Password	426
GPS Tracking	411	SMTP Encryption	426
Subgroup: RTC Synchronization	412	E-mail Address 1	427
NTP Clock Sync	412	E-mail Address 2	427
NTP Server	412	E-mail Address 3	427
GPS Clock Sync	413	E-mail Address 4	428
Time Zone	413	Subgroup: Messages Settings	428
Group: CM-Ethernet	414	Telephone Number 1	428
Subgroup: TCP/IP Settings	414	Telephone Number 2	429
IP Address Mode	414	Telephone Number 3	429
IP Address	415	Telephone Number 4	430
Subnet Mask	415	E-mail/SMS Language	430
Gateway IP	416	Event Message	431
DNS Mode	416	MPR Message	431
DNS IP Address 1	417	Wrn Message	431
DNS IP Address 2	417	NTP Server	432
IP Firewall	418	NTP Clock Synchronization	432
Subgroup: AirGate Settings	418	NTP Server	432
AirGate Connection	418	Time Zone	433
AirGate Address	419		

 **back to Controller objects**

Group: Process Control

Subgroup: Application Selector

Application Mode Select

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	MCB / MGCB [-]		
Default value	MCB	Force value	NO
Step	[-]		
Comm object	12157	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint selects default controller's application mode while any application LBI is not activated. Current controller's application mode is stored in value Application Mode (page 472) .			
IMPORTANT: Controller Mode (page 472) has to be OFF, otherwise controller application can not be changed.			
MCB	Application without master generator circuit breaker (MGCB). The controller controls only one breaker - a mains circuit breaker (MCB). Feedback from MCB is required.		
MGCB	Application with master generator circuit breaker (MGCB). The controller controls two breakers - MCB and MGCB. Feedbacks from both breakers are required.		
Note: The controller also controls the NCB, check the chapter Breaker Control (page 104) for more information about breakers.			

🔍 back to List of setpoints

Subgroup: Load Control

Load Request Source

Setpoint group	Process Control	Related FW	1.0.0													
Range [units]	Setpoint / Analog External Value [-]															
Default value	Setpoint	Force value	YES													
Step	[-]															
Comm object	20727	Related applications	MCB, MGCB													
Config level	Standard															
Setpoint visibility	Always															
Description																
This setpoint adjusts source type of requested load control.																
<table><tr><th>Load Request Source</th><th>Load Control PTM Mode (page 240)</th><th>Source</th></tr><tr><td rowspan="2">Setpoint</td><td>Baseload</td><td>#System Baseload (page 241)</td></tr><tr><td>Imp/Exp</td><td>Import Load (page 242)</td></tr><tr><td rowspan="2">Analog External Value</td><td>Baseload</td><td>LOAD CONTROL: ANEXT BASELOAD (PAGE 596)</td></tr><tr><td>Imp/Exp</td><td>LOAD CONTROL: ANEXT IMP/EXP LOAD (PAGE 597)</td></tr></table>				Load Request Source	Load Control PTM Mode (page 240)	Source	Setpoint	Baseload	#System Baseload (page 241)	Imp/Exp	Import Load (page 242)	Analog External Value	Baseload	LOAD CONTROL: ANEXT BASELOAD (PAGE 596)	Imp/Exp	LOAD CONTROL: ANEXT IMP/EXP LOAD (PAGE 597)
Load Request Source	Load Control PTM Mode (page 240)	Source														
Setpoint	Baseload	#System Baseload (page 241)														
	Imp/Exp	Import Load (page 242)														
Analog External Value	Baseload	LOAD CONTROL: ANEXT BASELOAD (PAGE 596)														
	Imp/Exp	LOAD CONTROL: ANEXT IMP/EXP LOAD (PAGE 597)														
See Load control (page 145) for more information.																

[🔍 back to List of setpoints](#)

#System Load Control PTM

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Baseload / Load Shar [-]		
Default value	Baseload	Force value	NO
Step	[-]		
Comm object	8774	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Load control mode in parallel to mains operation of the whole controller group.			
Baseload	The total power of the group is controlled to constant level given by the setpoint #System Baseload (page 241) . Each loaded unit takes equal part (relative to their nominal power) from this requested value. The load is regulated locally in each controller by Load control regulation loop, load-sharing is not active. The setpoint #System Baseload (page 241) is also used for determining which unit have to run or not.		
Load Shar	The load is controlled by the supervisor (IM1010) controller to share the total load (given by the setpoint #System Baseload (page 241)) with other loaded units in such a way, that all loaded units will be loaded at the same level (relative to their nominal power). Load-sharing regulation loop is active.		

Note: The Load Shar mode shall be used in case the supervisor (IM1010) controller is present in the system. In systems without the supervisor (IM1010) controller the setpoint must be setup to the Baseload option.

Note: The power factor (PF) is regulated to constant level given by the setpoint **#System PF Control PTM (page 244)** in parallel to mains operation and does not depend on active load control mode.

[back to List of setpoints](#)

Load Control PTM Mode

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Baseload / Imp / Exp [-]		
Default value	Baseload	Force value	YES
Step	[-]		
Comm object	8638	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the type of load control.			
Baseload	<p>System produces amount of the power. Source or requested power is given by setpoint Load Request Source (page 238) The rest of power is supplied from the mains or exported to the mains . Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint Import/Export Limitation (page 241) = Enabled. Then the request for the power of the System operating in baseload can be limited to prevent the Import/Export go below the limit given by setpoint Import Load (page 242).</p> <p>Example: Baseload = 1000 kW, load = 700 kW, Import load = 100. Then the Baseload request will be limited to 600 kW to prevent the Import power go below 100 kW</p> <p>Example: Baseload = 1000 kW, load = 700 kW, Import load = -100. Then the Baseload request will be limited to 800 kW to prevent the Import power go below -100 kW (actually it is limitation of the export).</p> <p>The load of the System is controlled to keep constant level of base load of the whole system. The level is adjusted by the setpoint #System Baseload (page 241).</p>		
	Imp/Exp	<p>System produces the certain amount of power to keep constant import/export from the mains regardless the demand of the load. The source of requested import/export is given by setpoint Load Request Source (page 238).</p>	

[back to List of setpoints](#)

Import/Export Limitation

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	9592	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enable or disable limitation for Import/Export. If the limitation is enabled, then the request for the power of the System is limited to prevent the Import go below the limit which is give by the setpoint Import Load (page 242).			
Example: If the Import Load is set to -5 kW the maximum power exported to the Mains is 5 kW. If the Import Load is set to 5 kW the minimum power imported from the Mains is 5 kW.			

🔍 back to List of setpoints

#System Baseload

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	0 .. 32 000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	1 000 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8775	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Required total active power of the controller group in parallel to mains operation in Baseload mode.			
The value from this Setpoint is used if:			
<div><div>></div>Setpoint #System Load Control PTM (page 239) = Baseload</div>			
<div><div>></div>Setpoint #System Load Control PTM (page 239) = Load Shar</div>			
<div><div>>></div>Setpoint Load Control PTM Mode (page 240) = Baseload</div>			
See chapter Load control (page 145) for more information.			
Note: The # setpoints are shared with all controllers on site.			
Note: The # setpoints are shared with all controllers on site via intercontroller CAN line.			

🔍 back to List of setpoints

Import Load

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	-32 000 .. 32 000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	0 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8641	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Defines actual imported (exported) active power in parallel to mains operations in Import/Export mode or the minimal imported (maximal exported) active power from the Mains in Baseload with I/E Limit mode.			
The value from this Setpoint is used if:			
<div><div>></div>Setpoint #System Load Control PTM (page 239) = Load Shar and</div> <div><div>>></div>Setpoint Load Control PTM Mode (page 240) = Import/Export or</div> <div><div>>></div>Setpoint Load Control PTM Mode (page 240) = Baseload and Import/Export Limitation (page 241) = Enabled.</div>			
See chapter Load control (page 145) for more information.			
Note: If the value of the setpoint is >0 the power is imported from the Mains, if the setpoint value is <0, then the power is exported to the mains.			

⬅ back to List of setpoints

Subgroup: PF/Q Control

PF/Q Request Source

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Setpoint / Analog External Value [-]		
Default value	Setpoint	Force value	YES
Step	[-]		
Comm object	16130	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjust the source type requested of PF/Q control.			
See PF Control (page 146) for more information.			
PF/Q Request Source	#System PF Control PTM (page 244)	PF/Q Control PTM Mode (page 244)	Source
Setpoint	Base PF/ Q Control	PF Control	#System Power Factor (page 245)
		Q Control	#System Base Q (page 246)
	Imp/Exp PF/ Q Control	PF Control	Import Power Factor (page 247)
		Q Control	Import Q (page 247)
Analog External Value	Imp/Exp PF/ Q Control	PF Control	PF CONTROL: ANEXT IMP/EXP PF (PAGE 598)

 [back to List of setpoints](#)

#System PF Control PTM

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Base PF / Var Shar [-]		
Default value	Base PF	Force value	NO
Step	[-]		
Comm object	8779	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Power factor control mode in parallel to mains operation of the whole controller group.			
Base PF	PF of the System is controlled by their PF control loops to provide constant system power factor adjusted by setpoint #System Power Factor (page 245) .		
Var Shar	PF of the System (reactive power) is controlled through the VAr sharing line.		

🔍 back to List of setpoints

PF/Q Control PTM Mode

Setpoint group	Process Control	Related FW	1.0.0				
Range [units]	PF Control / Q Control [-]						
Default value	PF Control	Force value	NO				
Step	[-]						
Comm object	10120	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoint adjust the type of PF/Q control.							
<table><tr><td>PF Control</td><td>The Total Running Power Factor (page 462) is controlled according to preset required value. See PF Control (page 146) for more information.</td></tr><tr><td>Q Control</td><td>The Total Running Q (page 462) is controlled according to preset required value. See PF Control (page 146) for more information.</td></tr></table>				PF Control	The Total Running Power Factor (page 462) is controlled according to preset required value. See PF Control (page 146) for more information.	Q Control	The Total Running Q (page 462) is controlled according to preset required value. See PF Control (page 146) for more information.
PF Control	The Total Running Power Factor (page 462) is controlled according to preset required value. See PF Control (page 146) for more information.						
Q Control	The Total Running Q (page 462) is controlled according to preset required value. See PF Control (page 146) for more information.						
Actual selected control mode is available in System PF/Q Control (page 466) .							

🔍 back to List of setpoints

PF/Q Regulation Type

Setpoint group	Process Control	Related FW	1.0.0				
Range [units]	Base PF/Q Control / Import/Export PF/Q Control [-]						
Default value	Base PF/Q Control	Force value	YES				
Step	[-]						
Comm object	16131	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoint adjust the regulation type of PF/Q control.							
<table><tr><td>Base PF/Q Control</td><td>System Gen-sets produces reactive power according to #System Power Factor (page 245).</td></tr><tr><td>Import/Export PF/Q Control</td><td>Mains Import/Export is exactly as requested, i.e. System power is adjusted to fulfill Import/Export requirements. See PF Control (page 146) for more information.</td></tr></table>				Base PF/Q Control	System Gen-sets produces reactive power according to #System Power Factor (page 245) .	Import/Export PF/Q Control	Mains Import/Export is exactly as requested, i.e. System power is adjusted to fulfill Import/Export requirements. See PF Control (page 146) for more information.
Base PF/Q Control	System Gen-sets produces reactive power according to #System Power Factor (page 245) .						
Import/Export PF/Q Control	Mains Import/Export is exactly as requested, i.e. System power is adjusted to fulfill Import/Export requirements. See PF Control (page 146) for more information.						

🔍 back to List of setpoints

#System Power Factor

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	0,60 .. 1,20 [-]		
Default value	1,00 [-]	Force value	NO
Step	0,01 [-]		
Comm object	8776	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Required total power factor of the controller group in parallel to mains operation in PF Control BASE mode.			
The value from this Setpoint is used if:			
<div><div>></div>Setpoint #System PF Control PTM (page 244) = Base PF</div>			
<div><div>></div>Setpoint #System PF Control PTM (page 244) = Var Shar</div>			
<div><div>>></div>Setpoint PF/Q Regulation Type (page 245) = Base PF/Q Control</div>			
See chapter PF Control (page 146) for more information.			
Note: If the setpoint value is >1 the Total RunningBus Load Character is C, if the setpoint value is <0 the Total RunningBus Load Character is L.			
Note: The # setpoints are shared with all controllers on site via intercontroller CAN line.			

🔍 back to List of setpoints

#System Base Q

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	-32 000 .. 32 000 [kVAr] (depends on the selected Power Formats And Units (page 164))		
Default value	0 kVAr (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kVAr (depends on the selected Power Formats And Units (page 164))		
Comm object	16407	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Required total reactive power of the controller group in parallel to mains operation in Q Control BASE mode.			
The value from this Setpoint is used if:			
<div><div>></div> Setpoint #System PF Control PTM (page 244) = Base Q</div> <div><div>></div> Setpoint #System PF Control PTM (page 244) = Load Shar</div> <div><div>>></div> Setpoint PF/Q Regulation Type (page 245) = Base PF/Q Control</div>			
See chapter Q Control (page 146) for more information.			
Note: The # setpoints are shared with all controllers on site via intercontroller CAN line.			

🔍 back to List of setpoints

Import Power Factor

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	0,001 .. 1,999 [-]		
Default value	1 [-]	Force value	NO
Step	0,001 [-]		
Comm object	8642	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Defines required power factor in parallel to mains operation in PF Control IMP/EXP mode.			
The value from this Setpoint is used if:			
<div><div>></div>Setpoint #System PF Control PTM (page 244) =Var Shar and</div>			
<div><div>></div>Setpoint PF/Q Regulation Type (page 245) = Import/Export PF/Q Control and</div>			
<div><div>></div>Setpoint PF/Q Control PTM Mode (page 244) = PF Control.</div>			
See chapter PF Control (page 146) for more information.			
Note: If the setpoint value is >1 the Mains Load Character is C, if the setpoint value is <0 the Mains Load Character is L.			

🔍 back to List of setpoints

Import Q

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	-32000 .. 32000 [kVAr] (depends on the selected Power Formats And Units (page 164)))		
Default value	0 kVAr	Force value	NO
Step	1 kVAr (depends on the selected Power Formats And Units (page 164)))		
Comm object	14143	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Defines actual imported (exported) reactive power in parallel to mains operations in Q Control IMP/EXP Mode.			
The value from this Setpoint is used if:			
<div><div>></div>Setpoint #System PF Control PTM (page 244) =Var Shar and</div>			
<div><div>></div>Setpoint PF/Q Regulation Type (page 245) = Import/Export PF/Q Control and</div>			
<div><div>></div>Setpoint PF/Q Control PTM Mode (page 244) = Q Control.</div>			
See chapter Q Control (page 146) for more information.			
Note: <i>If the value of the setpoint is >0 the power is imported from the mains, if the setpoint value is <0, then the power is exported to the mains.</i>			

🔍 back to List of setpoints

Subgroup: Mains Coupling

Mains Coupling

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	Force value	YES
Step	[-]		
Comm object	11037	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines how the controller cooperates with other mains controllers in the system where common busbar is supplied from multiple mains incomers.			
Note: * MGCB is only in MGCB application.			
Disabled	It is forbidden to close the MCB and *MGCB at the same time if there is mains voltage on the bus.		
Enabled	It is allowed to close the MCB and *MGCB at the same time if there is mains voltage on the bus.		

🔍 back to List of setpoints

Subgroup: Process Limitation

CB Control In MAN Mode

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Full Ctrl / Aut Trans / Islnd Disl [-]		
Default value	Full Ctrl	Force value	YES
Step	[-]		
Comm object	14962	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
The behavior of transition of load in MAN mode is adjusted via this setpoint.			
Note: MGCB is available only in MGCB application. For MCB application CB Control works same but MGCB is permanently closed.			

Full Ctrl	No limitation of CB control in MAN mode (operator can close any breaker manually or evoke the synchronization and consequential operation in parallel to mains)
Aut Trans	<p>Operator can control both MCB or MGCB breaker. However once transition is evoked the controller performs the automatic transfer of the load (depends on adjustment of setpoints Transfer Gen To Mains (page 341) and Transfer Mains To Gen (page 340)).</p> <p>Controller performs synchronization across MCB, if MGCB is closed and MCB button is pushed. Load transfer is done after synchronization and MGCB is opened automatically.</p> <p>Controller performs synchronization across MGCB, if MCB is closed and MGCB button is pushed. Load transfer is done after synchronization and MCB is opened automatically.</p> <p>It is also possible to open currently closed breaker and keep the load non-energized. Then it is possible to close MCB or MGCB to energize the load from a healthy source.</p> <p>Note: Parallel operation with mains continues, if system already operates in parallel with mains and setting is changed to Aut Trans. It is necessary to push MCB or MGCB button to open a breaker.</p> <p>Note: Open transfer is performed, if the Open option is selected with Transfer Gen To Mains (page 341) or Transfer Mains To Gen (page 340)</p>
Isld Disl	<p>Behaves like the full manual control but the Island operation is disabled.</p> <p>Example: When MCB is opened and MGCB is pressed, controller does not go to island.</p> <p>Example: In parallel operation when MCB button is pressed, MCB is not opened.</p>

🔍 back to List of setpoints

Subgroup: Mains Import Measurement

Mains Measurement P

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	None / Mains CT / Analog Input [-]		
Default value	None	Force value	NO
Step	[-]		
Comm object	10599	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
Defines source value of the Mains Import P (page 439) .			
None	The value Mains Import P (page 439) is not measured. The duration of the load transfer in direction Mains to Bus is given exactly by the setpoint Close Transfer Max Duration (page 339) .		
Mains CT	The value Mains Import P (page 439) is measured via Mains CTs which are located on phase L1, L2 and L3. The load transfer in direction Mains to Bus is considered to be finished when the mains is unloaded under certain level.		
Analog Input	The value Mains Import P (page 439) is measured via analog input, accordingly LAI: MAINS MEASUREMENT P (PAGE 597) . The load transfer in direction Mains to Bus is considered to be finished when the mains is unloaded under certain level.		

[⬅ back to List of setpoints](#)

Mains Measurement Q

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	None / Mains CT / Analog Input [-]		
Default value	None	Force value	NO
Step	[-]		
Comm object	10598	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
Defines source value of the Mains Import Q (page 439) .			
None	The value Mains Import Q (page 439) is not measured. The duration of the load transfer in direction Mains to Bus is given exactly by the setpoint Close Transfer Max Duration (page 339) .		
Mains CT	The value Mains Import Q (page 439) is measured via Mains CTs which are located on phase L1, L2 and L3. The load transfer in direction Mains to Bus is considered to be finished when the mains is unloaded under certain level.		
Analog Input	The value Mains Import Q (page 439) is measured via analog input, accordingly LAI: MAINS MEASUREMENT Q (PAGE 597) . The load transfer in direction Mains to Bus is considered to be finished when the mains is unloaded under certain level.		

🔍 back to List of setpoints

Subgroup: Peak Shaving

Peak Shaving

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	Force value	YES
Step	[-]		
Comm object	11601	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables/disables peak shaving function.			
Enabled	The Peak shaving (page 152) function is active and its behaviour is set by setpoints Peak Shaving Start Level (page 252) , Peak Shaving Stop Level (page 252) and Peak Shaving Start/Stop Delay (page 253) .		
Disabled	The Peak shaving (page 152) function is BLOCKED and the start command can not be activated even the conditions for Peaks Shaving activation were fulfilled.		

🔍 back to List of setpoints

Peak Shaving Start Level

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Peak Shaving Stop Level (page 252) .. 32000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	1000 kW (depends on the selected Power Formats And Units (page 164))	Force value	YES
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8643	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Peak Shaving (page 251) = Enabled		
Description			
<p>This setpoint starts System, when the value of the load consumption Load P (page 449) exceeds the value given by this setpoint for the time of Peak Shaving Start/Stop Delay (page 253).</p> <p>The System is synchronized to the Mains (kept in the parallel to the Mains) and the genset power is controlled according to the settings in the Groups Process Control and Load Control.</p> <p>The System stays running until the conditions for Peak Shaving run are active. Conditions of deactivation are given by the setpoint Peak Shaving Stop Level (page 252) and Peak Shaving Start/Stop Delay (page 253).</p>			

🔍 back to List of setpoints

Peak Shaving Stop Level

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	0 .. Peak Shaving Start Level (page 252) [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	900 kW (depends on the selected Power Formats And Units (page 164))	Force value	YES
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8644	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Peak Shaving (page 251) = Enabled		
Description			
This setpoint stops System, of the load consumption Load P (page 449) decreases under the value given by this setpoint for the time of Peak Shaving Start/Stop Delay (page 253) .			

🔍 back to List of setpoints

Peak Shaving Start/Stop Delay

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	600 s	Force value	YES
Step	1 s		
Comm object	9989	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Peak Shaving (page 251) = Enabled		
Description			
Defines the delay of activation or deactivation of the Peak shaving (page 152) .			
Starts when	The value of the load consumption Load P (page 449) exceeds the value given by the setpoint Peak Shaving Start Level (page 252) .		
Stop when	The value of the load consumption Load P (page 449) decreases under the value given by the setpoint Peak Shaving Stop Level (page 252)		

🔍 back to List of setpoints

Subgroup: Breaker Control Mode

MCB Control Mode

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Internal / External [-]		
Default value	Internal	Force value	YES
Step	[-]		
Comm object	9873	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts control mode of MCB.			
Internal	The MCB breaker is controlled by controller. The controller accepts the opening of MCB from the external device (Mains relay). When the MCB is opened externally then: ➤ The event "MCB opened Externally" is recorded in history log Incorrect reaction of the MCB FEEDBACK (PAGE 547) to internal MCB Close/Open command causes Wrn MCB Fail (page 657)		
	Controller does not control the MCB at all. The MCB is controlled externally, when the MCB FEEDBACK (PAGE 547) gets changed, then the event "MCB Opened" or "MCB Closed" is recorded to the history log. Controller always accepts the MCB FEEDBACK (PAGE 547) without of issuing any alarm. The controller informs the superordinate system about the status of the breaker		

automaton using the signals

➤ LBO FORWARD SYNCHRONIZATION (PAGE 574)

➤ LBO REVERSE SYNCHRONIZATION (PAGE 590)

🔍 back to List of setpoints

GCB Control Mode

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Internal / Follow / External [-]		
Default value	Internal	Force value	YES
Step	[-]		
Comm object	11771	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Application Mode Select (page 237) = MGCB		
Description			
This setpoint adjusts control mode of MGCB.			
Internal	<p>The breaker is controlled only from controller. Any unexpected change of GCB FEEDBACK (PAGE 552) causes Wrn MGCB Fail (page 660) immediately.</p> <p>Incorrect reaction of the GCB FEEDBACK (PAGE 552) on internal MGCB Close/Open command causes Wrn MGCB Fail (page 660)</p>		
Follow	<p>MGCB Opening GCB FEEDBACK (PAGE 552) = 0 is accepted from external devices with history record "MGCB Opened Externally".</p> <p>Incorrect reaction of the GCB FEEDBACK (PAGE 552) to internal MGCB Close/Open command causes Wrn MGCB Fail (page 660)</p>		
External	<p>Controller does not control the MGCB is controlled externally, when the GCB FEEDBACK (PAGE 552) get changed, then the event "MGCB Opened" or "MGCB Closed" is recorded to the history log.</p> <p>Controller always accept the GCB FEEDBACK (PAGE 552) without of issuing any alarm.</p> <p>IMPORTANT: Bus with closed MGCB is not blocked against starting.</p>		
<p>IMPORTANT: Anytime when the controller is synchronizing via MGCB the External MGCB closing is being accepted in all MGCB control modes.</p>			

🔍 back to List of setpoints

MGCB Parallel Close

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	No / Yes / MCB Closed [-]		
Default value	No	Force value	NO
Step	[-]		
Comm object	10921	Related applications	, MGCB

Config level	Advanced
Setpoint visibility	Only if Application Mode Select (page 237) = MGCB
Description	
This setpoint defines how the Gen-sets will be connected to the parallel with Mains while the controller is in the AUTO mode.	
No - GCB Closes First	Disables automatic MGCB closing in the case that the System Start/Stop output is activated. The Bus will be synchronized to the Mains via MGCB when at least one Gen-set is connected to the Bus.
Yes - MGCB Closes First	Enables automatic MGCB closing in the case that the System Start/Stop output is activated. The MGCB is closed immediately if there is no voltage on the Bus and all Gen-sets will be synchronized to the Mains/Bus via GCB.
MCB Closed	Enables automatic MGCB closing after MCB is closed. The MGCB is closed with 5 s delay after MCB if there is no voltage on the Bus and GCBs are opened. All starting Gen-sets will be synchronized to the Mains/Bus via GCB. Note: If Mains fails and there is no voltage on the Bus, the MGCB will be opened after MCB.

◀ back to List of setpoints

Multi Soft Start

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	14041	Related applications	, MGCB
Config level	Advanced		
Setpoint visibility	Only if Application Mode Select (page 237) = MGCB		
Description			
This setpoint allows closing the MGCB during SUS sequence without voltage on the Bus while starting to the Island / Multiple Island operation (MCB is opened).Check the chapter Multi soft start (page 139) for more information.			
Disabled	The MGCB will be closed after the SUS sequence is successfully / unsuccessfully finished.		
Enabled	The MGCB will be closed together with Gen-sets' GCBs during SUS sequence if there is no voltage on the Bus.		

◀ back to List of setpoints

Attempts To Close Breaker

Setpoint group	Process Control	Related FW	1.0.0
-----------------------	-----------------	-------------------	-------

Range [units]	1 .. 5 [-]		
Default value	2	Force value	NO
Step	1 [-]		
Comm object	19885	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the amount of attempts the controller performs when a breaker is requested to be closed.			
<div>Example: If the breaker feedback is not received at the end of the attempt, an alarm is not issued, unless it was the last attempt to close the breaker.</div>			

🔍 back to List of setpoints

Delay Between Closing Attempts

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	20 .. 60 [s]		
Default value	20 [s]	Force value	NO
Step	1 [s]		
Comm object	19883	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay between breaker closing attempts the controller performs when a breaker is requested to be closed. Delay is one second longer than you set here due breaker's safety.			
Example: If this setpoint is set to 10 seconds, the delay between another attempt to close the breaker will be 11 seconds.			

🔍 back to List of setpoints

Subgroup: Controller Redundancy

Watched Controller

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	0 .. 32 [-]		
Default value	0 (OFF) [-]	Force value	NO
Step	1 [-]		
Comm object	11719	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for controller redundancy function.			
<div><div>></div>Set this setpoint to 0/OFF to disable reading of messages from CAN2 line.</div>			
<div><div>></div>Set this setpoint to Master's CAN2 bus address to start controller redundancy function.</div>			
CU is reading the Heartbeat messages of selected CAN address on CAN2 line.			

🔍 back to List of setpoints

Group: Basic settings

Subgroup: Name

Controller Name

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	0 .. 15 characters [-]		
Default value	InteliMains 510	Force value	NO
Step	[-]		
Comm object	8637	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
User defined name, used for the controller identification at remote phone or mobile connection. Controller Name is maximally 15 characters long and can be entered using InteliConfig or from controller's configuration menu.			

🔍 back to List of setpoints

Subgroup: Power settings

Nominal DC Shore Power

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	1 .. 32 000 [kW] (depends on the selected Power Formats And Units (page 164)))		
Default value	200 kW (depends on the selected Power Formats And Units (page 164)))	Force value	YES
Step	1 kW (depends on the selected Power Formats And Units (page 164)))		
Comm object	19476	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal power imported from the Mains.			

🔍 back to List of setpoints

Subgroup: Current settings

Nominal Current

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	1 .. 10000 [A]		
Default value	350A	Force value	YES
Step	1 A		
Comm object	8275	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Current limit for current protections and maximal continuous current.			

🔍 back to List of setpoints

Mains CT Ratio Prim

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	1 .. 15000 [A]		
Default value	500 A	Force value	NO
Step	1 A		
Comm object	8274	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the primary range of the current transformer used for the Mains current measurement.			
Note: The setpoint is applied on all three phases of the Mains current.			
Note: The CT is usually described by this definition: CT Ratio Prim / CT Ratio Sec : Example: 100/5, 500/5, 1000/1			

[back to List of setpoints](#)

Mains CT Ratio Sec

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	/5A or /1A [-]		
Default value	/5A	Force value	NO
Step	[-]		
Comm object	10556	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the secondary range of the current transformer used for the Mains current measurement.			
Note: <i>This setpoint is applied on all three phases of the Mains current.</i>			
Note: <i>The CT is usually described by this definition: CT Ratio Prim / CT Ratio Sec: Example: 100/5, 500/5, 1000/1</i>			

[back to List of setpoints](#)

Aux Current Ratio Prim

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	1 .. 15000 [A]		
Default value	500 A	Force value	NO
Step	1 A		
Comm object	8566	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Soft Unload (page 344) != Normal		
Description			
This setpoint is used for settings of primary CT ratio of Aux Current (page 450) measurement, which is used for Aux Power (page 450) calculation for needs of Soft Unload function.			

🔍 back to List of setpoints

Aux Current Ratio Sec

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	/1A / /5A [-]		
Default value	/5A	Force value	NO
Step	[-]		
Comm object	10557	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Soft Unload (page 344) != Normal		
Description			
This setpoint is used for settings of secondary CT ratio of Aux Current (page 450) measurement, which is used for Aux Power (page 450) calculation for needs of Soft Unload function.			

🔍 back to List of setpoints

Mains CT Ratio Prim

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	1 .. 15000 [A]		
Default value	300 A	Force value	YES
Step	1 A		
Comm object	8566	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for settings of primary CT ratio of Aux Current (page 450) measurement, which is used for Aux Power (page 450) calculation for needs of Soft Unload function.			
IMPORTANT: L1 Aux current must be measured otherwise the power will be calculated wrongly.			
Note: The CT is usually described by this definition: Aux Current Ratio Prim / Aux Current Ratio Sec : Example: 100/5, 500/5, 1000/1			

[back to List of setpoints](#)

Mains CT Ratio Sec

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	/1A or /5A [-]		
Default value	/5A	Force value	YES
Step	[-]		
Comm object	10557	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for settings of secondary CT ratio of Aux Current (page 450) measurement, which is used for Aux Power (page 450) calculation for needs of Soft Unload function.			
IMPORTANT: L1 Aux current must be measured otherwise the power will be calculated wrongly.			
Note: The CT is usually described by this definition: Aux Current Ratio Prim / Aux Current Ratio Sec : Example: 100/5, 500/5, 1000/1			

[back to List of setpoints](#)

Subgroup: Voltage settings

Connection type

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	3ph4Wire / High Leg D / 3ph3Wire / SplPhL1L3 / SplPhL1L2 / MonoPhase [-]		

Default value	3Ph4Wire [-]	Force value	NO
Step	[-]		
Comm object	11628	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines connection type of the installation.			
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)		
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)		
SplitPhase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)		
Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)		

[🔍 back to List of setpoints](#)

Gen AC Bus Nominal Voltage Ph-N

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	Force value	YES
Step	1 V		
Comm object	8277	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only ifConnection type (page 261) != High Leg D or Connection type (page 261) != MonoPhase		
Description			
Nominal Bus voltage (phase to neutral).			

[back to List of setpoints](#)

Gen Nominal Voltage Ph-Ph

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	Force value	YES
Step	1 V		
Comm object	11657	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal Bus voltage (phase to phase).			

[back to List of setpoints](#)

Mains AC Shore Nominal Voltage Ph-N

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	Force value	YES
Step	1 V		
Comm object	9888	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only ifConnection type (page 261) != High Leg D or Connection type (page 261) != MonoPhase		
Description			
Nominal Mains voltage (phase to neutral).			

[back to List of setpoints](#)

Mains/Bus Nominal Voltage Ph-Ph

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	Force value	YES
Step	1 V		
Comm object	9907	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal Mains voltage (phase to phase).			

🔍 back to List of setpoints

Mains VT Ratio

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	0.01 .. 6000.00 [V/V]		
Default value	1.00 V/V	Force value	NO
Step	0.01 V/V		
Comm object	20281	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the converting ratio of the voltage meas transformer used on Terminal Diagram			
Note: <i>This setpoint is applied on all three phases of Mains voltage.</i>			
Example:			
<div>➤ No VT is in use - voltage conversion is 1/1 Mains VT Ratio = 1.00</div>			
<div>➤ VT 22kV/100V - voltage conversion is 22000/100 Mains VT Ratio = 220.00</div>			
<div>➤ VT 3.3kV/110V - voltage conversion is 3300/110 Mains VT Ratio = 30.00</div>			

🔍 back to List of setpoints

Bus VT Ratio

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	0.01 .. 6000.00 [V/V]		
Default value	1.00 V/V	Force value	NO
Step	0.01 V/V		
Comm object	20282	Related applications	MCB, MGCB
Config level	Advanced		

Setpoint visibility	Always
Description	
This setpoint adjusts the converting ratio of the voltage meas transformer used on Terminal Diagram	
Note: <i>This setpoint is applied on all three phases of Bus voltage.</i>	
Example: <ul style="list-style-type: none"> > No VT is in use - voltage conversion is 1/1 Bus VT Ratio = 1.00 > VT 22kV/100V - voltage conversion is 22000/100 Bus VT Ratio = 220.00 > VT 3.3kV/110V - voltage conversion is 3300/110 Bus VT Ratio = 30.00 	

🔍 back to List of setpoints

Bus Dead Level


Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	0.0 .. 13.0 [%] of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)		
Default value	6.5 % of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)	Force value	NO
Step	0.1 % of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)		
Comm object	14473	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the percentage voltage level below which is Bus considered as dead.			

🔍 back to List of setpoints

Subgroup: Phase Rotation

Phase Rotation


Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Clockwise / Counterclockwise [-]		
Default value	Clockwise	Force value	YES
Step	[-]		
Comm object	15122	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjust the phase sequence of voltage terminals.			

 [back to List of setpoints](#)

Subgroup: Frequency settings

Nominal Frequency

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	33.00 .. 520.00 [Hz]		
Default value	50,00 Hz	Force value	YES
Step	0.01 Hz		
Comm object	8278	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal frequency of system (usually 50 or 60 Hz).			
IMPORTANT: While System is running, this setpoint can be changed only inside currently selected range. The ranges are 45-54 Hz and 55-65 Hz.			

 [back to List of setpoints](#)

Subgroup: Controller settings

Controller mode

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	OFF / MAN / AUTO / TEST [-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	8315	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint can be used for changing the controller's mode remotely, e.g. via Modbus.			
InteliConfig: Use the mode selector on the main screen for changing the mode from the front panel.			
Display: Use mode selector by pressing (Right arrow) and (Left arrow). Confirm it by pressing (enter).			

🔍 back to List of setpoints

Power On Mode

Setpoint group	Basic settings	Related FW	1.0.0				
Range [units]	Previous / OFF [-]						
Default value	Previous	Force value	NO				
Step	[-]						
Comm object	13000	Related applications	MCB, MGCB				
Config level	Advanced						
Setpoint visibility	Always						
Description							
This setpoint adjusts controller mode after power on of controller.							
<table><tr><td>Previous</td><td>Controller is switched into the last mode before power off.</td></tr><tr><td>OFF</td><td>Controller is switched into OFF mode.</td></tr></table>				Previous	Controller is switched into the last mode before power off.	OFF	Controller is switched into OFF mode.
Previous	Controller is switched into the last mode before power off.						
OFF	Controller is switched into OFF mode.						
Note: Remote modes - In case that some LBI remote mode is activated during power on of controller than this LBI has higher priority than this setpoint - controller mode is forced into mode selected via LBI. After deactivation of LBI, controller is switched into value selected via setpoint Power On Mode							

🔍 back to List of setpoints

Backlight Timeout

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Disabled / 1 .. 255 [min]		
Default value	Disabled	Force value	NO
Step	1 min		
Comm object	10121	Related applications	MCB, MGCB
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

Horn Timeout

Setpoint group	Basic settings	Related FW	1.0.0						
Range [units]	Disabled = 0; 1 .. 600; Horn Reset [s]								
Default value	10 s	Force value	NO						
Step	1 s								
Comm object	8264	Related applications	MCB, MGCB						
Config level	Advanced								
Setpoint visibility	Always								
Description									
This setpoint affects horn's behavior.									
<table><tr><td>Disabled</td><td>Horn sound is disabled e.g. LBO HORN (PAGE 575) is never activated</td></tr><tr><td>1 .. 600 [s]</td><td>Timeout for LBO HORN (PAGE 575). Output opens after this time elapses</td></tr><tr><td>Horn Reset</td><td>LBO HORN (PAGE 575) is active until button Horn Reset is pressed.</td></tr></table>				Disabled	Horn sound is disabled e.g. LBO HORN (PAGE 575) is never activated	1 .. 600 [s]	Timeout for LBO HORN (PAGE 575). Output opens after this time elapses	Horn Reset	LBO HORN (PAGE 575) is active until button Horn Reset is pressed.
Disabled	Horn sound is disabled e.g. LBO HORN (PAGE 575) is never activated								
1 .. 600 [s]	Timeout for LBO HORN (PAGE 575). Output opens after this time elapses								
Horn Reset	LBO HORN (PAGE 575) is active until button Horn Reset is pressed.								
Note: Horn timeout starts again from the beginning if any new alarm appears before previous Horn timeout has elapsed.									

🔍 back to List of setpoints

Fail Safe Binary State

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Log0 / Log1 / Last Valid State [-]		
Default value	Last Valid State	Force value	YES
Step	[-]		
Comm object	21215	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of all binary inputs while the received value is invalid (communication lost). Changes of the setpoint will not be applied on peripherals which are already in fail safe binary state.			
Log0		The value is logical zero.	
Log1		The value is logical one.	
Last Valid State		The value is replaced by last valid state.	

[back to List of setpoints](#)

User Logging Record

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Enabled / Disabled		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23885	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables recording of user login in/out to the controller history.			
<div><div></div><div>Example: The fallowing records will be shown in the history if enabled: User with user index (0) loegged in via ETH.</div></div>			

[back to List of setpoints](#)

Subgroup: Battery Protections

Battery Undervoltage

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	8.0 V .. Battery Overvoltage (page 270) [V]		
Default value	18.0 V	Force value	NO
Step	0.1 V		
Comm object	8387	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for low battery voltage.			

🔍 back to List of setpoints

Battery Overvoltage

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Battery Undervoltage (page 270) .. 40.0 [V]		
Default value	36.0 V	Force value	NO
Step	0.1 V		
Comm object	9587	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for high battery voltage.			

🔍 back to List of setpoints

Battery Under And Overvoltage Delay

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	5 s	Force value	NO
Step	1 s		
Comm object	8383	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for which battery voltage can be out of range given by setpoints Battery Undervoltage (page 270) and Battery Overvoltage (page 270) . After this delay elapses, appropriate alarm (Wrn Battery Undervoltage (page 637) or Wrn Battery Overvoltage (page 637)) is activated.			

🔍 back to List of setpoints

Subgroup: Pulse counters

Conversion Coefficient Pulse 1

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	OFF / 0 .. 65000 [-]		
Default value	OFF	Force value	NO
Step	1 [-]		
Comm object	10994	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the rate of increasing of the "slow" Pulse Counter 1 (page 471) which is connected with LBI PULSE COUNTER 1 (PAGE 558) .			
Set this setpoint to OFF to turn the function off. See the chapter Pulse Counters (page 194) for more information.			

 [back to List of setpoints](#)

Conversion Coefficient Pulse 2

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	OFF / 0 .. 65000 [-]		
Default value	OFF	Force value	NO
Step	1 [-]		
Comm object	10995	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the rate of increasing of the "slow" Pulse Counter 2 (page 471) which is connected with LBI PULSE COUNTER 2 (PAGE 558) .			
Set this setpoint to OFF to turn the function off. See the chapter Pulse Counters (page 194) for more information.			

 [back to List of setpoints](#)

Group: Communication Settings

Subgroup: Controller Address

CAN Controller Address

Setpoint group	Communication Settings	Related FW	1.0.0
Range [units]	1 .. 32 [-]		
Default value	1 [-]	Force value	NO
Step	1 [-]		
Comm object	23999	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint adjusts Controller's CAN Address which is used for Can Intercontroller communication.</p> <p>This type of communication is used to share information between other ComAp controllers via CAN interface (Communication peripherals (page 17)).</p> <p><i>Note: Each controller connected via CAN has to have unique address, i.e. maximally 64 controllers can be connected together.</i></p>			

🔍 back to List of setpoints

Subgroup: RS485 Settings

RS485 Mode

Setpoint group	Communication Settings	Related FW	1.0.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	Force value	NO
Step	[-]		
Comm object	24134	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Communication protocol switch for on-board RS485.			
Direct	InteliConfig communication protocol via serial cable.		
MODBUS	MODBUS protocol.		

🔍 back to List of setpoints

RS485 Communication Speed

Setpoint group	Communication Settings	Related FW	1.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	57600 bps	Force value	NO
Step	[-]		
Comm object	24135	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
If the direct mode is selected on on-board RS485, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.			

🔍 back to List of setpoints

RS485 Modbus Mode

Setpoint group	Communication Settings	Related FW	1.0.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	Force value	NO
Step	[-]		
Comm object	24020	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts communication mode of Modbus-RTU, Modbus/TCP (page 214) .			
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		

🔍 back to List of setpoints

RS485 Modbus Speed

Setpoint group	Communication Settings	Related FW	1.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	Force value	NO
Step	[-]		
Comm object	24141	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts communication speed of Modbus-RTU, Modbus/TCP (page 214).			

🔍 back to List of setpoints

Subgroup: Intercontroller Settings

CAN Intercontroller Empty Check

Setpoint group	Communication Settings	Related FW	1.0.0				
Range [units]	Enabled / Disabled [-]						
Default value	Disabled	Force value	YES				
Step	[-]						
Comm object	9921	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoint enable or disable CAN2 Intercontroller Empty Check.							
<table><tr><td>Disabled</td><td>Detection of CAN Intercontroller Empty Check is disabled.</td></tr><tr><td>Enabled</td><td>Detection of CAN Intercontroller Empty Check is enabled. If controller does not see any other controller on theTerminal Diagram (page 33) orTerminal Diagram (page 33) theWrn CAN2 Empty (page 639) will be activated.</td></tr></table>				Disabled	Detection of CAN Intercontroller Empty Check is disabled.	Enabled	Detection of CAN Intercontroller Empty Check is enabled. If controller does not see any other controller on theTerminal Diagram (page 33) orTerminal Diagram (page 33) theWrn CAN2 Empty (page 639) will be activated.
Disabled	Detection of CAN Intercontroller Empty Check is disabled.						
Enabled	Detection of CAN Intercontroller Empty Check is enabled. If controller does not see any other controller on theTerminal Diagram (page 33) orTerminal Diagram (page 33) theWrn CAN2 Empty (page 639) will be activated.						

🔍 back to List of setpoints

Group: Mains Settings

Subgroup: Overload Protection

Overload MPR

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	100 .. 200 [%] of Nominal DC Shore Power (page 258)		
Default value	120 % of Nominal DC Shore Power (page	Force value	YES

	258)		
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	8280	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		

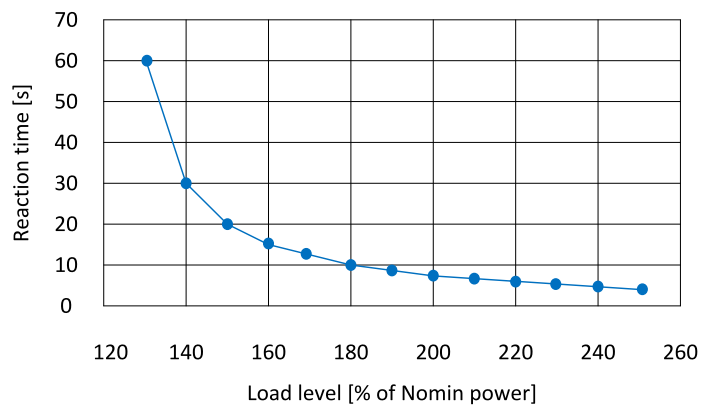
Description

This setpoint adjusts the relative power level, where the thermal overload protection starts to be evaluated. See setpoint **Overload Protection (page 292)** for complete explanation of the protection.

Load level	Reaction time [s]
100	no reaction
110	no reaction
120	600
130	60
140	30
150	20
160	15
170	12
180	10
190	8.6
200	7.5
210	6.7
220	6
230	5.5
240	5
250	4.6

2POvrldStEvDel 5 s
OverldStrtEval 120 %

$$\text{Reaction time [s]} = \frac{2\text{POvrldStEvDel} * \text{OverldStrtEval}}{\text{MainsActivePower [\%]} - \text{OverldStrtEval}}$$



The reaction time of the thermal overload protection is not fixed and is specified by the parameter **Overload Delay (page 276)**.

Note: Maximum reaction time is 3600 s after this time the protection is tripped.

[back to List of setpoints](#)

Overload Wrn

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0 .. Overload MPR (page 274) [%]		
Default value	105 %	Force value	NO
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	9685	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of Bus (in % of Nominal DC Shore Power (page 258)) protection. This is only warning.			

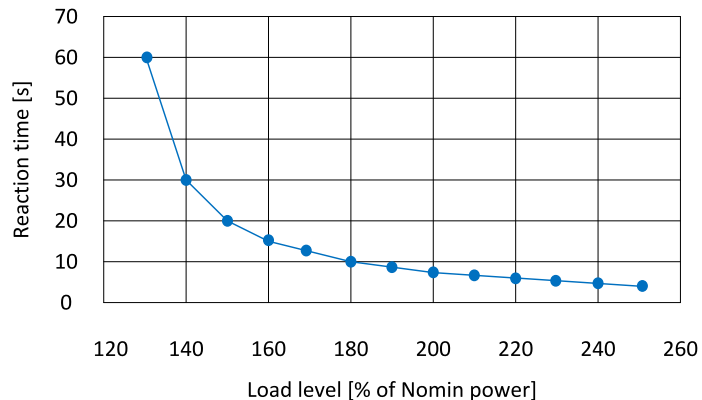
🔍 back to List of setpoints

Overload Delay

Setpoint group	Mains Settings	Related FW	1.0.0																										
Range [units]	0.1 .. 600.0 [s]																												
Default value	5.0 s	Force value	YES																										
Step	0.1 s																												
Comm object	8281	Related applications	MCB, MGCB																										
Config level	Standard																												
Setpoint visibility	Always																												
Description																													
This setpoint adjusts the default delay for the thermal overload protection. See setpoint Overload Protection (page 292) for complete explanation of the protection.																													
<table><tr><th>Load level</th><th>Reaction time [s]</th></tr><tr><td>100</td><td>no reaction</td></tr><tr><td>110</td><td>no reaction</td></tr><tr><td>120</td><td>3600 (max. value)</td></tr><tr><td>130</td><td>60</td></tr><tr><td>140</td><td>30</td></tr><tr><td>150</td><td>20</td></tr><tr><td>160</td><td>15</td></tr><tr><td>170</td><td>12</td></tr><tr><td>180</td><td>10</td></tr><tr><td>190</td><td>8.6</td></tr><tr><td>200</td><td>7.5</td></tr><tr><td>210</td><td>6.7</td></tr></table>				Load level	Reaction time [s]	100	no reaction	110	no reaction	120	3600 (max. value)	130	60	140	30	150	20	160	15	170	12	180	10	190	8.6	200	7.5	210	6.7
Load level	Reaction time [s]																												
100	no reaction																												
110	no reaction																												
120	3600 (max. value)																												
130	60																												
140	30																												
150	20																												
160	15																												
170	12																												
180	10																												
190	8.6																												
200	7.5																												
210	6.7																												
		2POvrldStEvDel	5 s																										
		OverldStrtEval	120 %																										

$$\text{Reaction time [s]} = \frac{2\text{POvrdStEvDel} * \text{OverldStrtEval}}{\text{MainsActivePower [\%]} - \text{OverldStrtEval}}$$

220	6
230	5.5
240	5
250	4.6



The reaction time of the thermal overload protection is not fixed; it depends on how much is the load above the limit of **Overload MPR** (page 274). The higher is the load the shorter the reaction time will be.

🔍 back to List of setpoints

Subgroup: Underload Protection

Minimal Power PTM

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0 .. 100 [%] of Running Nominal Power In PM (page 463)		
Default value	5 % of Running Nominal Power In PM (page 463)	Force value	NO
Step	1 % of Running Nominal Power In PM (page 463)		
Comm object	9241	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint defines minimal acceptable required power of the System. If **Required P Target** (page 465) is below the Minimal Power PTM, then the **Required P Target** (page 465) is overridden by this setpoint. Furthermore if **Minimal Power PTM Protection** (page 303) is enabled and the requested power of the System stays below Minimal Power PTM longer then **Minimal Power PTM Protection Del** (page 278), the alarm **Stp Request Under MinPowerPTM** (page 688) is activated.

IMPORTANT: If the setpoint is set too high it can happen that MCB opening will be blocked because it will not be possible to reach the Mains Unload MCB Open Window (page 342).

Note: Setpoint Minimal Power PTM is related to Running Nominal Power In PM (page 463).

🔍 back to List of setpoints

Minimal Power PTM Protection Del

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	10 s	Force value	NO
Step	1 s		
Comm object	17013	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Minimal Power PTM Protection (page 303) .			

[back to List of setpoints](#)

Subgroup: Current Protection

Short Circuit

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	100 .. 500 [%] of Nominal Current (page 258)		
Default value	150 % of Nominal Current (page 258)	Force value	NO
Step	1 % of Nominal Current (page 258)		
Comm object	8282	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative current threshold level for Short Circuit Protection.			
Note: When there is no control of breakers, the type of protection is Sd instead of BOC.			

[back to List of setpoints](#)

Short Circuit Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 10.00 [s]		
Default value	0 s	Force value	NO
Step	0.01 s		
Comm object	9991	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Short Circuit Protection.			

[back to List of setpoints](#)

IDMT Mains Overcurrent Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	1.0 .. 600.0 [s]		
Default value	4.0 s	Force value	NO
Step	0.1 s		
Comm object	8283	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint adjusts the delay for **IDMT Mains Overcurrent Protection (page 293)**.

IDMT curve shape selection. IDMT Overcurrent Delay is a reaction time of IDMT protection for 200% overcurrent $I_{Mains} = 2 \cdot \text{Nominal Current}$ (page 258)

IDMT is “very inverse” over current protection. Reaction time is not constant but depends on over current level according to the following formula:

$$\text{Reaction Time} = \frac{\text{Overcurrent IDMT Delay} * \text{Nominal Current}}{I_{gen} * \text{Nominal Current}}$$

Note: Reaction time is limited to 3600 s = 60 minutes. IDMT protection is not active for Reaction time values longer than 60 minutes.

I_{gen} is maximal value of all measured phases of Mains current.

Table 7.1 EXAMPLE of Reaction time for different over current levels

	Overcurrent IDMT Delay	Overcurrent		
		$\leq 100 \%$	101 %	110 %
Reaction time	0,2 s	No action	20 s	2 s
	2 s	No action	200 s	20 s
	20 s	No action	2000 s	200 s

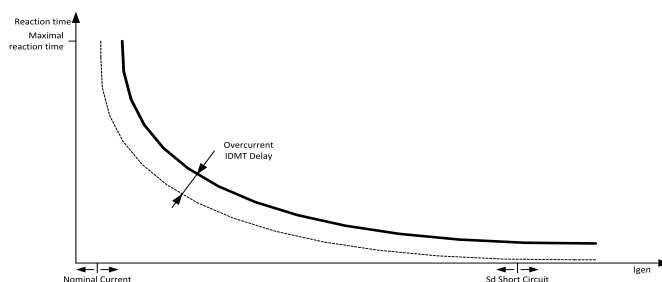


Image 7.1 IDMT Overcurrent Delay

[back to List of setpoints](#)

Current Unbalance

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	1 .. 200 [%] of Nominal DC Shore Power (page 258)		
Default value	50 % of Nominal DC Shore Power (page 258)	Force value	NO
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	8284	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Connection type (page 261) != MonoPhase		
Description			
This setpoint specifies the relative current threshold level for Current Unbalance Protection (page 295).			

[back to List of setpoints](#)

Current Unbalance Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	Force value	NO
Step	0.1 s		
Comm object	8285	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Connection type (page 261) != MonoPhase		
Description			
This setpoint specifies the delay for Current Unbalance Protection (page 295) .			

[back to List of setpoints](#)

Subgroup: Mains Voltage Protections

Mains Overvoltage

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Mains Undervoltage (page 282) .. 150 [%]		
Default value	110.0 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)	Force value	YES
Step	0.1 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Comm object	8305	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Mains <>V Protection (page 296).			
<i>Note: Mains Voltage L1-N (page 445), Mains Voltage L2-N (page 445), Mains Voltage L3-N (page 445), Mains Voltage L1-L2 (page 445), Mains Voltage L2-L3 (page 445) and Mains Voltage L3-L1 (page 446) are used for this protection.</i>			

⬅ back to List of setpoints

Mains Overvoltage Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 600.00 [s]		
Default value	5.00 s	Force value	YES
Step	0.01 s		
Comm object	8306	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Mains <>V Protection (page 296) .			

⬅ back to List of setpoints

Mains Overvoltage Hys

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.0 .. 30.0 [%] of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Default value	0.0 [%] of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)	Force value	NO
Step	0.1 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Comm object	14132	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Mains <>V Protection (page 296).			

⬅ back to List of setpoints

Mains Undervoltage

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	50 .. Mains Overvoltage (page 281) [%]		
Default value	60 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)	Force value	YES
Step	1 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Comm object	8307	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Mains <>V Protection (page 296).			
Note: Mains Voltage L1-N (page 445), Mains Voltage L2-N (page 445), Mains Voltage L3-N (page 445), Mains Voltage L1-L2 (page 445), Mains Voltage L2-L3 (page 445) and Mains Voltage L3-L1 (page 446) are used for this protection.			

⬅ back to List of setpoints

Mains Undervoltage Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 600.00 [s]		
Default value	1.50 s	Force value	YES
Step	0.01 s		
Comm object	8308	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Mains <>V Protection (page 296) .			

[back to List of setpoints](#)

Mains Undervoltage Hys

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.0 .. 50.0 [%] of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Default value	0.0 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)	Force value	YES
Step	0.1 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Comm object	14130	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Mains <>V Protection (page 296).			

[back to List of setpoints](#)

Mains Voltage Unbalance

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	1 .. 200 [%] of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Default value	10 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)	Force value	YES
Step	1 % of MainsAC Shore Nominal Voltage Ph-N (page 263) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 264)		
Comm object	8446	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Mains Voltage Unbalance Protection (page 298).			

 [back to List of setpoints](#)

Mains Voltage Unbalance Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 600.00 [s]		
Default value	2.00 s	Force value	YES
Step	0.01 s		
Comm object	8447	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Mains Voltage Unbalance Protection (page 298) .			

 [back to List of setpoints](#)

Subgroup: Mains Frequency Protection

Mains Overfrequency

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Mains Underfrequency (page 285) .. 150 [%]		
Default value	1.50 Hz	Force value	YES
Step	0.01 Hz		
Comm object	8310	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximal accepted frequency for Bus <>f Protection (page 302) .			

⬅ back to List of setpoints

Mains Overfrequency Hys

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 2.50 [Hz]		
Default value	0.00 Hz	Force value	YES
Step	0.01 Hz		
Comm object	14134	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Bus <>f Protection (page 302) .			

⬅ back to List of setpoints

Mains Underfrequency

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	50 .. Mains Overfrequency (page 285) [%]		
Default value	-1.50 Hz	Force value	YES
Step	0.01 Hz		
Comm object	14587	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts minimal accepted frequency for Bus <>f Protection (page 302) .			

⬅ back to List of setpoints

Mains Underfrequency Hys

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 2.50 [Hz]		
Default value	0.00 Hz	Force value	YES
Step	0.01 Hz		
Comm object	14135	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Bus <>f Protection (page 302) .			

⬅ back to List of setpoints

Mains <>f Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.00 .. 1000.00 [s]		
Default value	5.00 s	Force value	YES
Step	0.01 s		
Comm object	8311	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Bus <>f Protection (page 302) .			

⬅ back to List of setpoints

Subgroup: AMF Timers

AMF Start

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	9238	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enable or disable the AMF Function (page 102) .			

⬅ back to List of setpoints

Emergency Start Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0 .. 6 000 [s]		
Default value	5 s	Force value	YES
Step	1 s		
Comm object	8301	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		

Description

Delay between the mains failure and gen-set start command execution.

Image 7.2 Emergency Start Delay

◀ back to List of setpoints

Mains Return Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	1 .. 3 600 [s]		
Default value	20 s	Force value	YES
Step	1 s		
Comm object	8302	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay for which mains has to be returned from mains fail to start load transfer to mains.			

◀ back to List of setpoints

MCB Close Delay

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	0.0 .. 60.0 [s]		
Default value	1.0 s	Force value	YES
Step	0.1 s		
Comm object	8389	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay before MCB is closed after mains returns.			

⬅ back to List of setpoints

Subgroup: AMF Settings

Return From Island

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Manual / Auto [-]		
Default value	Auto	Force value	YES
Step	[-]		
Comm object	9590	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of closing MCB during AMF when the mains returns.			
Manual	Alarm ALI Manual Restore (page 671) is activated. MCB has to be closed manually via MCB close button. Note: Only MCB button command is being evaluated.		
Auto	MCB is closed automatically after Mains Return Delay (page 287) period elapses.		

⬅ back to List of setpoints

Return to Mains in TEST Mode

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled [-]	Force value	YES
Step	[-]		
Comm object	8618	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the behavior of the AMF function while the controller is in the TEST mode.			
Enabled	The load is transferred to the Mains according to settings of the Load Transfers and the Gen-sets are kept running unloaded.		
Disabled	The Load is kept supplied from the System until this situation is resolved by user e.g. putting the controller back into the AUTO mode.		

⬅ back to List of setpoints

MCB Logic

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Close-On / Close-Off [-]		
Default value	Close-Off	Force value	YES
Step	[-]		
Comm object	8444	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the behavior of LBO MCB CLOSE/OPEN (PAGE 579) and LBI MCB FEEDBACK (PAGE 547) .			
Close On	When LBO MCB CLOSE/OPEN (PAGE 579) is closed – LBI MCB FEEDBACK (PAGE 547) should be closed.		
Close Off	When LBO MCB CLOSE/OPEN (PAGE 579) is closed – LBI MCB FEEDBACK (PAGE 547) should be opened.		

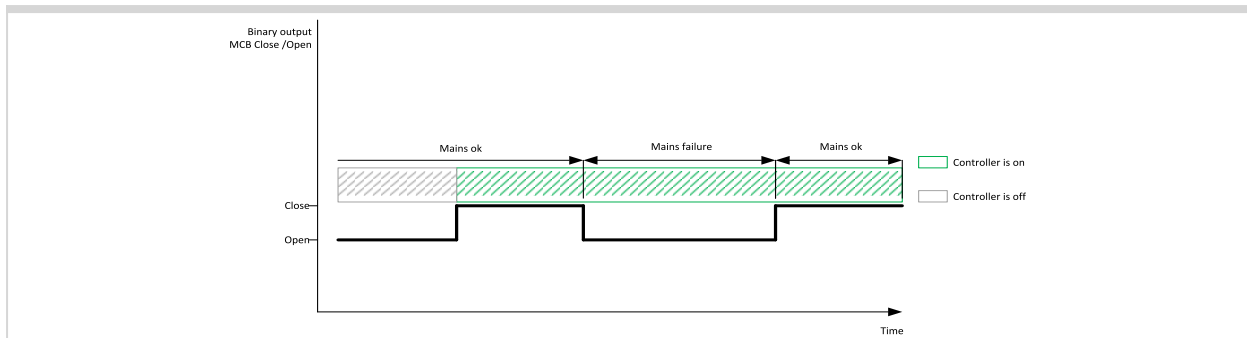


Image 7.3 Close-On

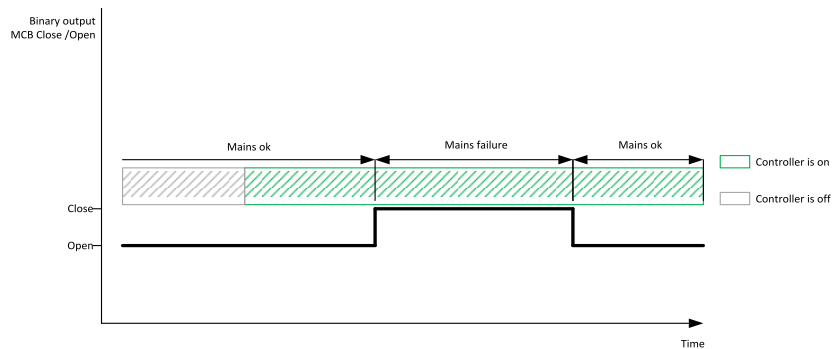


Image 7.4 Close-Off

Note: LBO MCB CLOSE/OPEN (PAGE 579) as well as this setpoint is used only for contactors.

⬅ back to List of setpoints

MCB Opens On

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	Mains Fail / Gen Run / Bus Voltage [-]		
Default value	Gen Run	Force value	YES
Step	[-]		
Comm object	9850	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of MCB opening during Controller mode (page 267) = AUTO .			
Mains Fail	MCB open command is sent immediately after Mains fail conditions are evaluated. If Mains parameters are ok after MCB was opened and before MGCB is closed, timer MCB Close Delay (page 288) is applied before MCB closing.		
Gen Run	MCB will be opened after Gen-set is running and LBO Ready To Load is closed. <i>Note: This option should be used for MCB using 230 V control without of the undervoltage coil.</i>		
Bus Voltage	MCB will be opened if there is voltage on the bus.		

⬅ back to List of setpoints

Subgroup: Loss of Mains Protections

Vector Shift Limit

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	1 .. 45 [°]		
Default value	10 °	Force value	YES
Step	1 °		
Comm object	9843	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Vector Shift Protection (page 305) != Disabled		
Description			
This setpoint adjusts the threshold level for the Vector Shift Protection (page 305) .			
Note: To adjust this setpoint properly, check the value Max Vector Shift (page 448) . The value is available in IntelliConfig, contains the maximal measured vector shift value since the Bus has been synchronized to the mains and after opening of MGCB or MCB it is "frozen". In normal conditions the value should not be higher than 3 ° and the most common setting of the threshold is about 7 °.			

◀ back to List of setpoints

ROCOF Windows Length

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	3 .. 30 [-]		
Default value	5	Force value	YES
Step	1 [-]		
Comm object	9990	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if ROCOF Protection (page 306) != Disabled		
Description			
This setpoint adjusts the time averaging level for the ROCOF Protection (page 306) . It defines the number of periods of the mains voltage in which the ROCOF protection is evaluated. The higher length of the ROCOF window means less sensitive protection for short oscillations of the frequency to both directions from the nominal value. Also, the delay of evaluation is higher.			

◀ back to List of setpoints

ROCOF df/dt

Setpoint group	Mains Settings	Related FW	1.0.0			
Range [units]	0.01 .. 10.00 [Hz/s]					
Default value	1.00 Hz/s	Force value	YES			
Step	0.01 Hz/s					
Comm object	9844	Related applications	MCB, MGCB			
Config level	Standard					
Setpoint visibility	Only if ROCOF Protection (page 306) != Disabled					
Description						
This setpoint adjusts the trip level for ROCOF Protection (page 306) .						

🔍 back to List of setpoints

Vector Shift/ROCOF CB Selector

Setpoint group	Mains Settings	Related FW	1.0.0
Range [units]	MCB / MGCB [-]		
Default value	MCB	Force value	YES
Step	[-]		
Comm object	10552	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Vector Shift Protection (page 305) != Disabled or ROCOF Protection (page 306) != Disabled		
Description			
This setpoint adjusts which breaker will be opened when Vector Shift Protection (page 305) , ROCOF Protection (page 306) is detected.			
<i>Note: If the MGCB is selected and a mains failure occurs the MGCB will be opened immediately when the vector shift or ROCOF is detected, however MCB will be also opened due to other mains protections such as Bus <>f Protection (page 302).</i>			

🔍 back to List of setpoints

Group: Protections

Subgroup: Overload Protection

Overload Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	13231	Related applications	MCB, MGCB

Config level	Advanced																																		
Setpoint visibility	Always																																		
Description <p>This setpoint enables or disables Overload Protection.</p> <p>Behavior of protection is adjusted via setpoints Overload MPR (page 274) and Overload Delay (page 276). This protection activates alarm Hst IDMT Overload (page 687).</p> <p>The reaction time is calculated by this formula:</p> $\text{Reaction time} = \frac{2\text{POverload Start Evaluation Level} \times 2\text{POverload Start Evaluation Delay}}{\frac{\text{Mains } P}{\text{Nominal Power}} \times 100 \times 2\text{POverload Start Evaluation Level}}$																																			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.																																			
<table border="1"> <thead> <tr> <th>Load level</th><th>Reaction time [s]</th></tr> </thead> <tbody> <tr><td>100</td><td>no reaction</td></tr> <tr><td>110</td><td>no reaction</td></tr> <tr><td>120</td><td>3600</td></tr> <tr><td>130</td><td>60</td></tr> <tr><td>140</td><td>30</td></tr> <tr><td>150</td><td>20</td></tr> <tr><td>160</td><td>15</td></tr> <tr><td>170</td><td>12</td></tr> <tr><td>180</td><td>10</td></tr> <tr><td>190</td><td>8.6</td></tr> <tr><td>200</td><td>7.5</td></tr> <tr><td>210</td><td>6.7</td></tr> <tr><td>220</td><td>6</td></tr> <tr><td>230</td><td>5.5</td></tr> <tr><td>240</td><td>5</td></tr> <tr><td>250</td><td>4.6</td></tr> </tbody> </table>	Load level	Reaction time [s]	100	no reaction	110	no reaction	120	3600	130	60	140	30	150	20	160	15	170	12	180	10	190	8.6	200	7.5	210	6.7	220	6	230	5.5	240	5	250	4.6	<p>2POverload Start Evaluation Level = 120 % 2POverload Start Evaluation Delay = 5 s</p>
Load level	Reaction time [s]																																		
100	no reaction																																		
110	no reaction																																		
120	3600																																		
130	60																																		
140	30																																		
150	20																																		
160	15																																		
170	12																																		
180	10																																		
190	8.6																																		
200	7.5																																		
210	6.7																																		
220	6																																		
230	5.5																																		
240	5																																		
250	4.6																																		
Setpoint options: <ul style="list-style-type: none"> ➤ Enabled / Disabled: Protection is enabled / disabled. ➤ Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557). 																																			

🔍 back to List of setpoints

Subgroup: Current Protection

IDMT Mains Overcurrent Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	15666	Related applications	MCB, MGCB

Config level	Advanced
Setpoint visibility	Always

Description

This setpoint enables or disables IDMT Mains Overcurrent Protection.

Behavior of protection is adjusted via setpoints **IDMT Mains Overcurrent Delay (page 279)**. This protection activates alarm **MPR IDMT Mains >A (page 687)**.

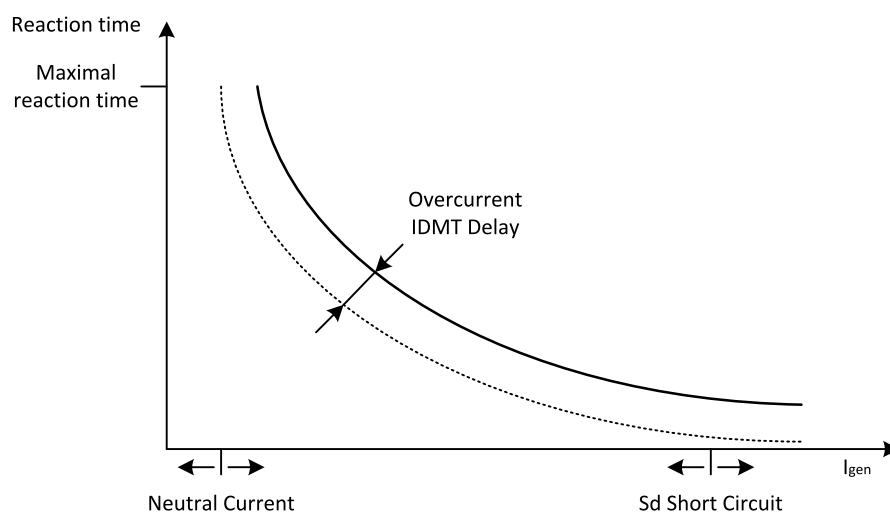
The reaction time is calculated by this formula:

$$\text{Reaction time} = \frac{\text{IDMT Mains >A Delay} \times \text{Nominal Current}}{I_{\text{mains}} - \text{Nominal Current}}$$

I_{Mains} = Maximum (Mains Current L1 (page 447), Mains Current L2 (page 447) and Mains Current L3 (page 447))

Note: Reaction time is limited to 3600 s = 60 minutes. IDMT protection is not active for Reaction time values longer than 60 minutes.

	Overcurrent IDMT Delay	Overcurrent		
		≤100 %	101 %	110 %
Reaction Time	0.2 s	No action	20 s	2 s
	2 s	No action	200 s	20 s
	20 s	No action	2000 s	200 s



Setpoint options:

- Enabled / Disabled: Protection is enabled / disabled.
- Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557).

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

🔍 back to List of setpoints

Current Unbalance Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	15667	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint enables or disables Current Unbalance Protection.

Protection is enabled. Behavior of protection is adjusted via setpoints **Current Unbalance (page 280)** and **Current Unbalance Delay (page 280)**. When relative difference between Mains currents is over setpoint **Current Unbalance (page 280)** for time longer than **Current Unbalance Delay (page 280)** alarm **MPR Current Unbalance (page 687)** is activated.

IMPORTANT: Behavior of this protection is influenced by setpoint Connection type (page 261)

Connection type (page 261)	Compared values (maximum difference)
3Ph4Wire	(Mains Current L1 (page 447), Mains Current L2 (page 447), Mains Current L3 (page 447))
High Leg D	
3Ph3Wire	
SplitPhase	
MonoPhase	No protection is evaluated.

Setpoint options:

>

Enabled / Disabled : Protection is enabled / disabled .

>

Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557)**.

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

🔍 back to List of setpoints

Short Circuit Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	15665	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Short Circuit protection.			
Behavior of protection is adjusted via setpoints Short Circuit Protection (page 296) and Short Circuit Delay (page 278) . When value of Mains Current L1 (page 447) , Mains Current L2 (page 447) and Mains Current L3 (page 447) related to Nominal Current (page 258) cross over Short Circuit (page 278) for time longer than Short Circuit Delay (page 278) alarm MPR Short Circuit (page 687) is activated.			
Setpoint options:			
➤ Enabled / Disabled : Protection is enabled / disabled.			
➤ Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557) .			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.			

🔍 back to List of setpoints

Subgroup: Voltage Protection

Mains <>V Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	20806	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Mains >V Protection.			
Behavior of protection is adjusted via setpoints Mains Overvoltage (page 281) , Mains Overvoltage Delay (page 281) and Mains Overvoltage Hys (page 282) . When Mains voltage exceeds limit set by Mains Overvoltage (page 281) for period longer than Mains Overvoltage Delay (page 281) relevant history records is written to the history and MCB is opened if:			

- > **Controller mode (page 267) = OFF**
and **MCB Opens On (page 290) = Mains Fail**
- > **Controller mode (page 267) = MAN**
and **Breaker state (page 473) = ParalOper**
- > **Controller mode (page 267) = AUTO**

Return from Mains >V can have hysteresis set by **Mains Overvoltage Hys (page 282)**.

Value	History Record
Mains Voltage L1-N (page 445)	MP MAINS OVERVOLTAGE L1-N (PAGE 678)
Mains Voltage L2-N (page 445)	MP MAINS OVERVOLTAGE L2-N (PAGE 678)
Mains Voltage L3-N (page 445)	MP MAINS OVERVOLTAGE L3-N (PAGE 679)
Mains Voltage L1-L2 (page 445)	MP MAINS OVERVOLTAGE L1-L2 (PAGE 679)
Mains Voltage L2-L3 (page 445)	MP MAINS OVERVOLTAGE L2-L3 (PAGE 680)
Mains Voltage L3-L1 (page 446)	MP MAINS OVERVOLTAGE L3-L1 (PAGE 680)

Setpoint options:

- > Enabled / Disabled: Protection is enabled / disabled.
- > Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI
**PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) /
PROTECTION FORCE DISABLE 3 (PAGE 557).**

🔍 back to List of setpoints

Mains Voltage Unbalance Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	20798	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint enables or disables Mains V Unbalance Protection.

Behavior of protection is adjusted via setpoints **Mains Voltage Unbalance (page 284)** and **Mains Voltage Unbalance Delay (page 284)**. When relative difference between Mains current is over setpoint **Mains Voltage Unbalance (page 284)** for time longer than **Mains Voltage Unbalance Delay (page 284)** alarm **MP Mains Voltage Unbalance Ph-N (page 685)** or **MP Mains Voltage Unbalance Ph-Ph (page 684)** is activated.

IMPORTANT: Behavior of this protection is influenced by setpoint Connection type (page 261)

Connection type (page 261)	Compared values (maximum difference)
3Ph4Wire	Mains Voltage L1-N (page 445), Mains Voltage L2-N (page 445) and Mains Voltage L3-N (page 445) OR Mains Voltage L1-L2 (page 445), Mains Voltage L2-L3 (page 445) and Mains Voltage L3-L1 (page 446)
High Leg D	Mains Voltage L1-L2 (page 445), Mains Voltage L2-L3 (page 445) and Mains Voltage L3-L1 (page 446)
3Ph3Wire	Mains Voltage L1-L2 (page 445), Mains Voltage L2-L3 (page 445) and Mains Voltage L3-L1 (page 446)
SplitPhase	Mains Voltage L1-N (page 445), Mains Voltage L2-N (page 445) and Mains Voltage L3-N (page 445)
MonoPhase	No protection is evaluated.

List of History Records

MPMains V Unbalance Ph-N

MPMains V Unbalance Ph-Ph

Setpoint options:

- Enabled / Disabled: Protection is enabled / disabled.
- Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557)**.

 [back to List of setpoints](#)

Bus <>V Protection

Setpoint group	Protections	Related FW	1.0.0														
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]																
Default value	Enabled	Force value	YES														
Step	[-]																
Comm object	15668	Related applications	MCB, MGCB														
Config level	Advanced																
Setpoint visibility	Always																
Description																	
This setpoint enables or disables Bus <>V Protection.																	
Protection is enabled. Behavior of protection is adjusted via setpoints Bus Undervoltage (page 307) .																	
When Bus voltage exceeds limit set by Bus Undervoltage (page 307) appropriate alarm is activated.																	
<table><tr><td>Value</td><td>Alarm</td></tr><tr><td>Bus Voltage L1-N (page 458)</td><td>Hst Bus Overvoltage L1-N (page 672)</td></tr><tr><td>Bus Voltage L2-N (page 458)</td><td>Hst Bus Overvoltage L2-N (page 672)</td></tr><tr><td>Bus Voltage L3-N (page 458)</td><td>Hst Bus Overvoltage L3-N (page 672)</td></tr><tr><td>Bus Voltage L1-L2 (page 458)</td><td>Hst Bus Overvoltage L1-L2 (page 673)</td></tr><tr><td>Bus Voltage L2-L3 (page 459)</td><td>Hst Bus Overvoltage L2-L3 (page 673)</td></tr><tr><td>Bus Voltage L3-L1 (page 459)</td><td>Hst Bus Overvoltage L3-L1 (page 673)</td></tr></table>				Value	Alarm	Bus Voltage L1-N (page 458)	Hst Bus Overvoltage L1-N (page 672)	Bus Voltage L2-N (page 458)	Hst Bus Overvoltage L2-N (page 672)	Bus Voltage L3-N (page 458)	Hst Bus Overvoltage L3-N (page 672)	Bus Voltage L1-L2 (page 458)	Hst Bus Overvoltage L1-L2 (page 673)	Bus Voltage L2-L3 (page 459)	Hst Bus Overvoltage L2-L3 (page 673)	Bus Voltage L3-L1 (page 459)	Hst Bus Overvoltage L3-L1 (page 673)
Value	Alarm																
Bus Voltage L1-N (page 458)	Hst Bus Overvoltage L1-N (page 672)																
Bus Voltage L2-N (page 458)	Hst Bus Overvoltage L2-N (page 672)																
Bus Voltage L3-N (page 458)	Hst Bus Overvoltage L3-N (page 672)																
Bus Voltage L1-L2 (page 458)	Hst Bus Overvoltage L1-L2 (page 673)																
Bus Voltage L2-L3 (page 459)	Hst Bus Overvoltage L2-L3 (page 673)																
Bus Voltage L3-L1 (page 459)	Hst Bus Overvoltage L3-L1 (page 673)																
Setpoint options:																	
➤ Enabled / Disabled: Protection is enabled / disabled.																	
➤ Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557).																	
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.																	

🔍 back to List of setpoints

Bus Voltage Unbalance Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	15669	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Bus Voltage Unbalance Protection.			

Behavior of protection is adjusted via setpoints **Bus V Unbalance** (page 308) and **Bus V Unbalance Delay** (page 308). When relative difference between Bus voltages is over setpoint **Bus V Unbalance** (page 308) for time longer than **Bus V Unbalance Delay** (page 308) alarm **Hst Bus Voltage Unbalance Ph-N** (page 675) or **Hst Bus Voltage Unbalance Ph-Ph** (page 676) is activated.

IMPORTANT: Behavior of this protection is influenced by setpoint **Connection type** (page 261)

Connection type (page 261)	Compared values (maximum difference)
3Ph4Wire	Bus Voltage L1-N (page 458), Bus Voltage L2-N (page 458) and Bus Voltage L3-N (page 458) OR Bus Voltage L1-L2 (page 458), Bus Voltage L2-L3 (page 459) and Bus Voltage L3-L1 (page 459)
High Leg D	Bus Voltage L1-L2 (page 458), Bus Voltage L2-L3 (page 459) and Bus Voltage L3-L1 (page 459)
3Ph3Wire	Bus Voltage L1-L2 (page 458), Bus Voltage L2-L3 (page 459) and Bus Voltage L3-L1 (page 459)
SplitPhase	Bus Voltage L1-N (page 458), Bus Voltage L2-N (page 458) and Bus Voltage L3-N (page 458)
MonoPhase	No protection is evaluated.

Setpoint options:

- > Enabled / Disabled: Protection is enabled / disabled.
- > Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI
PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) /
PROTECTION FORCE DISABLE 3 (PAGE 557).

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

⬅ back to List of setpoints

Subgroup: Frequency Protection

Mains <>f Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	20802	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
<p>This setpoint adjusts the behavior Mains >f Protection.</p> <ul style="list-style-type: none">> Controller mode (page 267) = OFF> Controller mode (page 267) = MAN and Breaker state (page 473) = ParalOper> Controller mode (page 267) = AUTO <p>Return from Mains >f can have hysteresis set by Mains Overfrequency Hys (page 285).</p> <p>Note: f_{max} = Nominal Frequency (page 266) + Mains Overfrequency (page 285)</p> <p>Setpoint options:</p> <ul style="list-style-type: none">> Enabled / Disabled: Protection is enabled / disabled.> Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557).			

🔍 back to List of setpoints

Bus <>f Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	15670	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
<p>This setpoint enables or disables Bus >f Protection.</p> <p>Behavior of protection is adjusted via setpoint Bus Overfrequency (page 309). When Bus Frequency (page 458) exceeds maximal accepted frequency for period longer than Bus <>f Delay (page 310) alarm Hst Bus Overfrequency (page 675) is activated.</p> <p>Note: $f_{max} = \text{Nominal Frequency (page 266)} + \text{Bus Overfrequency (page 309)}$</p> <p>Setpoint options:</p> <ul style="list-style-type: none">➤ Enabled / Disabled : Protection is enabled / disabled .➤ Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557). <p>IMPORTANT: If this protection is disabled, the MGCB cannot be closed.</p>			

🔍 back to List of setpoints

Subgroup: Minimal Power PTM Protection

Minimal Power PTM Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	17012	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Minimal Power PTM protection.			
The LBO MINIMAL POWER PTM LIMITATION (PAGE 588) is closed always when the System Required P Target is below Minimal Power PTM (page 277) .			
Enabled	Protection is enabled. Alarm Stp Request Under MinPowerPTM (page 688) is activated if controller detects that the System Required P Target is below Minimal Power PTM (page 277) while Parallel To Mains operation and Minimal Power PTM Protection Del (page 278) elapsed.		
Disabled	Protection is disabled.		
Protection Force Disable 1	Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) .		
Protection Force Disable 2	Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 2 (PAGE 557) .		
Protection Force Disable 3	Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 3 (PAGE 557) .		
Note: This protections is not evaluated if System power goes under Minimal Power because of Import/Export Limitation (page 241) .			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.			

🔍 back to List of setpoints

Subgroup: Bus Meas Error Protection

Bus Meas Error Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Disabled / Protection Force Disable 1 / Protection Force Disable 2 / Protection Force Disable 3 [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	10558	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Bus Measurement Error protection.			
Alarm Wrn Bus Meas Error (page 637) is activated if controller detects a mismatch between the expected and currently measured voltage on the bus for period longer than 20 s. Mismatch means that measured voltage is lower/higher than Bus Dead Level (page 265) , although the controller receives information about closed/opened breaker.			
Setpoint options:			
➤ Enabled / Disabled : Protection is enabled / disabled .			
➤ Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 556) / PROTECTION FORCE DISABLE 2 (PAGE 557) / PROTECTION FORCE DISABLE 3 (PAGE 557) .			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.			

🔍 back to List of setpoints

Subgroup: Loss of Mains Protections

Vector Shift Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Parallel Only / Disabled [-]		
Default value	Disabled	Force value	YES
Step	[-]		
Comm object	10551	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables the function of the built-in Vector Shift protection. Behavior of protection is adjusted via setpoints Vector Shift Limit (page 291) and Vector Shift/ROCOF CB Selector (page 292) . When measured vector shift on Mains Voltage L1-N (page 445) is over the Vector Shift Limit (page 291) , breaker specified in Vector Shift/ROCOF CB Selector (page 292) is opened and history record Vector Shift is written to the history.			
<i>Note: If a vector shift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is reclosed again after Mains Return Delay (page 287), as the mains is evaluated as healthy.</i>			
Enabled	Protection is always active while MCB is closed.		
Parallel Only	Protection is active only if Breaker state (page 473) = ParalOper i.e. MCB and MGCB are closed.		
Disabled	Protection is disabled.		

 [back to List of setpoints](#)

ROCOF Protection

Setpoint group	Protections	Related FW	1.0.0
Range [units]	Enabled / Parallel Only / Disabled [-]		
Default value	Disabled	Force value	YES
Step	[-]		
Comm object	9840	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint enables or disables the function of the built-in ROCOF1 Protection.

Behavior of protection is adjusted via setpoints **ROCOF Windows Length (page 291)**, **ROCOF df/dt (page 292)** and **Vector Shift/ROCOF CB Selector (page 292)**.

When measured **ROCOF (page 448)** is over **ROCOF df/dt (page 292)** in respective period given by **ROCOF Windows Length (page 291)**, breaker specified in **Vector Shift/ROCOF CB Selector (page 292)** is opened and history record ROCOF is written to the history. Maximal ROCOF is stored in **Max ROCOF (page 449)** which is reset every time when the breaker is closed again.

Note: *If a ROCOF is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is reclosed again after **MCB Close Delay (page 288)**, as the mains is evaluated as healthy.*

Enabled	Protection is always active while MCB is closed.
Parallel Only	Protection is active only if Breaker state (page 473) = ParalOper i.e. MCB and MGCB are closed.
Disabled	Protection is disabled.

🔍 back to List of setpoints

Subgroup: Phase Rotation Protection

Phase Rotation Protection

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Clockwise / Counterclockwise [-]		
Default value	Clockwise	Force value	YES
Step	[-]		
Comm object	19709	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjust the phase sequence of voltage terminals.			

🔍 back to List of setpoints

Group: Generator settings

Subgroup: Bus Voltage Protection

Bus Undervoltage

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	100 .. 200 of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263) [%]		
Default value	120 % of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)	Force value	YES
Step	1 % of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)		
Comm object	8291	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Bus <>V Protection (page 299).			
<i>Note: Bus Voltage L1-N (page 458), Bus Voltage L2-N (page 458), Bus Voltage L3-N (page 458), Bus Voltage L1-L2 (page 458), Bus Voltage L2-L3 (page 459) and Bus Voltage L3-L1 (page 459) are used for this protection.</i>			

🔍 back to List of setpoints

Bus Overvoltage

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	20 .. 99 [%] of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)		
Default value	90 % of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)	Force value	YES
Step	1 % of Gen AC Bus Nominal Voltage Ph-N (page 263) and Gen Nominal Voltage Ph-Ph (page 263)		
Comm object	8293	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Bus <>V Protection (page 299).			
<i>Note: Bus Voltage L1-N (page 458), Bus Voltage L2-N (page 458), Bus Voltage L3-N (page 458), Bus Voltage L1-L2 (page 458), Bus Voltage L2-L3 (page 459) and Bus Voltage L3-L1 (page 459) are used for this protection.</i>			

🔍 back to List of setpoints

Bus <>V Delay

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0.01 .. 6000.0 [s]		
Default value	5.00 s	Force value	YES
Step	0.01 s		
Comm object	9103	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Bus <>V Protection (page 299) .			

[back to List of setpoints](#)

Bus V Unbalance

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	1 .. 200 [%]		
Default value	10 %	Force value	YES
Step	1 %		
Comm object	8288	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Connection type (page 261) != MonoPhase		
Description			
This setpoint specifies the relative voltage threshold level for Bus Voltage Unbalance Protection (page 299) .			

[back to List of setpoints](#)

Bus V Unbalance Delay

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0.01 .. 600.00 [s]		
Default value	3.00 s	Force value	YES
Step	0.01 s		
Comm object	8289	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Connection type (page 261) != MonoPhase		
Description			
This setpoint specifies the delay for Bus Voltage Unbalance Protection (page 299) .			

[back to List of setpoints](#)

Subgroup: Bus Frequency Protection

Bus Overfrequency

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0.00 .. 5.00 [Hz]		
Default value	1.50 Hz	Force value	YES
Step	0.01 Hz		
Comm object	8296	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximal accepted frequency for Bus <>f Protection (page 302) .			
IMPORTANT: When Application Mode (page 472) = MINT this setpoint also specifies the maximal accepted frequency for Bus >f Protection.			
Note: f_{max} = <i>Nominal Frequency (page 266)</i> + <i>Bus >f</i>			

[back to List of setpoints](#)

Bus Underfrequency

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0.00 .. 5.00 [Hz]		
Default value	1.50 Hz	Force value	YES
Step	0.01 Hz		
Comm object	14588	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximal accepted frequency for Bus <>f Protection (page 302) .			
IMPORTANT: When Application Mode (page 472) = MINT this setpoint also specifies the maximal accepted frequency for Bus <f Protection.			
Note: f_{min} = Nominal Frequency (page 266) - Bus <f			

[back to List of setpoints](#)

Bus <>f Delay

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0.01 .. 600.0 [s]		
Default value	5.00 s	Force value	YES
Step	0.01 s		
Comm object	8297	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Bus <>f Protection (page 302) .			

 [back to List of setpoints](#)

Group: Load Shedding

Subgroup: Load Shedding

Load Shedding Active

Setpoint group	Load Shedding	Related FW	1.0.0
Range [units]	Disabled / Island only / IsL+Trip paral / All the time [-]		
Default value	Disabled	Force value	YES
Step	[-]		
Comm object	11001	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Allways		
Description			
This setpoint adjusts the activation of the Load Shedding (page 134) function.			
<ul style="list-style-type: none">> Disabled – Function is disabled.> Island only – Function is active when Breaker state (page 473) = IsOper or Breaker state (page 473) = MultIsOp.<ul style="list-style-type: none">>> Load shedding outputs (page 135) are closed/opened one by one in island operations>> All Load shedding outputs (page 135) are closed at once when the System comes into the island operation if MCB and MGCB were opened -> Bus is powered -> MGCB closed.> IsL+Trip paral – Function behaves same as Load Shedding Active = Island only and adds load shedding when Breaker state (page 473) is changed from ParalOper/MultParOp to IsOper/MultIsOp .<ul style="list-style-type: none">>> Load shedding outputs (page 135) are closed/opened one by one in island operations>> All Load shedding outputs (page 135) are closed at once when the System changes into island operation state in this way: MCB and MGCB were opened -> Bus is powered -> MGCB closed.>> All Load shedding outputs (page 135) are closed at once when the System changes into island operation state in this way: MCB and MGCB were closed -> MCB opened.> All the time – Function is active regardless of Breaker state (page 473).<ul style="list-style-type: none">>> All Load shedding outputs (page 135) are never tripped at once when MGCB is closed into parallel operation.>> All Load shedding outputs (page 135) are tripped at once when MGCB is closed into island operation.			

🔍 back to List of setpoints

Load Shedding Based On

Setpoint group	Load Shedding	Related FW	1.0.0				
Range [units]	Mains Import / Gensets Power [-]						
Default value	Mains Import	Force value	YES				
Step	[-]						
Comm object	9905	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Only if Load Shedding Active (page 311) != Disabled						
Description							
This setpoint defines which parameter will be used for the Load Shedding.							
<table><tr><td>Mains Import</td><td>Load Shedding is using the value Mains Import P.</td></tr><tr><td>Gensets Power</td><td>Load Shedding is using the value Total Running P.</td></tr></table>				Mains Import	Load Shedding is using the value Mains Import P.	Gensets Power	Load Shedding is using the value Total Running P.
Mains Import	Load Shedding is using the value Mains Import P.						
Gensets Power	Load Shedding is using the value Total Running P.						

[back to List of setpoints](#)

Load Shedding Level

Setpoint group	Load Shedding	Related FW	1.0.0
Range [units]	Load Reconnection Level (page 313) .. 200 [%] of Nominal DC Shore Power (page 258)		
Default value	80 % of Nominal DC Shore Power (page 258)	Force value	YES
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	8884	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Load Shedding Active (page 311) != Disabled		
Description			
This setpoint adjusts decisive level for load disconnection during Load Shedding (page 134) function.			

[back to List of setpoints](#)

Load Shedding Delay

Setpoint group	Load Shedding	Related FW	1.0.0
Range [units]	0.0..600.0 [s]		
Default value	10 s	Force value	YES
Step	1 s		
Comm object	8887	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Load Shedding Active (page 311) != Disabled		
Description			
This setpoint adjusts the delay between load disconnections during Load Shedding (page 134) function.			

🔍 back to List of setpoints

Load Reconnection Level

Setpoint group	Load Shedding	Related FW	1.0.0
Range [units]	0 .. 20 [%] of Nominal DC Shore Power (page 258)		
Default value	20 % of Nominal DC Shore Power (page 258)	Force value	YES
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	8890	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Load Shedding Active (page 311) != Disabled		
Description			
This setpoint adjusts the decisive level between load reconnection during Load Shedding (page 134) function.			

🔍 back to List of setpoints

Load Reconnection Delay

Setpoint group	Load Shedding	Related FW	1.0.0
Range [units]	0..600 [s]		
Default value	10 s	Force value	YES
Step	1 s		
Comm object	8893	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Load Shedding Active (page 311) != Disabled		
Description			
This setpoint adjusts the delay between load reconnection during Load Shedding (page 134) function.			

🔍 back to List of setpoints

Auto Load Reconnection

Setpoint group	Load Shedding	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	Force value	YES
Step	[-]		
Comm object	9649	Related applications	MCB, MGCB
Config level	Advanced		
Setpoint visibility	Only if Load Shedding Active (page 311) != Disabled		
Description			
This setpoint enables/disables Automatic Load Shedding (page 134) .			
Disabled	Rising edge of LBI MANUAL LOAD RECONNECTION (PAGE 546) lowers the load reduction stage by one while Mains Import P (page 439) drops under Load Reconnection Level (page 313) .		
Enabled	Load reduction stage is lowered by one when Mains Import P (page 439) drops under Load Reconnection Level (page 313) and period of Load Reconnection Delay (page 313) elapsed from last load reduction stage lowering.		

🔍 back to List of setpoints

Group: Power Management

Subgroup: Power Management Control

#Power Management Mode

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	ABS [kW] / N/A Mode / REL [%]		
Default value	ABS [kW]	Force value	NO
Step	[-]		
Comm object	9874	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects the Power Management (page 165) function mode.			
ABS [kW]	The Power Management (page 165) is based on Nominal DC Shore Power (page 258) of each unit.		
N/A Mode	Power Management mode which has been set via CAN2 (page 17) (Communication peripherals (page 17)) is not supported in this controller. Alarm Wrn Unsupported PMS Mode (page 669) is active.		
REL [%]	The Power Management (page 165) is based on relative load, i.e. ratio of Total Running P (page 462) to Nominal DC Shore Power (page 258) .		

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 33)** and/or **Terminal Diagram (page 33)** . Change of this setpoint will be reflected in all controllers.

🔍 back to List of setpoints

#Priority Auto Swap

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	Disabled / RunHourEq / N/A Mode / Efficient [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	10593	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects the optimization of Power Management (page 165) function.			
Disabled	Optimization is disabled. Priorities are given directly by the values adjusted in the setpoint Priority in each unit.		
Run Hours Equal	This method changes the priorities (not the setpoint Priority in each unit) to equalize running hours of the units or to keep maximal difference of running hours set by #Run Hours Max Difference (page 335) .		
N/A Mode	Power Management mode, which has been set via CAN2 (page 17) (Communication peripherals (page 17)) , is not supported in this controller.		
Efficient	This method changes the priorities (not the setpoint Priority in each unit) to optimize which units are running according to their nominal power, requested Load reserve and Run Hours. For units with the same nominal power also run hour equalization is being performed.		

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 33)** and/or **Terminal Diagram (page 33)** . Change of this setpoint will be reflected in all controllers.

[back to List of setpoints](#)

#System Start Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	5 s	Force value	NO
Step	1 s		
Comm object	8549	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay of the system activation after the LBI REMOTE START/STOP (PAGE 560) has been activated.			
<i>Note: System Start Delay countdown is changed to 1 second for parallel operation (Bus is in parallel with Mains).</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#System Stop Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	30 s	Force value	NO
Step	1 s		
Comm object	8550	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay of the system deactivation after the LBI REMOTE START/STOP (PAGE 560) has been deactivated.			
Note: <i>System Stop Delay countdown is changed to 1 second for parallel operation (Bus is in parallel with Mains).</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Dynamic Spinning Reserve

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	14126	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to enable/disable use of the Dynamic Spinning Reserve (page 184) functionality in power management.			

🔍 back to List of setpoints

Ignore Load Reserve For Island

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	Yes / No [-]		
Default value	No	Force value	YES
Step	[-]		
Comm object	17014	Related applications	, MGCB
Config level	Standard		
Setpoint visibility	Only if Application Mode (page 472) = MGCB		
Description			
This setpoint changes the behavior of Power Management in MGCB application in AUT and TEST mode. It is used to prevent of overloading of the first Gen-set connected to the dead bus in island operation.			
No	Load reserve condition has to be fulfilled otherwise, the command to close MGCB is not sent.		
Yes	Load reserve condition does not have to be fulfilled for the closing of MGCB, i.e. MGCB is closed when the bus is healthy, without checking load reserve requirements.		

🔍 back to List of setpoints

Subgroup: Load Reserve Set 1

#Starting Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Load Reserve 1 (page 320) [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	60 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8489	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 1 is activated and Actual Reserve (page 460) drops bellow this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
<p>Note: If the absolute power management is selected, this setpoint (or the setpoints #Starting Load Reserve 2 (page 322), #Starting Load Reserve 3 (page 325) or #Starting Load Reserve 4 (page 328) depending on which load reserve set is selected) determines also the number of Controllers (that are part of the power management) which will start (according to their priority and nominal power).</p>			
<p>IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.</p>			

🔍 back to List of setpoints

#Stopping Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 1 (page 319) .. 32000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	110 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8491	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 1 is activated and Actual Reserve (page 460) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
Note: <i>The reserve for stop must be always adjusted higher than the reserve for start.</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Starting Rel Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Load Reserve 1 (page 320) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10648	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 1 is activated and Actual Relative Reserve (page 464) drops below this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Stopping Rel Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 1 (page 321) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10652	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 1 is activated and Actual Relative Reserve (page 464) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Load Reserve Set 2

#Starting Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Load Reserve 2 (page 323) [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	410 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8490	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 2 is activated and Actual Reserve (page 460) drops bellow this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
<p>Note: If the absolute power management is selected, this setpoint (or the setpoints #Starting Load Reserve 2 (page 322) depending on which load reserve set is selected) determines also the number of Controllers (that are part of the power management) which will start (according to their priority and nominal power).</p>			
<p>IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.</p>			

🔍 back to List of setpoints

#Stopping Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 2 (page 322) .. 32000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	460 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8633	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 2 is activated and Actual Reserve (page 460) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
Note: <i>The reserve for stop must be always adjusted higher than the reserve for start.</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Starting Rel Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Rel Load Reserve 2 (page 324) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10649	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 2 is activated and Actual Relative Reserve (page 464) drops below this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Stopping Rel Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 2 (page 324) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10653	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 2 is activated and Actual Relative Reserve (page 464) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Load Reserve Set 3

#Starting Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Load Reserve 3 (page 326) [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	410 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8831	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 3 is activated and Actual Reserve (page 460) drops below this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

[back to List of setpoints](#)

#Stopping Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 3 (page 325) .. 32000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	460 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8833	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 3 is activated and Actual Reserve (page 460) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
Note: <i>The reserve for stop must be always adjusted higher than the reserve for start.</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Starting Rel Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Rel Load Reserve 3 (page 327) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10650	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 3 is activated and Actual Relative Reserve (page 464) drops below this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Stopping Rel Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 3 (page 327) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10654	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 3 is activated and Actual Relative Reserve (page 464) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Load Reserve Set 4

#Starting Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Load Reserve 4 (page 329) [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	410 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8832	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 4 is activated and Actual Reserve (page 460) drops below this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Stopping Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 4 (page 328) .. 32000 [kW] (depends on the selected Power Formats And Units (page 164))		
Default value	460 kW (depends on the selected Power Formats And Units (page 164))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164))		
Comm object	8834	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 460) for Power Management (page 165) function.</p> <p>If Load Reserve Set 4 is activated and Actual Reserve (page 460) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
Note: The reserve for stop must be always adjusted higher than the reserve for start.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Starting Rel Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Rel Load Reserve 4 (page 330) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10651	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 4 is activated and Actual Relative Reserve (page 464) drops below this limit, next Controller will be started.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Stopping Rel Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 4 (page 330) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10655	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 315) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 464) for Power Management (page 165) function.</p> <p>If Load Reserve Set 4 is activated and Actual Relative Reserve (page 464) rises over this limit, next Controller will be stopped.</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 ACTIVE (PAGE 543), LOAD RES 3 ACTIVE (PAGE 544) and LOAD RES 4 ACTIVE (PAGE 545). If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Minimal Running Power

#Min Run Power 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 65000 [kW] (depends on the selected Power Formats And Units (page 164)))		
Default value	210 kW (depends on the selected Power Formats And Units (page 164)))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164)))		
Comm object	9584	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint adjusts required Minimal Running Power (page 464) of Controllers if Minimal Running Power 1 is chosen.</p> <p>There are 3 Minimal Running Power options. This one is activated by LBI MIN RUN POWER ACT 1 (PAGE 554).</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Min Run Power 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 65000 [kW] (depends on the selected Power Formats And Units (page 164)))		
Default value	210 kW (depends on the selected Power Formats And Units (page 164)))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164)))		
Comm object	9585	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts required Minimal Running Power (page 464) of Controllers if Minimal Running Power 2 is chosen.			
There are 3 Minimal Running Power options. This one is activated by LBI MIN RUN POWER ACT 2 (PAGE 554) .			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Min Run Power 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 65000 [kW] (depends on the selected Power Formats And Units (page 164)))		
Default value	210 kW (depends on the selected Power Formats And Units (page 164)))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 164)))		
Comm object	9586	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts required Minimal Running Power (page 464) of Controllers if Minimal Running Power 3 is chosen.			
There are 3 Minimal Running Power options. This one is activated by LBI MIN RUN POWER ACT 3 (PAGE 555) .			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Start/Stop Timing

#Next Engine Start Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 3 600 [s]		
Default value	5 s	Force value	NO
Step	1 s		
Comm object	8492	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay before next Controller is started after Actual Reserve (page 460) / Actual Relative Reserve (page 464) drops bellow Starting Load Reserve of currently active Load Reserve Set.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Next Engine Stop Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 3600 [s]		
Default value	20 s	Force value	NO
Step	1 s		
Comm object	8494	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay before next Controller is stopped after Actual Reserve (page 460) / Actual Relative Reserve (page 464) rises over Stopping Load Reserve of currently active Load Reserve Set.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Slow Stop Protection

#Slow Stop Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	60 s	Force value	NO
Step	1 s		
Comm object	8495	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts for how long the next Controllers will suppress their own Slow Stop alarms to give chance to another Controller to start and replace the defective one.			
Note: <i>If there is no Controller available to start, the Slow Stop alarms are not suppressed.</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Over Load Next Start Protection

#Overload Next Start Protection

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	14942	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Overload Next Start Protection. It makes the next Controller (in priority order) to start when the load excises the value given by the setpoint #Overload Next Start Level (page 334) right after the delay #Overload Next Start Delay (page 335) . #Overload Next Start Protection requires Starting Load Reserve condition to be fulfilled in order to be used.			
Disabled		Protection is disabled.	
Enabled		Protection is enabled. If Total Running P (page 462) of PM Controllers related to Running Nominal Power In PM (page 463) is over #Overload Next Start Level (page 334) , another Controller is started after #Overload Next Start Delay (page 335) .	

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 33)** and/or **Terminal Diagram (page 33)** . Change of this setpoint will be reflected in all controllers.

🔍 back to List of setpoints

#Overload Next Start Level

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 100 [%] of Running Nominal Power In PM (page 463)		
Default value	80 % of Running Nominal Power In PM (page 463)	Force value	NO
Step	1 % of Running Nominal Power In PM (page 463)		
Comm object	14941	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Overload Next Start Protection (page 334) = Enabled		
Description			
This setpoint adjusts the minimal load for #Overload Next Start Protection (page 334).			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Overload Next Start Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 5 [s]		
Default value	1 s	Force value	NO
Step	1 s		
Comm object	8493	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if #Overload Next Start Protection (page 334) = Enabled		
Description			
This setpoint adjusts the delay for #Overload Next Start Protection (page 334).			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Run Hours Equalization

#Run Hours Max Difference

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 65000 [h]		
Default value	100 h	Force value	NO
Step	1 h		
Comm object	9919	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximal difference between Running hours of Controllers in Power Management (page 165) function if #Priority Auto Swap (page 316) .			
If the difference between Running hours of Controllers is over this limit, priorities are swapped.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Efficient Mode

#Power Band Change Up Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	Force value	NO
Step	[s]		
Comm object	8896	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand rose above the upper limit of the current power band. Setpoint is taken into account only if #Priority Auto Swap (page 316) = Efficient.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

#Power Band Change Down Delay

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	Force value	NO
Step	[s]		
Comm object	10795	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand drops below the lower limit of the current power band. Setpoint is taken into account only if #Priority Auto Swap (page 316) = Efficient.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) . Change of this setpoint will be reflected in all controllers.			

🔍 back to List of setpoints

Subgroup: Group Settings

Control Group

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	1 .. 32 [-]		
Default value	1 [-]	Force value	YES
Step	1 [-]		
Comm object	10589	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts control group in which the particular controller belongs to.			
If there are no logical groups on the site, adjust this setpoint to 1. See more information in chapter Control Groups (page 112) .			

[back to List of setpoints](#)

Group Link L

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	1 .. 32 [-]		
Default value	1 [-]	Force value	YES
Step	1 [-]		
Comm object	10590	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
If the input GROUP LINK (PAGE 542) of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter Control Groups (page 112)). This setpoint is used to select which group is located at the left side of the group link breaker. (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.			

[back to List of setpoints](#)

Group Link R

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	1 .. 32 [-]		
Default value	1 [-]	Force value	YES
Step	1 [-]		
Comm object	10591	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
If the input GROUP LINK (PAGE 542) of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter Control Groups (page 112)). This setpoint is used to select which group is located at the right side of the group link breaker. (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.			

[back to List of setpoints](#)

Group: Load Control

Subgroup: Regulation Loops

Load Gain

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0,0 .. 200,0 [%]		
Default value	10,0 [%]	Force value	YES
Step	0,1 [%]		
Comm object	8659	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the load control PI loop.			
Note: See the chapter Regulation Loops (page 195) for more information.			

[back to List of setpoints](#)

Load Int

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0 .. 200 [%]		
Default value	50 [%]	Force value	YES
Step	1 [%]		
Comm object	8713	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the integration factor (I-factor) of the load control PI loop.			
Note: See the chapter Regulation Loops (page 195) for more information.			

🔍 back to List of setpoints

Subgroup: Load Transfer

Close Transfer Max Duration

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	< 0,1 = 0,0; 0,1 .. 600,0 [s]		
Default value	5,0 s	Force value	YES
Step	0,1 s		
Comm object	8661	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
The time of parallel work of System and Mains in close transition.			

🔍 back to List of setpoints

Open Transfer Min Break

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	< 0,1 = 0,0; 0,1 .. 600,0 [s]		
Default value	1,0 s	Force value	YES
Step	0,1 s		
Comm object	8303	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Minimal duration of break in open transition when Transfer Gen To Mains (page 341) or Transfer Mains To Gen (page 340) is chosen as open transfer.			

🔍 back to List of setpoints

Transfer Mains To Gen

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	Open / Close Only / Close Prim / SoftTransf [-]		
Default value	SoftTransf	Force value	YES
Step	[-]		
Comm object	12969	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the type of transfer of load from Mains to System.			
Open	Transfer of the load from Mains to System without parallel work and synchronization (one breaker opens and second is closed - checking feedbacks). The setpoint Open Transfer Min Break (page 339) sets the minimal duration of break.		
Close Only	Transfer of the load from Mains to System with synchronization and parallel work. The time of parallel work is given by setpoint Close Transfer Max Duration (page 339) . In case of synchronization fail, MCB stays close and System is stopped.		
Close Prim	Transfer of the load from Mains to System with synchronization and parallel work. The time of parallel work is given by setpoint Close Transfer Max Duration (page 339) . In case of synchronization fail, open transfer is done.		
SoftTransf	Transfer of the load from Mains to System with parallel work and soft loading of the System. This function is proceeded like the closed transfer, but there is time limitation of loading of theSystem adjusted via setpoint Load Ramp (page 343) . The transfer is succeed only when theSystem is fully loaded – Mains is fully unloaded (level of load when Mains is considered as unloaded is adjusted via setpoint Mains Unload MCB Open Window (page 342)) .		
Note: Close transfer of load is also affected by setpoint Mains Measurement P (page 250) .			
Note: The behavior of transition of load in MAN mode is adjusted via setpoint CB Control In MAN Mode (page 248) .			

🔍 back to List of setpoints

Transfer Gen To Mains

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	Open / Close Only / Close Prim / SoftTransf [-]		
Default value	SoftTransf	Force value	YES
Step	[-]		
Comm object	14688	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the type of transfer of load from System to Mains.			
Open	Transfer of the load from System to Mains without parallel work and synchronization (one breaker opens and second is closed - checking feedbacks). The setpoint Open Transfer Min Break (page 339) sets the minimal duration of break.		
Close Only	Transfer of the load from System to Mains with synchronization and parallel work. The time of parallel work is given by setpoint Close Transfer Max Duration (page 339) . In case of synchronization fail, MGCB stays closed and System keeps running.		
Close Prim	Transfer of the load from System to Mains with synchronization and parallel work. The time of parallel work is given by setpoint Close Transfer Max Duration (page 339) . In case of synchronization fail, open transfer is done.		
SoftTransf	Transfer of the load from System to Mains with parallel work and soft unloading of the System. This function is proceeded like the closed transfer, but there is time limitation of unloading of the System adjusted via setpoint Load Ramp (page 343) . The transfer is succeed only when the System is fully unloaded (level of load when System is considered as unloaded is adjusted via setpoint Generator Unload MGCB Open Level (page 342)).		
Note: The behavior of transition of load in MAN mode is adjusted via setpoint CB Control In MAN Mode (page 248) .			

🔍 back to List of setpoints

Generator Unload MGCB Open Level

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0 .. 100 [%] of Nominal DC Shore Power (page 258)		
Default value	10 % of Nominal DC Shore Power (page 258)	Force value	YES
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	8547	Related applications	, MGCB
Config level	Standard		
Setpoint visibility	Only if Application Mode Select (page 237) = MGCB		
Description			
This setpoint adjusts the required value of the Total Running P (page 462) (power of all Gen-sets connected to the bus) when the MGCB is opened during unloading of the system.			
Note: This setpoint is usually higher than 0 to prevent the System going to reverse power.			

🔍 back to List of setpoints

Mains Unload MCB Open Window

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0 .. 100 [%] of Nominal DC Shore Power (page 258)		
Default value	1 % of Nominal DC Shore Power (page 258)	Force value	YES
Step	1 % of Nominal DC Shore Power (page 258)		
Comm object	14694	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the value which defines the level where the Mains is considered as unloaded. When this window is reached and it is required to open MCB, the MCB will be opened and remaining load in the window will be transfer to Controllers.			
IMPORTANT: If the window is set too high the Mains can be considered as unloaded and MCB will be opened while there is not enough reserve power on Controllers. This can cause overload of Controllers and blackout.			
IMPORTANT: This window and the setpoint Minimal Power PTM (page 277) must be set in the way where MCB opening will not be blocked by Minimal Power PTM level while all available Controllers are running in Load Shar.			
Note: This setpoint is window. It means that when you adjust this setpoint to 10%, there is window from -10% to +10%. The reason is Import/Export function.			

🔍 back to List of setpoints

Load Ramp

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	200 s	Force value	YES
Step	1 s		
Comm object	8658	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint adjusts the ramping time of Required P (page 466) to Required P Target (page 465) while loading/unloading.</p> <p>The ramping time is set for ΔP which is given by the value Running Nominal Power Of All (page 463).</p> <p>Example: Running Nominal Power Of All (page 463) = 20 kW, Load Ramp = 10 seconds. The ramp is changing with speed 20 kW per 10 seconds (2 kW/s) to the zero value.</p>			

[back to List of setpoints](#)

Soft Unload Ramp

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0 .. 1800 [s]		
Default value	60 s	Force value	YES
Step	1 s		
Comm object	16489	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint adjusts the ramping time of the Required P (page 466) to the Required P Target (page 465) while soft unloading when MGCB is requested to be opened.</p> <p>The Required P reach the zero value at the end of the timer. The ramping time is set for ΔP which is given by the value Running Nominal Power Of All (page 463).</p> <p>Example: Running Nominal Power Of All (page 463) = 20 kW, Soft Unload Ramp = 10 seconds. The ramp is changing with speed 20 kW per 10 seconds (2 kW/s) to the zero value.</p>			

[back to List of setpoints](#)

Soft Unload

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	Normal / Aux CT on Load / Aux CT on Gen [-]		
Default value	Normal	Force value	YES
Step	[-]		
Comm object	12201	Related applications	, MGCB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint defines which parameter will be used for the soft unloading.

Normal	The unload process is based on the value Total Running P (page 462) . The MGCB is opened when value Total Running P (page 462) is lower than limit Generator Unload MGCB Open Level (page 342) (rated from Nominal DC Shore Power (page 258)). MGCB is opened latest when Close Transfer Max Duration (page 339) elapsed.
Aux CT on Load	The unload process is based on the value Aux Power (page 450) . The aux CT has to be located on the load L1. The value of power flowing through MGCB is calculated as substitution of Aux Power - Mains Import P . The MGCB is opened when value of power flowing through MGCB is lower than limit Generator Unload MGCB Open Level (page 342) (rated from Nominal Mains Import). MGCB is opened latest when Close Transfer Max Duration (page 339) elapsed.
Aux CT on Gen	The unload process is based on the value Aux Power (page 450) . The aux CT has to be located on the bus L1 to measure the power flowing through the MGCB directly. The MGCB is opened when value of power flowing through MGCB is lower than limit Generator Unload MGCB Open Level (page 342) (rated from Nominal Mains Import). MGCB is opened latest when Close Transfer Max Duration (page 339) elapsed.

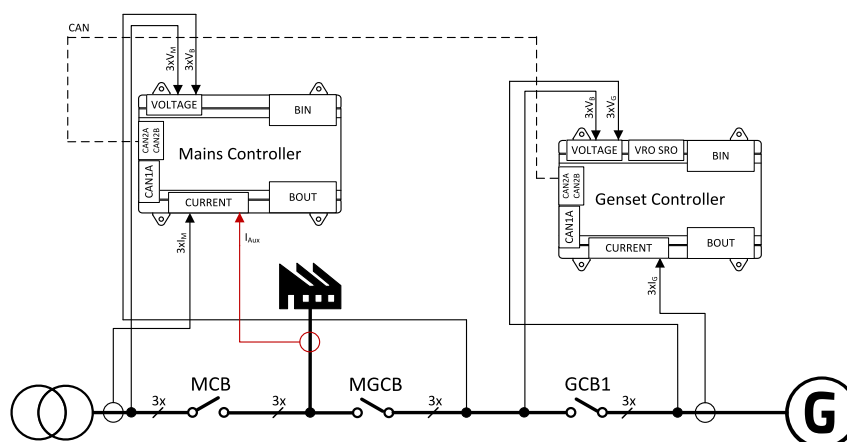
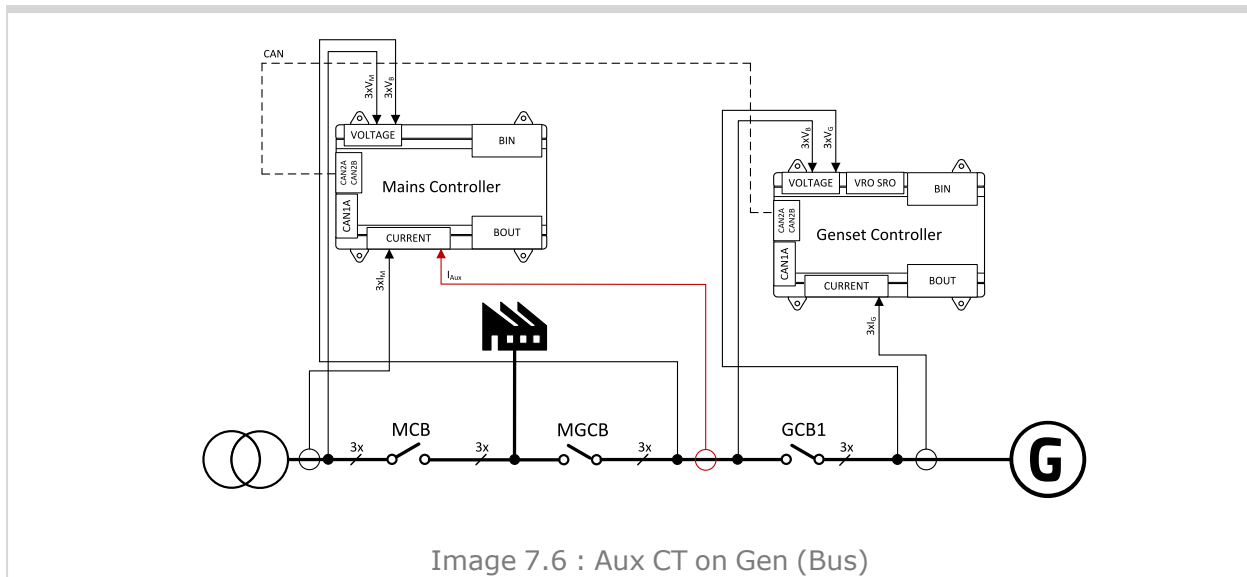


Image 7.5 : Aux CT on Load



⬅ back to List of setpoints

Group: PF Control

Subgroup: Regulation Loops

PF Gain

Setpoint group	PF Control	Related FW	1.0.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 [%]	Force value	YES
Step	0.1 [%]		
Comm object	8503	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the PF control PI loop.			
Note: See the chapter <i>Regulation Loops</i> (page 195) for more information.			

⬅ back to List of setpoints

PF Int

Setpoint group	PF Control	Related FW	1.0.0
Range [units]	0 .. 200 [%]		
Default value	50 [%]	Force value	YES
Step	1 [%]		
Comm object	8721	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the integration factor (I-factor) of the PF control PI loop.			
Note: See the chapter <i>Regulation Loops (page 195)</i> for more information.			

 [back to List of setpoints](#)

Group: Synchronization

Subgroup: Synchronization

Synchronization Type

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	PhaseMatch / SlipSynchr [-]		
Default value	PhaseMatch	Force value	YES
Step	[-]		
Comm object	14802	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the type of Synchronization (page 108) .			
➤ PhaseMatch			
This type of synchronization is based on voltage and phase shift match. Limits are adjusted via setpoints Voltage Window (page 348) and Phase Window (page 349) . When voltage and phase shift match the breaker close command is sent after Dwell Time (page 349) is elapsed.			
➤ SlipSynchr			
This type of synchronization regulates the voltage to match Voltage Window (page 348) and Bus Frequency (page 458) to match the Slip Frequency (page 350) . When this frequency is reached, Dwell Time (page 349) starts to be counted down and when elapses, breaker close command is sent.			
IMPORTANT: The breaker close command is sent in advance due to breaker latency which is set via setpoint MGCB Latency (page 350) / MCB Latency (page 351).			
Note: Synchronization is not allowed if there is any already synchronized Mains Controller in the control group.			

🔍 back to List of setpoints

Synchronization Timeout

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	1 .. 1800 [s] / No Timeout		
Default value	60 s	Force value	YES
Step	1 s		
Comm object	8657	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximum duration of Synchronization (page 108) .			
Note: <i>If this setpoint is adjusted to No Timeout then automatic restart of synchronization occurs every 180s. This method helps to synchronize successfully even in difficult conditions.</i>			

[back to List of setpoints](#)

Voltage Window

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	0,0 .. 100,0 [%]		
Default value	10,0 %	Force value	YES
Step	0,1 %		
Comm object	8650	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximal voltage difference between respective phases of Mains and Bus for Synchronization (page 108). (Bus Voltage L1-N (page 458), Mains Voltage L1-N (page 445), Bus Voltage L2-N (page 458),Mains Voltage L2-N (page 445), ...)			

[back to List of setpoints](#)

Phase Window

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	0 .. 90 [°]		
Default value	10 °	Force value	YES
Step	1 °		
Comm object	8652	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 347) = PhaseMatch		
Description			
This setpoint adjusts the maximal Slip Angle (page 448) for Synchronization (page 108) . In order to disable breaker close command, adjust this setpoint to 0. Synchronization procedure will be active for Synchronization Timeout (page 348) or until breaker is closed from an external device.			

🔍 back to List of setpoints

Bus to Mains Phase Shift

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	-120 .. 120 [°]		
Default value	0 °	Force value	YES
Step	1 °		
Comm object	9578	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to compensate phase shift which is caused by transformer.			

🔍 back to List of setpoints

Dwell Time

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	0,0 .. 25,0 [s]		
Default value	0,3 s	Force value	YES
Step	0,1 s		
Comm object	8653	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
The period of time that the phase angle difference must be within Phase Window (page 349) and voltage difference within Voltage Window (page 348) before the breaker is closed.			

🔍 back to List of setpoints

Slip Frequency

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	-0,50 .. 0,50 [Hz]		
Default value	-0,25 Hz	Force value	YES
Step	0,01 Hz		
Comm object	14798	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 347) = SlipSynchr		
Description			
This setpoint adjusts the required Bus Frequency (page 458) during synchronization while Synchronization Type (page 347) = SlipSynchr.			

🔍 back to List of setpoints

Slip Frequency Window

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	0,01 .. 0,50 [Hz]		
Default value	0,15 Hz	Force value	YES
Step	0,01 Hz		
Comm object	14799	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 347) = SlipSynchr		
Description			
Window of slip frequency for slip synchronization (Synchronization Type (page 347) = SlipSynchr).			

🔍 back to List of setpoints

MGCB Latency

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	Force value	YES
Step	1 ms		
Comm object	14800	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 347) = SlipSynchr and Application Mode Select (page 237) = MGCB		
Description			
Latency of MGCB. This setpoint is enable, when Synchronization Type (page 347) has SlipSynchro value. Synchronization Type (page 347) setting value of this setpoint.			

🔍 back to List of setpoints

MCB Latency

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	Force value	YES
Step	1 ms		
Comm object	14801	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 347) = SlipSynchr		
Description			
Latency of MCB.			
IMPORTANT: This setpoint is enable, when Synchronization Type (page 347) has Split Synchro value			

🔍 back to List of setpoints

Subgroup: Frequency Regulation Loop

Frequency Gain

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0,0 .. 200,0 [%]		
Default value	10,0 [%]	Force value	YES
Step	0,1 [%]		
Comm object	8715	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop.			
Note: See the chapter Regulation Loops (page 195) for more information.			

🔍 back to List of setpoints

Frequency Int

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0 .. 200 [%]		
Default value	50 [%]	Force value	YES
Step	1 [%]		
Comm object	8716	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the integration factor (I-factor) of the frequency control PI loop.			
Note: See the chapter <i>Regulation Loops</i> (page 195) for more information.			

🔍 back to List of setpoints

Angle Gain

Setpoint group	Load Control	Related FW	1.0.0
Range [units]	0,0 .. 200,0 [%]		
Default value	10,0 [%]	Force value	YES
Step	0,1 [%]		
Comm object	8718	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop.			
<i>Note: During synchronization, first the frequency loop is started to match the System frequency with the mains or bus and after that the phase angle loop is started to match the phase angle.</i>			
<i>Note: See the chapter Regulation Loops (page 195) for more information.</i>			

🔍 back to List of setpoints

Subgroup: Voltage Regulation Loop

Voltage Gain

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 [%]	Force value	YES
Step	0.1 [%]		
Comm object	8501	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop.			
Note: See the chapter Regulation Loops (page 195) for more information.			

🔍 back to List of setpoints

Voltage Int

Setpoint group	Synchronization	Related FW	1.0.0
Range [units]	0 .. 200 [%]		
Default value	50 [%]	Force value	YES
Step	1 [%]		
Comm object	8720	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the integration factor (I-factor) of the voltage control PI loop.			
Note: See the chapter <i>Regulation Loops (page 195)</i> for more information.			

🔍 back to List of setpoints

Group: User Buttons

Subgroup: User Buttons

User Button 1

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20826	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 1 which is part of User Buttons (page 199) .			
COMMAND	User Button 1 is controlled by command from internal display.		
MAN ON	Value of the User Button 1 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 1 is still 0.		

[back to List of setpoints](#)

User Button 2

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20827	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 2 which is part of User Buttons (page 199) .			
COMMAND	User Button 2 is controlled by command from internal display.		
MAN ON	Value of the User Button 2 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 2 is still 0.		

[back to List of setpoints](#)

User Button 3

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20828	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 3 which is part of User Buttons (page 199) .			
COMMAND	User Button 3 is controlled by command from internal display.		
MAN ON	Value of the User Button 3 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 3 is still 0.		

[back to List of setpoints](#)

User Button 4

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20829	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 4 which is part of User Buttons (page 199) .			
COMMAND	User Button 4 is controlled by command from internal display.		
MAN ON	Value of the User Button 4 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 4 is still 0.		

[back to List of setpoints](#)

User Button 5

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20830	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 5 which is part of User Buttons (page 199) .			
COMMAND	User Button 5 is controlled by command from internal display.		
MAN ON	Value of the User Button 5 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 5 is still 0.		

[back to List of setpoints](#)

User Button 6

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20831	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 6 which is part of User Buttons (page 199) .			
COMMAND	User Button 6 is controlled by command from internal display.		
MAN ON	Value of the User Button 6 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 6 is still 0.		

[back to List of setpoints](#)

User Button 7

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20832	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 7 which is part of User Buttons (page 199) .			
COMMAND	User Button 7 is controlled by command from internal display.		
MAN ON	Value of the User Button 7 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 7 is still 0.		

[back to List of setpoints](#)

User Button 8

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20833	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 8 which is part of User Buttons (page 199) .			
COMMAND	User Button 8 is controlled by command from internal display.		
MAN ON	Value of the User Button 8 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 8 is still 0.		

[back to List of setpoints](#)

User Button 9

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20834	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 9 which is part of User Buttons (page 199) .			
COMMAND	User Button 9 is controlled by command from internal display.		
MAN ON	Value of the User Button 9 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 9 is still 0.		

[back to List of setpoints](#)

User Button 10

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20835	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 10 which is part of User Buttons (page 199) .			
COMMAND	User Button 10 is controlled by command from internal display.		
MAN ON	Value of the User Button 10 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 10 is still 0.		

[back to List of setpoints](#)

User Button 11

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20836	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 11 which is part of User Buttons (page 199) .			
COMMAND	User Button 11 is controlled by command from internal display.		
MAN ON	Value of the User Button 11 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 11 is still 0.		

[back to List of setpoints](#)

User Button 12

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20837	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 12 which is part of User Buttons (page 199) .			
COMMAND	User Button 12 is controlled by command from internal display.		
MAN ON	Value of the User Button 12 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 12 is still 0.		

[back to List of setpoints](#)

User Button 13

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20838	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 13 which is part of User Buttons (page 199) .			
COMMAND	User Button 13 is controlled by command from internal display.		
MAN ON	Value of the User Button 13 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 13 is still 0.		

[back to List of setpoints](#)

User Button 14

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20839	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 14 which is part of User Buttons (page 199) .			
COMMAND	User Button 14 is controlled by command from internal display.		
MAN ON	Value of the User Button 14 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 14 is still 0.		

[back to List of setpoints](#)

User Button 15

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20840	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 15 which is part of User Buttons (page 199) .			
COMMAND	User Button 15 is controlled by command from internal display.		
MAN ON	Value of the User Button 15 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 15 is still 0.		

[back to List of setpoints](#)

User Button 16

Setpoint group	User Buttons	Related FW	1.0.0
Range [units]	COMMAND / MAN ON / MAN OFF [-]		
Default value	COMMAND	Force value	YES
Step	[-]		
Comm object	20841	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 16 which is part of User Buttons (page 199) .			
COMMAND	User Button 16 is controlled by command from internal display.		
MAN ON	Value of the User Button 16 is still 1. Note: You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the User Button 1 will be 1 until command is received.		
MAN OFF	Value of the User Button 16 is still 0.		

[back to List of setpoints](#)

Group: Scheduler

Subgroup: Time & Date

Time

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	HH:MM:SS [-]		
Default value	0:0:0	Force value	NO
Step	[-]		
Comm object	24554	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Real time clock adjustment.			

[back to List of setpoints](#)

Date

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	YYYY-MM-DD [-]		
Default value	2017-01-01	Force value	NO
Step	[-]		
Comm object	24553	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Actual date adjustment.			

[back to List of setpoints](#)

Time Stamp Period

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Off / 1 .. 240 [min]		
Default value	60 min	Force value	YES
Step	1 min		
Comm object	8979	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Time interval for periodic history records.			

[back to List of setpoints](#)

Time Zone

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00	Force value	NO
Step	[-]		
Comm object	24366	Related applications	MCB, MGCB
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: <i>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.</i>			

[back to List of setpoints](#)

DST Switching Mode

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Auto / Manual		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	20250	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoints is used to enable or disable daylight saving time.</p> <ul style="list-style-type: none">➤ 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. 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 364).➤ DISABLED - Time mode is fixedly set to STD and the function does not perform any changes of RTC time.			

[back to List of setpoints](#)

Time Mode

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	STD / DST		
Default value	STD	Force value	NO
Step	[-]		
Comm object	20249	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if DST Switching Mode = Manual		
Description			
In manual DST Switching Mode (page 363) this input is used to adjust the actual time mode. If DST Switching Mode is set to any other option, this input is not taken into account.			

[back to List of setpoints](#)

DST Period Rule

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Australia / Chile / Europe / Mexico / New Zealand / Paraguay / US/Canada		
Default value	Europe	Force value	NO
Step	[-]		
Comm object	20251	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if DST Switching Mode = Auto		
Description			
Selection of the rule that will be applied for the calculation of the DST validity period.			

[back to List of setpoints](#)

Subgroup: Timer 1

Timer 1 Function

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	Force value	YES
Step	[-]		
Comm object	15358	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint defines and enables the function of the Timer 1. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint Timer 1 Setup (page 366).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 1 (PAGE 572) is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.</p>			
IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.			
IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.			
Disabled	The Timer is disabled.		
Manual On	The Timer is disabled but his binary output is activated (can be used for testing purposes).		
No Func	There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.		
Mode OFF	The binary output of the Timer is internally connected to the Remote OFF binary input.		
TEST	The binary output of the Timer is internally connected to the binary input Remote TEST.		
TEST OnLd	The binary output of the Timer is internally connected to the Remote TEST On Load binary input.		
MFail Blk	The binary output of the Timer is internally connected to the Mains Fail Block binary input.		

🔍 back to List of setpoints

Timer 1 Setup

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	N/A [-]		
Default value	N/A [-]	Force value	NO
Step	N/A [-]		
Comm object	10969	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Timer 1 Function (page 365) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 1. See Exercise Timers (page 123) for step by step manual.			

 [back to List of setpoints](#)

Subgroup: Timer 2

Timer 2 Function

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disabled [-]	Force value	YES
Step	[-]		
Comm object	15359	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint defines and enables the function of the Timer 2. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint Timer 2 Setup (page 368).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 2 (PAGE 573) is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.</p>			
IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.			
IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.			
Disabled	The Timer is disabled.		
Manual On	The Timer is disabled but his binary output is activated (can be used for testing purposes).		
No Func	There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.		
Mode OFF	The binary output of the Timer is internally connected to the Remote OFF binary input.		
TEST	The binary output of the Timer is internally connected to the binary input Remote TEST.		
TEST OnLd	The binary output of the Timer is internally connected to the Remote TEST On Load binary input.		
MFail Blk	The binary output of the Timer is internally connected to the Mains Fail Block binary input.		

🔍 back to List of setpoints

Timer 2 Setup

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	N/A [-]		
Default value	N/A [-]	Force value	NO
Step	N/A [-]		
Comm object	10970	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Timer 2 Function (page 367) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 2. See Exercise Timers (page 123) for step by step manual.			

 [back to List of setpoints](#)

Subgroup: Timer 3

Timer 3 Function

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	Force value	YES
Step	[-]		
Comm object	15360	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint defines and enables the function of the Timer 3. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint Timer 3 Setup (page 370).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 3 (PAGE 573) is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.</p>			
IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.			
IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.			
Disabled	The Timer is disabled.		
Manual On	The Timer is disabled but his binary output is activated (can be used for testing purposes).		
No Func	There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.		
Mode OFF	The binary output of the Timer is internally connected to the Remote OFF binary input.		
TEST	The binary output of the Timer is internally connected to the binary input Remote TEST.		
TEST OnLd	The binary output of the Timer is internally connected to the Remote TEST On Load binary input.		
MFail Blk	The binary output of the Timer is internally connected to the Mains Fail Block binary input.		

🔍 back to List of setpoints

Timer 3 Setup

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	N/A [-]		
Default value	N/A [-]	Force value	NO
Step	N/A [-]		
Comm object	10971	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Timer 3 Function (page 369) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 3. See Exercise Timers (page 123) for step by step manual.			

 [back to List of setpoints](#)

Subgroup: Timer 4

Timer 4 Function

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	Force value	YES
Step	[-]		
Comm object	15361	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint defines and enables the function of the Timer 4. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint Timer 4 Setup (page 372).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 4 (PAGE 573) is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.</p>			
IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.			
IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.			
Disabled	The Timer is disabled.		
Manual On	The Timer is disabled but his binary output is activated (can be used for testing purposes).		
No Func	There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.		
Mode OFF	The binary output of the Timer is internally connected to the Remote OFF binary input.		
TEST	The binary output of the Timer is internally connected to the binary input Remote TEST.		
TEST OnLd	The binary output of the Timer is internally connected to the Remote TEST On Load binary input.		
MFail Blk	The binary output of the Timer is internally connected to the Mains Fail Block binary input.		

🔍 back to List of setpoints

Timer 4 Setup

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	N/A [-]		
Default value	N/A [-]	Force value	NO
Step	N/A [-]		
Comm object	10973	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Timer 4 Function (page 371) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 4. See Exercise Timers (page 123) for step by step manual.			

 [back to List of setpoints](#)

Subgroup: Timer 5

Timer 5 Function

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	Force value	YES
Step	[-]		
Comm object	15362	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint defines and enables the function of the Timer 5. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint Timer 5 Setup (page 374).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 5 (PAGE 574) is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.</p>			
IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.			
IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.			
Disabled	The Timer is disabled.		
Manual On	The Timer is disabled but his binary output is activated (can be used for testing purposes).		
No Func	There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.		
Mode OFF	The binary output of the Timer is internally connected to the Remote OFF binary input.		
TEST	The binary output of the Timer is internally connected to the binary input Remote TEST.		
TEST OnLd	The binary output of the Timer is internally connected to the Remote TEST On Load binary input.		
MFail Blk	The binary output of the Timer is internally connected to the Mains Fail Block binary input.		

🔍 back to List of setpoints

Timer 5 Setup

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	N/A [-]		
Default value	N/A [-]	Force value	NO
Step	N/A [-]		
Comm object	10974	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Timer 5 Function (page 373) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 5. See Exercise Timers (page 123) for step by step manual.			

 [back to List of setpoints](#)

Subgroup: Timer 6

Timer 6 Function

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	Disabled / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	Force value	YES
Step	[-]		
Comm object	15363	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint defines and enables the function of the Timer 6. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint Timer 6 Setup (page 376).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 6 (PAGE 574) is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.</p>			
IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.			
IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.			
Disabled	The Timer is disabled.		
Manual On	The Timer is disabled but his binary output is activated (can be used for testing purposes).		
No Func	There is no any other function, only binary output of the Timer is activated once the condition is fulfilled.		
Mode OFF	The binary output of the Timer is internally connected to the Remote OFF binary input.		
TEST	The binary output of the Timer is internally connected to the binary input Remote TEST.		
TEST OnLd	The binary output of the Timer is internally connected to the Remote TEST On Load binary input.		
MFail Blk	The binary output of the Timer is internally connected to the Mains Fail Block binary input.		

🔍 back to List of setpoints

Timer 6 Setup

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	N/A [-]		
Default value	N/A [-]	Force value	NO
Step	N/A [-]		
Comm object	10975	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if Timer 6 Function (page 375) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 6. See Exercise Timers (page 123) for step by step manual.			

[back to List of setpoints](#)

Group: Plug-In Modules

Subgroup: Slot A

Slot A

Setpoint group	Plug-In Modules	Related FW	1.0.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	Force value	NO
Step	[-]		
Comm object	24280	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enable or disable module in slot A.			

[back to List of setpoints](#)

Subgroup: Slot B

Slot B

Setpoint group	Plug-In Modules	Related FW	1.0.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	Force value	NO
Step	[-]		
Comm object	24279	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enable or disable module in slot B.			

[◀ back to List of setpoints](#)

Group: Ethernet

Subgroup: TCP/IP Settings

IP Address Mode

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	Manual / Automatic / Disabled [-]		
Default value	Automatic	Force value	NO
Step	[-]		
Comm object	24259	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to select the method how the ethernet connection is adjusted on Communication peripherals (page 17) .			
Manual:	The Ethernet connection is fixed by means of the setpoints. 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 settings is obtained automatically from the DHCP server. The obtained settings is shown in related values. If the process of obtaining the settings from the DHCP server is not successful, the values 000.000.000.000 are shown.		
Disabled:	The Ethernet terminal is disabled.		
IMPORTANT: When the mode is switched from Automatic to Manual the TCP/IP settings will be changed to the values in the related setpoints. In case you are using Ethernet 2 to connect the CU you will be disconnected. Turn off the setpoint hiding function to manually change the TCP/IP settings to same values obtained via DHCP so you will not be disconnected when changing mode.			

[◀ back to List of setpoints](#)

DNS Mode

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	Manual / Automatic [-]		
Default value	Automatic	Force value	
Step	[-]		
Comm object	24101	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if IP Address Mode (page 377) = Automatic		
Description			
This setpoint enables to enter DNS server addresses for Communication peripherals (page 17) manually, even with the IP Address Mode (page 377) set to Automatic.			
Automatic:	DNS server addresses are automatically obtained from a DHCP server.		
Manual:	IP address 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		

[back to List of setpoints](#)

IP Firewall

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0				
Range [units]	Disabled / Enabled [-]						
Default value	Disabled	Force value	NO				
Step	[-]						
Comm object	24092	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoints enables or disables the built-in Firewall (page 130) functionality for Communication peripherals (page 17) .							
<table><tr><td>Disabled:</td><td>The firewall function is switched off</td></tr><tr><td>Enabled:</td><td>The firewall function is switched on.</td></tr></table>				Disabled:	The firewall function is switched off	Enabled:	The firewall function is switched on.
Disabled:	The firewall function is switched off						
Enabled:	The firewall function is switched on.						
IMPORTANT: Loss of connection can happen when enabling the firewall and using remote connection via Internet							

[back to List of setpoints](#)

Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	24365	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables AirGate connection (page 63) function.			

[◀ back to List of setpoints](#)

AirGate Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	global.airgate.link	Force value	NO
Step	[-]		
Comm object	24364	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
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.			

[◀ back to List of setpoints](#)

AirGate Port

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 65535 [-]		
Default value	54440 [-]	Force value	NO
Step	1 [-]		
Comm object	24096	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This port is used for TCP communication with the AirGate server.			
Note: Use port 5440 for standard ComAp AirGate service.			

[back to List of setpoints](#)

Subgroup: ComAp Client Settings

ComAp Client Inactivity Timeout

Setpoint group	EthernetCM- EthernetCM-4G- GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 65535 [s]		
Default value	60 s	Force value	YES
Step	1 s		
Comm object	24098	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. IntelliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

[back to List of setpoints](#)

Direct Connection

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	24099	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enable/disable direct connection of a ComAp client (e.g. IntelliConfig) to the IP address of the controller.			
Note: For Direct connection the controller IP address must be reachable from the client IP address.			

[back to List of setpoints](#)

Direct Connection Port

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	0 .. 65535 [-]		
Default value	23 [-]	Force value	NO
Step	1 [-]		
Comm object	24374	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This port is used to listen for an incoming TCP connection on Communication peripherals (page 17) .			

[back to List of setpoints](#)

Subgroup: Modbus Server Settings

Modbus Server

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	24337	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enables or disables Modbus communication via Communication peripherals (page 17) .			

◀ back to List of setpoints

Modbus Client Inactivity Timeout

Setpoint group	Ethernet CM-Ethernet ETH Interface 3 - Modbus	Related FW	1.0.0
Range [units]	0 .. 65535 [s]		
Default value	60 s	Force value	NO
Step	1 s		
Comm object	24097	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time.			
Note: This setpoint is shared with other Modbus Client Inactivity Timeout setpoints.			

◀ back to List of setpoints

Subgroup: SNMP Settings

SNMP Agent

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Disabled / SNMP v1/v2c / SNMP v3 [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	24336	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoints Enables or disables Simple Network Management Protocol (SNMP) Agent.			
Note: <i>SNMP v3 has upgraded encryption, remote configuration, and security (extra setpoints are available).</i>			
Note: <i>It is supported only User-Based security model (USM, RFC-3414). View-based Access Control Model (VACM, RFC-3415) is not supported.</i>			

[back to List of setpoints](#)

SNMP Traps IP Address 1

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	0 .. 63 characters [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24095	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 383) != Disabled		
Description			
IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

[back to List of setpoints](#)

SNMP Traps IP Address 2

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24094	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 383) != Disabled		
Description			
IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

[back to List of setpoints](#)

Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	global.airgate.link:9925	Force value	NO
Step	[-]		
Comm object	24093	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) and port number (e.g. :9925) of the SMTP server. Ask your internet provider or IT manager for this information.</p>			
<p>Example: Enter the IP address "74.125.39.109" and port number "9925" as "74.125.39.109:9925".</p>			
<p>Note: You may use also any public SMTP server which does not require connection over SSL/TLS channels.</p>			

[back to List of setpoints](#)

SMTP Sender Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23878	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
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.			
<i>Note: It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i>			
IMPORTANT: This item is obligatory when emails are configured.			

[back to List of setpoints](#)

SMTP User Name

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23877	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

[back to List of setpoints](#)

SMTP User Password

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23876	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

[back to List of setpoints](#)

SMTP Encryption

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	NONE / SSL/TLS / STARTTLS [-]		
Default value	NONE	Force value	NO
Step	[-]		
Comm object	24076	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects encryption type for SMTP session.			
NONE	Session is without of any encryption.		
SSL/TLS	Encrypted channel is created first and only after that session is created.		
STARTTLS	Session is created without of encryption and after command STARTTLS it is switched to encrypted session.		

[back to List of setpoints](#)

E-mail Address 1

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24298	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

🔍 back to List of setpoints

E-mail Address 2

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24297	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

🔍 back to List of setpoints

E-mail Address 3

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24145	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

🔍 back to List of setpoints

E-mail Address 4

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24144	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

Subgroup: Messages Settings

E-mail/SMS Language

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Depends on controller's supported languages. [-]		
Default value	English	Force value	NO
Step	[-]		
Comm object	24299	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to set the language of Event, Warning, etc. e-mails.			

[back to List of setpoints](#)

Event Message

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	10926	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Event Messages.			

[back to List of setpoints](#)

MPR Message

Setpoint group	CM-Ethernet CM-4G-GPS Ethernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	8484	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Mains Protection Messages.			

[back to List of setpoints](#)

Stp Message

Setpoint group	CM-4G-GPS Ethernet	Related FW	1.0.0
Range [units]	Enabled/Disabled		
Default value	Enabled	Force value	
Step	[-]		
Comm object	8485	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Description			

[back to List of setpoints](#)

Wrn Message

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	8482	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Warning Messages.			

[back to List of setpoints](#)

Subgroup: RTC Synchronization

NTP Clock Synchronization

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	24075	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to enable/disable synchronization of the controller's time with the exact time from a NTP server.			

[back to List of setpoints](#)

NTP Server

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	0 .. 63 characters [-]		
Default value	pool.ntp.org	Force value	NO
Step	[-]		
Comm object	24074	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
NTP server address for time synchronization.			
Note: Only valid IP address or domain can be inserted.			

[back to List of setpoints](#)

Time Zone

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00	Force value	NO
Step	[-]		
Comm object	24366	Related applications	MCB, MGCB
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: <i>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.</i>			

[back to List of setpoints](#)

Group: CM-RS232-485

Subgroup: COM1 Setting

COM1 Mode

Setpoint group	CM-RS232-485	Related FW	1.0.0								
Range [units]	Direct / MODBUS / DualSlave / Dual Master [-]										
Default value	Direct	Force value	NO								
Step	[-]										
Comm object	24522	Related applications	MCB, MGCB								
Config level	Standard										
Setpoint visibility	Only if relevant module is installed										
Description											
Communication protocol switch for the COM1 channel.											
<table><tr><td>Direct</td><td>InteliConfig communication protocol via serial cable.</td></tr><tr><td>MODBUS</td><td>MODBUS protocol.</td></tr><tr><td>DualSlave</td><td>Dual operation protocol – slave function</td></tr><tr><td>DualMaster</td><td>Dual operation protocol – master function</td></tr></table>				Direct	InteliConfig communication protocol via serial cable.	MODBUS	MODBUS protocol.	DualSlave	Dual operation protocol – slave function	DualMaster	Dual operation protocol – master function
Direct	InteliConfig communication protocol via serial cable.										
MODBUS	MODBUS protocol.										
DualSlave	Dual operation protocol – slave function										
DualMaster	Dual operation protocol – master function										

[back to List of setpoints](#)

COM1 Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	Force value	NO
Step	[-]		
Comm object	24341	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM1 Mode (page 391)		
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.			

[back to List of setpoints](#)

COM1 Modbus Mode

Setpoint group	CM-RS232-485	Related FW	1.0.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	Force value	NO
Step	[-]		
Comm object	23867	Related applications	MCB, MGCB
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		

[back to List of setpoints](#)

COM1 MODBUS Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	Force value	NO
Step	[-]		
Comm object	24477	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM1 Mode (page 391)		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

[back to List of setpoints](#)

Subgroup: COM2 Setting

COM2 Mode

Setpoint group	CM-RS232-485	Related FW	1.0.0								
Range [units]	Direct / MODBUS / DualSlave / Dual Master [-]										
Default value	Direct	Force value	NO								
Step	[-]										
Comm object	24451	Related applications	MCB, MGCB								
Config level	Standard										
Setpoint visibility	Only if relevant module is installed										
Description											
Communication protocol switch for the COM2 channel.											
<table><tr><td>Direct</td><td>InteliConfig communication protocol via serial cable.</td></tr><tr><td>MODBUS</td><td>MODBUS protocol.</td></tr><tr><td>DualSlave</td><td>Dual operation protocol – slave function</td></tr><tr><td>DualMaster</td><td>Dual operation protocol – master function</td></tr></table>				Direct	InteliConfig communication protocol via serial cable.	MODBUS	MODBUS protocol.	DualSlave	Dual operation protocol – slave function	DualMaster	Dual operation protocol – master function
Direct	InteliConfig communication protocol via serial cable.										
MODBUS	MODBUS protocol.										
DualSlave	Dual operation protocol – slave function										
DualMaster	Dual operation protocol – master function										

[back to List of setpoints](#)

COM2 Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	57600 bps	Force value	NO
Step	[-]		
Comm object	24340	Related applications	MCB, MGCB
Config level	Standard		

Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM2 Mode (page 393)
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.	

[◀ back to List of setpoints](#)

COM2 Modbus Mode

Setpoint group	CM-RS232-485	Related FW	1.0.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	Force value	NO
Step	[-]		
Comm object	23866	Related applications	MCB, MGCB
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		

[◀ back to List of setpoints](#)

COM2 MODBUS Communication Speed

Setpoint group	CM-RS232-485	Related FW	1.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	Force value	NO
Step	[-]		
Comm object	24420	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM2 Mode (page 393)		
Description			
If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here.			

[◀ back to List of setpoints](#)

Group: CM-4G-GPS

Subgroup: Cellular Interface

Internet Connection

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	24315	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjust the communication mode of module.			

[back to List of setpoints](#)

Network Mode

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	2G / 3G / 4G / Automatic [-]		
Default value	Automatic	Force value	NO
Step	[-]		
Comm object	24132	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts preferred connection type of CM-4G-GPS module.			

[back to List of setpoints](#)

Access Point Name

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	internet	Force value	NO
Step	[-]		
Comm object	24363	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
Description			
APN (Access Point Name) of the network, provided by GSM operator.			

[back to List of setpoints](#)

Connection Check IP1

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	"empty"	Force value	NO
Step	[-]		
Comm object	23978	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
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			

[🔍 back to List of setpoints](#)

Connection Check IP2

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	"empty"	Force value	NO
Step	[-]		
Comm object	23977	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
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			

[⬅ back to List of setpoints](#)

Connection Check IP3

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	"empty"	Force value	NO
Step	[-]		
Comm object	23976	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
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			

 [back to List of setpoints](#)

Subgroup: TCP/IP Settings

DNS Mode

Setpoint group	CM-4G-GPS	Related FW	1.0.0				
Range [units]	Automatic / Manual [-]						
Default value	Automatic	Force value	NO				
Step	[-]						
Comm object	23988	Related applications	MCB, MGCB				
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 395) set to Automatic.							
<table><tr><td>Automatic</td><td>DNS server addresses automatically obtained from a DHCP server are used</td></tr><tr><td>Manual</td><td>DNS IP Address 1 (page 399) and DNS IP Address 2 (page 400) 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</td></tr></table>				Automatic	DNS server addresses automatically obtained from a DHCP server are used	Manual	DNS IP Address 1 (page 399) and DNS IP Address 2 (page 400) 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
Automatic	DNS server addresses automatically obtained from a DHCP server are used						
Manual	DNS IP Address 1 (page 399) and DNS IP Address 2 (page 400) 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						

[back to List of setpoints](#)

DNS IP Address 1

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	24314	Related applications	MCB, MGCB
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 399) 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 399) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

[back to List of setpoints](#)

DNS IP Address 2

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	23986	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
The setpoint is used to select the method how the DNS Address 2 is adjusted.			
If DNS Mode (page 399) is FIXED this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.			
If DNS Mode (page 399) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

[back to List of setpoints](#)

IP Firewall

Setpoint group	CM-4G-GPS	Related FW	1.0.0				
Range [units]	ENABLED / DISABLED [-]						
Default value	DISABLED	Force value	NO				
Step	[-]						
Comm object	23959	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Only if relevant module is installed						
Description							
This setpoints enables to switch on the built-in Firewall functionality.							
<table><tr><td>DISABLED</td><td>The firewall function is switched off</td></tr><tr><td>ENABLED</td><td>The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others – Firewall)</td></tr></table>				DISABLED	The firewall function is switched off	ENABLED	The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others – Firewall)
DISABLED	The firewall function is switched off						
ENABLED	The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others – Firewall)						

[back to List of setpoints](#)

Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Disabled/ Enabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23968	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
Description			
This setpoint enable or disable AirGate connection via CM-4G-GPS.			
DISABLED:	Only SMS are sent. Internet-enabled SIM card is not required. AirGate is not used.		
ENABLED	This mode uses the "AirGate" service. Internet-enabled SIM card must be used. The AirGate server address is adjusted by the setpoint AirGate Address (page 419) .		
IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.			

🔍 back to List of setpoints

AirGate Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	global.airgate.link	Force value	NO
Step	[-]		
Comm object	24364	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
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.			

🔍 back to List of setpoints

Airgate Port

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	1 .. 65535 [-]		
Default value	54440	Force value	NO
Step	1		
Comm object	24091	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
Description			
This port is used for TCP communication with the AirGate server.			
Note: Use port 54440 for standard ComAp AirGate service.			

🔍 back to List of setpoints

Subgroup: ComAp Client Settings

Direct Connection

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23961	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this to enable/disable direct connection of a ComAp client (e.g. IntelliConfig) to the IP address of the controller.			
Note: For Direct connection the controller IP address must be reachable from the client IP address.			

🔍 back to List of setpoints

Direct Connection Port

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	1 .. 65535 [-]		
Default value	23	Force value	NO
Step	[-]		
Comm object	23960	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

[⬅ back to List of setpoints](#)

ComAp Client Inactivity Timeout

Setpoint group	EthernetCM- EthernetCM-4G- GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 65535 [s]		
Default value	60 s	Force value	YES
Step	1 s		
Comm object	24098	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. IntelliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

[⬅ back to List of setpoints](#)

Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	global.airgate.link:9925	Force value	NO
Step	[-]		
Comm object	24093	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) and port number (e.g. :9925) of the SMTP server. Ask your internet provider or IT manager for this information.</p> <p>Example: Enter the IP address "74.125.39.109" and port number "9925" as "74.125.39.109:9925".</p> <p>Note: You may use also any public SMTP server which does not require connection over SSL/TLS channels.</p>			

[back to List of setpoints](#)

SMTP Sender Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23878	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
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: <i>It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i>			
IMPORTANT: This item is obligatory when emails are configured.			

[back to List of setpoints](#)

SMTP User Name

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23877	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

[◀ back to List of setpoints](#)

SMTP User Password

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23876	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

[◀ back to List of setpoints](#)

SMTP Encryption

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	NONE / SSL/TLS / STARTTLS [-]		
Default value	NONE	Force value	NO
Step	[-]		
Comm object	24076	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects encryption type for SMTP session.			
NONE	Session is without of any encryption.		
SSL/TLS	Encrypted channel is created first and only after that session is created.		
STARTTLS	Session is created without of encryption and after command STARTTLS it is switched to encrypted session.		

[back to List of setpoints](#)

E-mail Address 1

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24298	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

E-mail Address 2

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24297	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

E-mail Address 3

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24145	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

E-mail Address 4

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24144	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

Subgroup: Messages Settings

Telephone Number 1

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24296	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

🔍 back to List of setpoints

Telephone Number 2

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24295	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

🔍 back to List of setpoints

Telephone Number 3

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24143	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

[back to List of setpoints](#)

Telephone Number 4

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24142	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

[back to List of setpoints](#)

E-mail/SMS Language

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Depends on controller's supported languages. [-]		
Default value	English	Force value	NO
Step	[-]		
Comm object	24299	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to set the language of Event, Warning, etc. e-mails.			

[back to List of setpoints](#)

Event Message

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	10926	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Event Messages.			

[back to List of setpoints](#)

MPR Message

Setpoint group	CM-Ethernet CM-4G-GPS Ethernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	8484	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Mains Protection Messages.			

[back to List of setpoints](#)

Wrn Message

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	8482	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Warning Messages.			

[back to List of setpoints](#)

Subgroup: GPS Settings

GPS Tracking

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23975	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
Description			
If GPS tracking is enabled the module sends position/speed data to the controller with period 10 s.			

[back to List of setpoints](#)

Subgroup: RTC Synchronization

NTP Clock Sync

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	23964	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server. The period of synchronization is 1 hour or when the cotnroller is reset or when the setpoint is reset (Enabled->Disabled->Enabled).			

[◀ back to List of setpoints](#)

NTP Server

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	pool.ntp.org	Force value	NO
Step	[-]		
Comm object	23963	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

[◀ back to List of setpoints](#)

GPS Clock Sync

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23974	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 395)		
Description			
This setpoint is used to enable/disable synchronization of the controller's time with the exact time from GPS.			
The module sends UTC timestamp to the controller after reset/power on and then in period of 60 minutes.			

[⬅ back to List of setpoints](#)

Time Zone

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00	Force value	NO
Step	[-]		
Comm object	24366	Related applications	MCB, MGCB
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: <i>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.</i>			

[⬅ back to List of setpoints](#)

Group: CM-Ethernet

Subgroup: TCP/IP Settings

IP Address Mode

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	MANUAL / AUTOMATIC / DISABLED [-]		
Default value	AUTOMATIC	Force value	NO
Step	[-]		
Comm object	23939	Related applications	MCB, MGCB
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 <u>IP Addr</u> , <u>NetMask</u> , <u>GateIP</u> , <u>DNS IP Address</u> . This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).		
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.		

 [back to List of setpoints](#)

IP Address

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	0 .. 15 characters [-]		
Default value	192.168.1.254	Force value	NO
Step	[-]		
Comm object	23950	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint IP Address Mode (page 414)		
Description			
<p>The setpoint is used to set the address when you are in static mode .</p> <p>If IP Address Mode (page 414) 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.</p> <p>If IP Address Mode (page 414) is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.</p> <p>If IP Address Mode (page 414) is DISABLED Ethernet terminal is disabled.</p> <p>Note: Only valid IP address can be inserted.</p>			

[back to List of setpoints](#)

Subnet Mask

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	Force value	NO
Step	[-]		
Comm object	23949	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint IP Address Mode (page 414)		
Description			
The setpoint is used to select the method how the Subnet Mask is adjusted.			
If IP Address Mode (page 414) 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 414) is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.			
If IP Address Mode (page 414) is DISABLED Ethernet terminal is disabled.			

[back to List of setpoints](#)

Gateway IP

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	Force value	NO
Step	[-]		
Comm object	23948	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint IP Address Mode (page 414)		
Description			
<p>The setpoint is used to select the method how the Gateway IP is adjusted.</p> <p>If IP Address Mode (page 414) is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.</p> <p>If IP Address Mode (page 414) is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.</p> <p>If IP Address Mode (page 414) is DISABLED Ethernet terminal is disabled.</p> <p>A gateway is a device which connects the respective segment with the other segments and/or Internet.</p>			

[back to List of setpoints](#)

DNS Mode

Setpoint group	CM-Ethernet	Related FW	1.0.0				
Range [units]	Automatic / Manual [-]						
Default value	Automatic	Force value	NO				
Step	[-]						
Comm object	23921	Related applications	MCB, MGCB				
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 414) set to Automatic.							
<table><tr><td>Automatic</td><td>DNS server addresses automatically obtained from a DHCP server are used</td></tr><tr><td>Manual</td><td>DNS IP Address 1 (page 417) and DNS IP Address 2 (page 417) 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</td></tr></table>				Automatic	DNS server addresses automatically obtained from a DHCP server are used	Manual	DNS IP Address 1 (page 417) and DNS IP Address 2 (page 417) 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
Automatic	DNS server addresses automatically obtained from a DHCP server are used						
Manual	DNS IP Address 1 (page 417) and DNS IP Address 2 (page 417) 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						

[back to List of setpoints](#)

DNS IP Address 1

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	23947	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
<p>The setpoint is used to select the method how the DNS Address 1 is adjusted .</p> <p>If IP Address Mode (page 414) 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.</p> <p>If IP Address Mode (page 414) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.</p> <p>If IP Address Mode (page 414) is DISABLED Ethernet terminal is disabled.</p>			

[back to List of setpoints](#)

DNS IP Address 2

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	23946	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
The setpoint is used to select the method how the DNS Address 2 is adjusted.			
If IP Address Mode (page 414) 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 414) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			
If IP Address Mode (page 414) is DISABLED Ethernet terminal is disabled.			

[back to List of setpoints](#)

IP Firewall

Setpoint group	CM-Ethernet	Related FW	1.0.0				
Range [units]	ENABLED / DISABLED [-]						
Default value	DISABLED	Force value	NO				
Step	[-]						
Comm object	23920	Related applications	MCB, MGCB				
Config level	Standard						
Setpoint visibility	Only if relevant module is installed						
Description							
This setpoints enables to switch on the built-in Firewall functionality.							
<table><tr><td>DISABLED</td><td>The firewall function is switched off</td></tr><tr><td>ENABLED</td><td>The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others – Firewall)</td></tr></table>				DISABLED	The firewall function is switched off	ENABLED	The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others – Firewall)
DISABLED	The firewall function is switched off						
ENABLED	The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others – Firewall)						

[back to List of setpoints](#)

Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	24365	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables AirGate connection (page 63) function.			

[back to List of setpoints](#)

AirGate Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	global.airgate.link	Force value	NO
Step	[-]		
Comm object	24364	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
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.			

[back to List of setpoints](#)

AirGate Port

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 65535 [-]		
Default value	54440 [-]	Force value	NO
Step	1 [-]		
Comm object	24096	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This port is used for TCP communication with the AirGate server.			
Note: Use port 5440 for standard ComAp AirGate service.			

[back to List of setpoints](#)

Subgroup: ComAp Client Settings

Direct Connection

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23961	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this to enable/disable direct connection of a ComAp client (e.g. IntelliConfig) to the IP address of the controller.			
Note: For Direct connection the controller IP address must be reachable from the client IP address.			

[⬅ back to List of setpoints](#)

Direct Connection Port

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	1 .. 65535 [-]		
Default value	23	Force value	NO
Step	[-]		
Comm object	23960	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

[⬅ back to List of setpoints](#)

ComAp Client Inactivity Timeout

Setpoint group	EthernetCM- EthernetCM-4G- GPSEthernet	Related FW	1.0.0
Range [units]	0 .. 65535 [s]		
Default value	60 s	Force value	YES
Step	1 s		
Comm object	24098	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. IntelliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

[⬅ back to List of setpoints](#)

Subgroup: MODBUS Settings

MODBUS Server

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	23937	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable Modbus communication via ethernet interface.			

[⬅ back to List of setpoints](#)

MODBUS Client Inactivity Timeout

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	0 .. 600 [s]		
Default value	60 s	Force value	NO
Step	1 s		
Comm object	24097	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time.			

[back to List of setpoints](#)

Subgroup: SNMP Settings

SNMP Agent

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	23936	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable SNMP Agent.			

[back to List of setpoints](#)

SNMP Trap Format

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	v1Trap / v2Notif / v2Inform [-]		
Default value	v1Trap	Force value	NO
Step	[-]		
Comm object	23922	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts type of SNMP traps.			

[back to List of setpoints](#)

SNMP Traps IP Address 1

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	0 .. 63 characters [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24095	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 383) != Disabled		
Description			
IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

[back to List of setpoints](#)

SNMP Traps IP Address 2

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24094	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 383) != Disabled		
Description			
IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

[back to List of setpoints](#)

SNMP RD Community String

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	public	Force value	NO
Step	[-]		
Comm object	24335	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 383) != Disabled		
Description			
SNMP Community String only for reading.			

[back to List of setpoints](#)

SNMP WR Community String

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	private	Force value	NO
Step	[-]		
Comm object	24334	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 383) = SNMP v1/v2c		
Description			
SNMP Community String for writing and reading.			

[back to List of setpoints](#)

Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	global.airgate.link:9925	Force value	NO
Step	[-]		
Comm object	24093	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
<p>This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) and port number (e.g. :9925) of the SMTP server. Ask your internet provider or IT manager for this information.</p> <p>Example: Enter the IP address "74.125.39.109" and port number "9925" as "74.125.39.109:9925".</p> <p>Note: You may use also any public SMTP server which does not require connection over SSL/TLS channels.</p>			

[back to List of setpoints](#)

SMTP Sender Address

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23878	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
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: <i>It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i>			
IMPORTANT: This item is obligatory when emails are configured.			

[back to List of setpoints](#)

SMTP User Name

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23877	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

[back to List of setpoints](#)

SMTP User Password

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	23876	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

[back to List of setpoints](#)

SMTP Encryption

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	NONE / SSL/TLS / STARTTLS [-]		
Default value	NONE	Force value	NO
Step	[-]		
Comm object	24076	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects encryption type for SMTP session.			
NONE	Session is without of any encryption.		
SSL/TLS	Encrypted channel is created first and only after that session is created.		
STARTTLS	Session is created without of encryption and after command STARTTLS it is switched to encrypted session.		

[back to List of setpoints](#)

E-mail Address 1

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24298	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

E-mail Address 2

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24297	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)


E-mail Address 3

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24145	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

[back to List of setpoints](#)

E-mail Address 4


Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24144	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

 [back to List of setpoints](#)

Subgroup: Messages Settings

Telephone Number 1

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24296	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

 [back to List of setpoints](#)

Telephone Number 2

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24295	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

[back to List of setpoints](#)

Telephone Number 3

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24143	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

[back to List of setpoints](#)

Telephone Number 4

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	Force value	NO
Step	[-]		
Comm object	24142	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	(missing or bad snippet)		
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.			

[back to List of setpoints](#)

E-mail/SMS Language

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Depends on controller's supported languages. [-]		
Default value	English	Force value	NO
Step	[-]		
Comm object	24299	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to set the language of Event, Warning, etc. e-mails.			

[back to List of setpoints](#)

Event Message

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	10926	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Event Messages.			

[back to List of setpoints](#)

MPR Message

Setpoint group	CM-Ethernet CM-4G-GPS Ethernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	8484	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Mains Protection Messages.			

[back to List of setpoints](#)

Wrn Message

Setpoint group	CM-EthernetCM-4G-GPSEthernet	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	YES
Step	[-]		
Comm object	8482	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Warning Messages.			

[back to List of setpoints](#)

NTP Server

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	0 .. 63 characters [-]		
Default value	pool.ntp.org	Force value	NO
Step	[-]		
Comm object	24074	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
NTP server address for time synchronization.			
<i>Note: Only valid IP address or domain can be inserted.</i>			

[back to List of setpoints](#)

NTP Clock Synchronization

Setpoint group	CM-Ethernet Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	Force value	NO
Step	[-]		
Comm object	24075	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to enable/disable synchronization of the controller's time with the exact time from a NTP server.			

[back to List of setpoints](#)

NTP Server

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	[-]		
Default value	pool.ntp.org	Force value	NO
Step	[-]		
Comm object	23933	Related applications	MCB, MGCB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

[back to List of setpoints](#)

Time Zone

Setpoint group	Scheduler	Related FW	1.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00	Force value	NO
Step	[-]		
Comm object	24366	Related applications	MCB, MGCB
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: <i>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.</i>			

 [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 full list of values go to the chapter **List of values (page 435)**

Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- The value is not being evaluated in the scope of the current application and configuration.
- Sensor fail has been detected on an analog input.
- The configured ECU or extension module does not provide the particular value.
- The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as “####” in IntelliConfig and on the controller screen. If such a value is read out via MODBUS, it will contain the data 32768 in the case of signed values and 65535 in the case of unsigned values.

List of group of values

Group: Mains	439
Group: Load	449
Group: Gen-sets	451
Group: Bus	458
Group: Power Management	460
Group: Load Control	465
Group: PF Control	466
Group: Control Loops	467
Group: Controller I/O	468
Group: Statistics	469
Group: Info	472
Group: User Buttons	477
Group: Log Bout	477
Group: Plug-in	479
Group: Plug-In I/O	480
Group: CM-4G-GPS	488
Group: CM-Ethernet	492
Group: Ethernet	495
Group: Date/Time	501
Group: PLC	502
Group: SH Modules	526

List of values

Group: Mains	439	Mains Current L1	447	Gen-set 21 Power	455
Mains Import P	439	Mains Current L2	447	Gen-set 22 Power	455
Mains Import P L1	439	Mains Current L3	447	Gen-set 23 Power	455
Mains Import P L2	439	Mains Current Unbalance	447	Gen-set 24 Power	455
Mains Import P L3	439	Slip Frequency	448	Gen-set 25 Power	455
Mains Import Q	439	Slip Angle	448	Gen-set 26 Power	456
Mains Import Q L1	440	Max Vector Shift	448	Gen-set 27 Power	456
Mains Import Q L2	440	ROCOF	448	Gen-set 28 Power	456
Mains Import Q L3	440	Max ROCOF	449	Gen-set 29 Power	456
Mains Import S	440	Group: Load	449	Gen-set 30 Power	456
Mains Import S L1	440	Load P	449	Gen-set 31 Power	457
Mains Import S L2	441	Load Q	449	Gen-set 32 Power	457
Mains Import S L3	441	Load PF	450	Group: Bus	458
Mains Power Factor	441	Load Character	450	Bus Frequency	458
Mains Load Character	441	Aux Current	450	Bus Voltage L1-N	458
Mains Power Factor L1	442	Aux Power	450	Bus Voltage L2-N	458
Mains Power Factor L2	442	Group: Gen-sets	451	Bus Voltage L3-N	458
Mains Power Factor L3	442	Gen-set 1 Power	451	Bus Voltage L1-L2	458
Mains Load Character L1	442	Gen-set 2 Power	451	Bus Voltage L2-L3	459
Mains Load Character L2	443	Gen-set 3 Power	451	Bus Voltage L3-L1	459
Mains Load Character L3	443	Gen-set 4 Power	451	Bus Voltage	459
Mains Voltage THD L1	443	Gen-set 5 Power	451	Bus Voltage THD L1	459
Mains Voltage THD L2	443	Gen-set 6 Power	452	Bus Voltage THD L2	459
Mains Voltage THD L3	444	Gen-set 7 Power	452	Bus Voltage THD L3	460
Mains Current THD L1	444	Gen-set 8 Power	452	Bus V Unbalance Ph-N	460
Mains Current THD L2	444	Gen-set 9 Power	452	Bus V Unbalance Ph-Ph	460
Mains Current THD L3	444	Gen-set 10 Power	452	Group: Power Management	460
Mains Frequency	444	Gen-set 11 Power	453	Actual Reserve	460
Mains Voltage L1-N	445	Gen-set 12 Power	453	Actual Reserve	461
Mains Voltage L2-N	445	Gen-set 13 Power	453	Stop Reserve	461
Mains Voltage L3-N	445	Gen-set 14 Power	453	Dynamic Spinning	
Mains Voltage L1-L2	445	Gen-set 15 Power	453	Reserve	461
Mains Voltage L2-L3	445	Gen-set 16 Power	454	Dynamic Spinning	
Mains Voltage L3-L1	446	Gen-set 17 Power	454	Reserve Offset	461
Mains Voltage	446	Gen-set 18 Power	454	Total Running P	462
Mains V Unabalance Ph-N	446	Gen-set 19 Power	454	Total Running Q	462
Mains V Unbalance Ph-Ph	446	Gen-set 20 Power	454	Total Running S	462

Total Running Power Factor	462	Mains kWh Imported	471	Group: Plug-In I/O	480
Total Running Load Character	462	Mains kVarh Imported	471	EM Analog Input A 1	480
Total Running Samax	463	Pulse Counter 1	471	EM Analog Input A 2	480
Running Nominal Power In PM	463	Pulse Counter 2	471	EM Analog Input A 3	480
Running Nominal Power Of All	463	Group: Info	472	EM Analog Input A 4	481
Available Nominal Power In PM	463	Application Mode	472	EM Analog Input A 5	481
Minimal Running Power	464	Controller Mode	472	EM Analog Input A 6	481
Actual Relative Reserve	464	Load Shedding Status	472	EM Analog Input A 7	481
Start Relative Reserve	464	Breaker state	473	EM Analog Input A 8	482
Stop Relative Reserve	464	Timer Text	473	EM Analog Input A 9	482
Actual Power Band	465	Connection Type	473	EM Analog Input A 10	482
Next Power Band	465	Timer Value	473	EM Analog Input A 11	482
Group: Load Control	465	ID String	473	EM Analog Input A 12	483
Required P Target	465	FW Version	474	EM Analog Input A 13	483
Required P	466	Application	474	EM Analog Input A 14	483
System Load Control	466	FW Branch	474	EM Analog Input A 15	483
Group: PF Control	466	Forced Value Status	474	EM Analog Input A 16	484
System PF/Q Control	466	SPI Module A	474	EM Analog Input B 1	484
Required Q	467	SPI Module B	475	EM Analog Input B 2	484
Required Qrel	467	CAN16	475	EM Analog Input B 3	484
Required PF	467	CAN32	475	EM Analog Input B 4	485
Required PF Character	467	Reg16	476	EM Analog Input B 5	485
Group: Control Loops	467	Reg32	476	EM Analog Input B 6	485
Loadsharing Output	467	Gen Loaded 16	476	EM Analog Input B 7	485
Varsharing Output	468	Gen Loaded 32	477	EM Analog Input B 8	486
Group: Controller I/O	468	Group: User Buttons	477	EM Analog Input B 9	486
Battery Voltage	468	User Buttons	477	EM Analog Input B 10	486
Binary Inputs	468	Group: Log Bout	477	EM Analog Input B 11	486
Binary Outputs	469	Log Bout 1	477	EM Analog Input B 12	487
Group: Statistics	469	Log Bout 2	478	EM Analog Input B 13	487
Sum MWh	469	Log Bout 3	478	EM Analog Input B 14	487
Sum MVAh	469	Log Bout 4	478	EM Analog Input B 15	487
Sum MVAh	470	Log Bout 5	478	EM Analog Input B 16	488
Mains kVAh	470	Log Bout 6	478	Group: CM-4G-GPS	488
Mains kWh Exported	470	Log Bout 7	479	Modem Status	488
Mains kVarh Exported	470	Log Bout 8	479	AirGate Status	488
		Log Bout 9	479	Network Status	488
		Group: Plug-in	479	GPS Status	489
		EM BIO A	479	Signal Strength	489
		EM BIO B	480		

IP Address	489	Group: Date/Time	501	PLC-AOUT 35	508
Secondary DNS	489	Date	501	PLC-AOUT 36	509
Primary DNS	490	Time	501	PLC-AOUT 37	509
AirGate Servicing Node	490	Time Mode	501	PLC-AOUT 38	509
Network Mode	490	Group: PLC	502	PLC-AOUT 39	509
Network Name	490	PLC-AOUT 1	502	PLC-AOUT 40	509
Modem FW Version	491	PLC-AOUT 2	502	PLC-AOUT 41	510
Speed	491	PLC-AOUT 3	502	PLC-AOUT 42	510
Active Satellites	491	PLC-AOUT 4	502	PLC-AOUT 43	510
Longitude	491	PLC-AOUT 5	502	PLC-AOUT 44	510
Latitude	492	PLC-AOUT 6	503	PLC-AOUT 45	510
Last E-mail Result	492	PLC-AOUT 7	503	PLC-AOUT 46	511
AirGate ID	492	PLC-AOUT 8	503	PLC-AOUT 47	511
Group: CM-Ethernet	492	PLC-AOUT 9	503	PLC-AOUT 48	511
AirGate Status	492	PLC-AOUT 10	503	PLC-AOUT 49	511
Ethernet PHY mode	493	PLC-AOUT 11	504	PLC-AOUT 50	511
ETH Interface Status	493	PLC-AOUT 12	504	PLC-AOUT 51	512
AirGate Servicing Node	493	PLC-AOUT 13	504	PLC-AOUT 52	512
Last E-mail Result	493	PLC-AOUT 14	504	PLC-AOUT 53	512
AirGate ID	494	PLC-AOUT 15	504	PLC-AOUT 54	512
Secondary DNS	494	PLC-AOUT 16	505	PLC-AOUT 55	512
Primary DNS	494	PLC-AOUT 17	505	PLC-AOUT 56	513
Current Gateway	494	PLC-AOUT 18	505	PLC-AOUT 57	513
Current Subnet Mask	495	PLC-AOUT 19	505	PLC-AOUT 58	513
Current IP Address	495	PLC-AOUT 20	505	PLC-AOUT 59	513
MAC Address	495	PLC-AOUT 21	506	PLC-AOUT 60	513
Group: Ethernet	495	PLC-AOUT 22	506	PLC-AOUT 61	514
MAC Address	495	PLC-AOUT 23	506	PLC-AOUT 62	514
Ethernet PHY mode	496	PLC-AOUT 24	506	PLC-AOUT 63	514
Current IP Address	496	PLC-AOUT 25	506	PLC-AOUT 64	514
Current Subnet Mask	496	PLC-AOUT 26	507	PLC-BOUT 1	514
Current Gateway	496	PLC-AOUT 27	507	PLC-BOUT 2	515
Primary DNS	497	PLC-AOUT 28	507	PLC-BOUT 3	515
Secondary DNS	497	PLC-AOUT 29	507	PLC-BOUT 4	515
ETH Interface Status	497	PLC-AOUT 30	507	PLC-BOUT 5	515
AirGate Status	498	PLC-AOUT 31	508	PLC-BOUT 6	515
AirGate ID	498	PLC-AOUT 32	508	PLC-BOUT 7	516
AirGate Servicing Node	499	PLC-AOUT 33	508	PLC-BOUT 8	516
Last E-mail Result	500	PLC-AOUT 34	508	PLC-BOUT 9	516

PLC-BOUT 10	516	PLC Resource 4	524
PLC-BOUT 11	516	PLC Resource 5	524
PLC-BOUT 12	517	PLC Resource 6	524
PLC-BOUT 13	517	PLC Resource 7	525
PLC-BOUT 14	517	PLC Resource 8	525
PLC-BOUT 15	517	PLC Resource 9	525
PLC-BOUT 16	517	PLC Resource 10	525
PLC-BOUT 17	518	Group: SH Modules	526
PLC-BOUT 18	518	SHBIN-1	526
PLC-BOUT 19	518	SHBIN-2	526
PLC-BOUT 20	518	SHBIN-3	527
PLC-BOUT 21	518	SHBIN-4	527
PLC-BOUT 22	519	SHBIN-5	528
PLC-BOUT 23	519	SHBIN-6	528
PLC-BOUT 24	519	SHBOUT-1	529
PLC-BOUT 25	519	SHBOUT-2	529
PLC-BOUT 26	519	SHBOUT-3	530
PLC-BOUT 27	520	SHBOUT-4	530
PLC-BOUT 28	520	SHBOUT-5	531
PLC-BOUT 29	520	SHBOUT-6	531
PLC-BOUT 30	520	SHAIN-1 1	532
PLC-BOUT 31	520	SHAIN-1 2	532
PLC-BOUT 32	521	SHAIN-1 3	532
PLC-BOUT 33	521	SHAIN-1 4	532
PLC-BOUT 34	521	SHAIN-2 1	533
PLC-BOUT 35	521	SHAIN-2 2	533
PLC-BOUT 36	521	SHAIN-2 3	533
PLC-BOUT 37	522	SHAIN-2 4	533
PLC-BOUT 38	522		
PLC-BOUT 39	522		
PLC-BOUT 40	522		
PLC-BOUT 41	522		
PLC-BOUT 42	523		
PLC-BOUT 43	523		
PLC-BOUT 44	523		
PLC-BOUT 45	523		
PLC Resource 1	523		
PLC Resource 2	524		
PLC Resource 3	524		

 **back to Controller
objects**

Group: Mains

Mains Import P

Value group	Mains	Related FW	1.0.0
Units	kW		
Comm object	8703	Related applications	MCB, MGCB
Description			
Imported active power [kW] from Mains.			

[back to List of values](#)

Mains Import P L1

Value group	Mains	Related FW	1.0.0
Units	kW		
Comm object	8805	Related applications	MCB, MGCB
Description			
Imported active power [kW] from L1 phase of the Mains.			

[back to List of values](#)

Mains Import P L2

Value group	Mains	Related FW	1.0.0
Units	kW		
Comm object	8806	Related applications	MCB, MGCB
Description			
Imported active power [kW] from L2 phase of the Mains.			

[back to List of values](#)

Mains Import P L3

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8807	Related applications	MCB, MGCB
Description			
Imported active power [kW] from L3 phase of the Mains.			

[back to List of values](#)

Mains Import Q

Value group	Value Group Mains	Related FW	1.0.0
Units	kVAr		
Comm object	8704	Related applications	MCB, MGCB
Description			
Imported reactive power [kVAr] from Mains.			

[back to List of values](#)

Mains Import Q L1

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8808	Related applications	MCB, MGCB
Description			
Imported reactive power [kVAr] from L1 phase of the Mains.			

[back to List of values](#)

Mains Import Q L2

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8809	Related applications	MCB, MGCB
Description			
Imported reactive power [kVAr] from L2 phase of the Mains.			

[back to List of values](#)

Mains Import Q L3

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8810	Related applications	MCB, MGCB
Description			
Imported reactive power [kVAr] from L3 phase of the Mains.			

[back to List of values](#)

Mains Import S

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8811	Related applications	MCB, MGCB
Description			
Imported apparent power [kVA] from Mains.			

[back to List of values](#)

Mains Import S L1

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8812	Related applications	MCB, MGCB
Description			
Imported apparent power [kVA] from L1 phase of the Mains.			

[back to List of values](#)

Mains Import S L2

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8813	Related applications	MCB, MGCB
Description			
Imported apparent power [kVA] from L2 phase of the Mains.			

[back to List of values](#)

Mains Import S L3

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8814	Related applications	MCB, MGCB
Description			
Imported apparent power [kVA] from L3 phase of the Mains.			

[back to List of values](#)

Mains Power Factor

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8705	Related applications	MCB, MGCB
Description			
Power factor of the Mains.			

[back to List of values](#)

Mains Load Character

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8709	Related applications	MCB, MGCB
Description			
Character of Mains load. "L" means inductive load, "C" is capacitive and "R" is resistive load. Load character of the Mains. L = inductive load, C = capacitive load, and R = resistive load.			

[back to List of values](#)

Mains Power Factor L1

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8815	Related applications	MCB, MGCB
Description			
Power factor of the L1 phase of the Mains.			

[back to List of values](#)

Mains Power Factor L2

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8816	Related applications	MCB, MGCB
Description			
Power factor of the L2 phase of the Mains.			

[back to List of values](#)

Mains Power Factor L3

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8817	Related applications	MCB, MGCB
Description			
Power factor of the L3 phase of the Mains.			

[back to List of values](#)

Mains Load Character L1

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8818	Related applications	MCB, MGCB
Description			
Load character of the L1 phase of the Mains.			
L = inductive load, C = capacitive load, and R = resistive load.			

[back to List of values](#)

Mains Load Character L2

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8819	Related applications	MCB, MGCB
Description			
Load character of the L2 phase of the Mains.			
L = inductive load, C = capacitive load, and R = resistive load.			

[back to List of values](#)

Mains Load Character L3

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8820	Related applications	MCB, MGCB
Description			
Load character of the L3 phase of the Mains.			
L = inductive load, C = capacitive load, and R = resistive load.			

[back to List of values](#)

Mains Voltage THD L1

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16060	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) Mains Voltage L1-N (page 445) .			

[back to List of values](#)

Mains Voltage THD L2

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16061	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Mains Voltage L2-N (page 445) .			

[back to List of values](#)

Mains Voltage THD L3

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16062	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Mains Voltage L3-N (page 445) .			

[back to List of values](#)

Mains Current THD L1

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16064	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Mains Current L1 (page 447) .			

[back to List of values](#)

Mains Current THD L2

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16065	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Mains Current L2 (page 447) .			

[back to List of values](#)

Mains Current THD L3

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16066	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Mains Current L3 (page 447) .			

[back to List of values](#)

Mains Frequency

Value group	Value Group Mains	Related FW	1.0.0
Units	Hz		
Comm object	8211	Related applications	MCB, MGCB
Description			
Frequency of Mains.			

[back to List of values](#)

Mains Voltage L1-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	8195	Related applications	MCB, MGCB
Description			
Value of Mains voltage on phase 1.			

[back to List of values](#)

Mains Voltage L2-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	8196	Related applications	MCB, MGCB
Description			
Value of Mains voltage on phase 2.			

[back to List of values](#)

Mains Voltage L3-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	8197	Related applications	MCB, MGCB
Description			
Value of Mains voltage on phase 3.			

[back to List of values](#)

Mains Voltage L1-L2

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	9631	Related applications	MCB, MGCB
Description			
Value of Mains phase to phase voltage between L1 and L2 phases.			

[back to List of values](#)

Mains Voltage L2-L3

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	9632	Related applications	MCB, MGCB
Description			
Value of Mains phase to phase voltage between L2 and L3 phases.			

[back to List of values](#)

Mains Voltage L3-L1

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	9633	Related applications	MCB, MGCB
Description			
Value of Mains phase to phase voltage between L3 and L1 phases.			

🔍 back to List of values

Mains Voltage

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	10666	Related applications	MCB, MGCB
Description			
Average value of all Mains Voltage phases.			

🔍 back to List of values

Mains V Unbalance Ph-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	10549	Related applications	MCB, MGCB
Description			
This value contains the maximum difference of values Mains Voltage L1-N (page 445) , Mains Voltage L2-N (page 445) , Mains Voltage L3-N (page 445) at a given moment.			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 261) .			

🔍 back to List of values

Mains V Unbalance Ph-Ph

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	17337	Related applications	MCB, MGCB
Description			
This value contains the maximum difference of values Mains Voltage L1-L2 (page 445) , Mains Voltage L2-L3 (page 445) , Mains Voltage L3-L1 (page 446) at a given moment.			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 261) .			

🔍 back to List of values

Mains Current L1

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	8801	Related applications	MCB, MGCB
Description			
Current of the L1 phase of the Mains.			

🔍 back to List of values

Mains Current L2

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	8802	Related applications	MCB, MGCB
Description			
Current of the L2 phase of the Mains.			

🔍 back to List of values

Mains Current L3

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	8803	Related applications	MCB, MGCB
Description			
Current of the L3 phase of the Mains.			

🔍 back to List of values

Mains Current Unbalance

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	17338	Related applications	MCB, MGCB
Description			
This value contains the maximum difference of values Mains Current L1 (page 447) , Mains Current L2 (page 447) and Mains Current L3 (page 447) .			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 261).			

🔍 back to List of values

Slip Frequency

Value group	Value Group Bus	Related FW	1.0.0
Units	Hz		
Comm object	8224	Related applications	MCB, MGCB
Description			
Slip frequency during synchronization.			

🔍 back to List of values

Slip Angle

Value group	Value Group Bus	Related FW	1.0.0
Units	°		
Comm object	8225	Related applications	MCB, MGCB
Description			
Slip angle during synchronization.			

🔍 back to List of values

Max Vector Shift

Value group	Value Group Mains	Related FW	1.0.0
Units	°		
Comm object	9847	Related applications	MCB, MGCB
Description			
Maximal measured value of Vector shift (page 137) of the Mains. It is reset to zero always when: <ul style="list-style-type: none"> ➤ Vector Shift Protection (page 305) = Parallel Only - controller goes to parallel to mains operation ➤ Vector Shift Protection (page 305) = Enabled - MCB gets closed 			

🔍 back to List of values

ROCOF

Value group	Value Group Mains	Related FW	1.0.0
Units	Hz/s		
Comm object	9848	Related applications	MCB, MGCB
Description			
This value contains actual rate of change of frequency measured by ROCOF Protection (page 306) . See ROCOF (page 137) for more information.			

🔍 back to List of values

Max ROCOF

Value group	Value Group Mains	Related FW	1.0.0
Units	Hz/s		
Comm object	10049	Related applications	MCB, MGCB
Description			
This value contains maximal rate of change of frequency measured by ROCOF Protection (page 306) since the protection got active.			
See ROCOF (page 137) for more information.			
Setting		Reset of value	
ROCOF Protection (page 306) = Enabled	Vector Shift/ROCOF CB Selector (page 292) = MCB	When MCB closes.	
	Vector Shift/ROCOF CB Selector (page 292) = MGCB	When MGCB closes.	
ROCOF Protection (page 306) = Parallel Only		After entering parallel operation (Breaker state (page 473) = ParalOper)	

🔍 back to List of values

Group: Load

Load P

Value group	Load	Related FW	1.0.0
Units	kW		
Comm object	10601	Related applications	MCB, MGCB
Description			
Load's active power.			
Note: This value can be also switched into one decimal see <i>Power Formats And Units (page 164)</i> .			

🔍 back to List of values

Load Q

Value group	Load	Related FW	1.0.0
Units	kVAr		
Comm object	10644	Related applications	MCB, MGCB
Description			
Load's reactive power.			
Note: This value can be also switched into one decimal see <i>Power Formats And Units (page 164)</i> .			

🔍 back to List of values

Load PF

Load	Load	Related FW	1.0.0
Units	[-]		
Comm object	16158	Related applications	MCB, MGCB
Description			
Load's power factor.			

🔍 back to List of values

Load Character

Value group	Load	Related FW	1.0.0
Units	[-]		
Comm object	9026	Related applications	MCB, MGCB
Description			
Load's character. "L" means inductive load, "C" is capacitive and "R" is resistive load (Load PF (page 450) = 1).			

🔍 back to List of values

Aux Current

Value group	Load	Related FW	1.0.0
Units	A		
Comm object	14996	Related applications	MCB, MGCB
Description			
This Value is product of aux current measurement which is used for calculation of Aux Power (page 450) for needs of Soft Unload function. Auxiliary current is measured either on Loads or System/Gen-sets' bus according to setpoint Soft Unload (page 344) .			

🔍 back to List of values

Aux Power

Value group	Load	Related FW	1.0.0
Units	kW		
Comm object	16899	Related applications	MCB, MGCB
Description			
This Value is calculated from the value Aux Current (page 450) and it is used for needs of Soft Unload function. Auxiliary current is measured either on Loads or System/Gen-sets' bus according to setpoint Soft Unload (page 344) .			

🔍 back to List of values

Group: Gen-sets

Gen-set 1 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10935	Related applications	MCB, MGCB
Description			
Active power of Mains 1.			

[back to List of values](#)

Gen-set 2 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10936	Related applications	MCB, MGCB
Description			
Active power of Mains 2.			

[back to List of values](#)

Gen-set 3 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10937	Related applications	MCB, MGCB
Description			
Active power of Mains 3.			

[back to List of values](#)

Gen-set 4 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10938	Related applications	MCB, MGCB
Description			
Active power of Mains 4.			

[back to List of values](#)

Gen-set 5 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10939	Related applications	MCB, MGCB
Description			
Active power of Mains 5.			

[back to List of values](#)

Gen-set 6 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10940	Related applications	MCB, MGCB
Description			
Active power of Mains 6.			

[back to List of values](#)

Gen-set 7 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10941	Related applications	MCB, MGCB
Description			
Active power of Mains 7.			

[back to List of values](#)

Gen-set 8 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10942	Related applications	MCB, MGCB
Description			
Active power of Mains 8.			

[back to List of values](#)

Gen-set 9 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10943	Related applications	MCB, MGCB
Description			
Active power of Mains 9.			

[back to List of values](#)

Gen-set 10 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10944	Related applications	MCB, MGCB
Description			
Active power of Mains 10.			

[back to List of values](#)

Gen-set 11 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10945	Related applications	MCB, MGCB
Description			
Active power of Mains 11.			

[back to List of values](#)

Gen-set 12 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10946	Related applications	MCB, MGCB
Description			
Active power of Mains 12.			

[back to List of values](#)

Gen-set 13 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10947	Related applications	MCB, MGCB
Description			
Active power of Mains 13.			

[back to List of values](#)

Gen-set 14 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10948	Related applications	MCB, MGCB
Description			
Active power of Mains 14.			

[back to List of values](#)

Gen-set 15 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10949	Related applications	MCB, MGCB
Description			
Active power of Mains 15.			

[back to List of values](#)

Gen-set 16 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10950	Related applications	MCB, MGCB
Description			
Active power of Mains 16.			

[back to List of values](#)

Gen-set 17 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10951	Related applications	MCB, MGCB
Description			
Active power of Mains 17.			

[back to List of values](#)

Gen-set 18 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10952	Related applications	MCB, MGCB
Description			
Active power of Mains 18.			

[back to List of values](#)

Gen-set 19 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10953	Related applications	MCB, MGCB
Description			
Active power of Mains 19.			

[back to List of values](#)

Gen-set 20 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10954	Related applications	MCB, MGCB
Description			
Active power of Mains 20.			

[back to List of values](#)

Gen-set 21 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10955	Related applications	MCB, MGCB
Description			
Active power of Mains 21.			

[back to List of values](#)

Gen-set 22 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10956	Related applications	MCB, MGCB
Description			
Active power of Mains 22.			

[back to List of values](#)

Gen-set 23 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10957	Related applications	MCB, MGCB
Description			
Active power of Mains 23.			

[back to List of values](#)

Gen-set 24 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10958	Related applications	MCB, MGCB
Description			
Active power of Mains 24.			

[back to List of values](#)

Gen-set 25 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10959	Related applications	MCB, MGCB
Description			
Active power of Mains 25.			

[back to List of values](#)

Gen-set 26 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10960	Related applications	MCB, MGCB
Description			
Active power of Mains 26.			

[back to List of values](#)

Gen-set 27 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10961	Related applications	MCB, MGCB
Description			
Active power of Mains 27.			

[back to List of values](#)

Gen-set 28 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10962	Related applications	MCB, MGCB
Description			
Active power of Mains 28.			

[back to List of values](#)

Gen-set 29 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10963	Related applications	MCB, MGCB
Description			
Active power of Mains 29.			

[back to List of values](#)

Gen-set 30 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10964	Related applications	MCB, MGCB
Description			
Active power of Mains 30.			

[back to List of values](#)

Gen-set 31 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10965	Related applications	MCB, MGCB
Description			
Active power of Mains 31.			

[▲ back to List of values](#)

Gen-set 32 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10966	Related applications	MCB, MGCB
Description			
Active power of Mains 32.			

[▲ back to List of values](#)

Group: Bus

Bus Frequency

Value group	Value Group Bus	Related FW	1.0.0
Units	Hz		
Comm object	20799	Related applications	MCB, MGCB
Description			
This is the value of Bus frequency.			

[back to List of values](#)

Bus Voltage L1-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	8192	Related applications	MCB, MGCB
Description			
Voltage of the L1 phase of the Bus.			

[back to List of values](#)

Bus Voltage L2-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	8193	Related applications	MCB, MGCB
Description			
Voltage of the L2 phase of the Bus.			

[back to List of values](#)

Bus Voltage L3-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	8194	Related applications	MCB, MGCB
Description			
Voltage of the L3 phase of the Bus.			

[back to List of values](#)

Bus Voltage L1-L2

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	9628	Related applications	MCB, MGCB
Description			
Phase to phase voltage between the L1 and L2 phases of the Bus.			

[back to List of values](#)

Bus Voltage L2-L3

Value group	Bus	Related FW	1.0.0
Units	V		
Comm object	9629	Related applications	MCB, MGCB
Description			
Phase to phase voltage between the L2 and L3 phases of the Bus.			

[back to List of values](#)

Bus Voltage L3-L1

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	9630	Related applications	MCB, MGCB
Description			
Phase to phase voltage between the L3 and L1 phases of the Bus.			

[back to List of values](#)

Bus Voltage

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	10645	Related applications	MCB, MGCB
Description			
Average value of all voltage phases of the Bus.			

[back to List of values](#)

Bus Voltage THD L1

Value group	Value Group Bus	Related FW	1.0.0
Units	%		
Comm object	16052	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Bus Voltage L1-N (page 458) .			

[back to List of values](#)

Bus Voltage THD L2

Value group	Value Group Bus	Related FW	1.0.0
Units	%		
Comm object	16053	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Bus Voltage L2-N (page 458) .			

[back to List of values](#)

Bus Voltage THD L3

Value group	Value Group Bus	Related FW	1.0.0
Units	%		
Comm object	16054	Related applications	MCB, MGCB
Description			
This value represents PF measurement and evaluation (page 16) of Bus Voltage L3-N (page 458) .			

🔍 back to List of values

Bus V Unbalance Ph-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	10548	Related applications	MCB, MGCB
Description			
This value contains the maximum difference of values Bus Voltage L1-N (page 458) , Bus Voltage L2-N (page 458) , Bus Voltage L3-N (page 458) at a given moment.			
<i>Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 261).</i>			

🔍 back to List of values

Bus V Unbalance Ph-Ph

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	17336	Related applications	MCB, MGCB
Description			
This value contains the maximum difference of values Bus Voltage L1-L2 (page 458) , Bus Voltage L2-L3 (page 459) , Bus Voltage L3-L1 (page 459) at a given moment.			
<i>Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 261).</i>			

🔍 back to List of values

Group: Power Management

Actual Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15805	Related applications	MCB, MGCB
Description			
Actual absolute reserve in Power Management (page 165) .			

🔍 back to List of values

Actual Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15806	Related applications	MCB, MGCB
Description			
Required minimal Actual Reserve (page 460) for starting of next unit in the Power Management (page 165) .			

🔍 back to List of values

Stop Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15807	Related applications	MCB, MGCB
Description			
Required maximal Actual Reserve (page 460) for stopping of next unit in the Power Management (page 165) .			

🔍 back to List of values

Dynamic Spinning Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15673	Related applications	MCB, MGCB
Description			
The value Dynamic Spinning Reserve is added to required load reserve given by setpoints #Starting Load Reserve 1 (page 319) and #Stopping Load Reserve 1 (page 320) (according to actual load reserve set 1, 2, 3 or 4) to shift the actual load reserve settings in dynamic way.			

🔍 back to List of values

Dynamic Spinning Reserve Offset

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15674	Related applications	MCB, MGCB
Description			
The value Dynamic Spinning Reserve Offset is added only to required stopping load reserve given by setpoints #Stopping Load Reserve 1 (page 320) (according to actual load reserve set 1, 2, 3 or 4) to create some dynamic offset between starting and stopping load reserve.			

🔍 back to List of values

Total Running P

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10657	Related applications	MCB, MGCB
Description			
Actual value of active power from all controllers running in Power Management (page 165) .			

[back to List of values](#)

Total Running Q

Value group	Power Management	Related FW	1.0.0
Units	kVAr		
Comm object	10656	Related applications	MCB, MGCB
Description			
Actual value of reactive power from all controllers running in Power Management (page 165) .			

[back to List of values](#)

Total Running S

Value group	Power Management	Related FW	1.0.0
Units	kVA		
Comm object	16424	Related applications	MCB, MGCB
Description			
Actual value of apparent power from all controllers running in Power Management (page 165) .			

[back to List of values](#)

Total Running Power Factor

Value group	Power Management	Related FW	1.0.0
Units	[-]		
Comm object	14590	Related applications	MCB, MGCB
Description			
This value represents the total power factor (Cos ϕ) of all running Controllers.			

[back to List of values](#)

Total Running Load Character

Value group	Power Management	Related FW	1.0.0
Units	[-]		
Comm object	9028	Related applications	MCB, MGCB
Description			
This value represents the total character of all running Controllers.			

[back to List of values](#)

Total Running Samax

Value group	Power Management	Related FW	1.0.0
Units	kVA		
Comm object	16425	Related applications	MCB, MGCB
Description			
<p>This value show maximal apparent power of running Controllers within the group that are connected to the bus/mains.</p> <p>The value is limited due to date type to -32000...32000 in case the sum of all apparent power of Controllers is above this range, the value shows fixed value 32000 and the warning Total Running PQS Value Overflow is activated.</p>			

[back to List of values](#)

Running Nominal Power In PM

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10999	Related applications	MCB, MGCB
Description			
Actual nominal power of all running controllers on inter-controller CAN in Power Management (page 165) .			

[back to List of values](#)

Running Nominal Power Of All

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10658	Related applications	MCB, MGCB
Description			
Actual nominal power of all running controllers on inter-controller CAN.			

[back to List of values](#)

Available Nominal Power In PM

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10998	Related applications	MCB, MGCB
Description			
Available nominal power of all controllers on inter-controller CAN in Power Management (page 165) .			

[back to List of values](#)

Minimal Running Power

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10012	Related applications	MCB, MGCB
Description			
Actual minimal nominal power of all Controllers, which are running.			

[back to List of values](#)

Actual Relative Reserve

Value group	Power Management	Related FW	1.0.0
Units	%		
Comm object	10788	Related applications	MCB, MGCB
Description			
Actual relative reserve in Power Management (page 165).			

[back to List of values](#)

Start Relative Reserve

Value group	Power Management	Related FW	1.0.0
Units	%		
Comm object	10786	Related applications	MCB, MGCB
Description			
Required minimal Actual Relative Reserve (page 464) for starting of next unit in the Power Management (page 165).			

[back to List of values](#)

Stop Relative Reserve

Value group	Power Management	Related FW	1.0.0
Units	%		
Comm object	10787	Related applications	MCB, MGCB
Description			
Required maximal Actual Relative Reserve (page 464) for stopping of next unit in the Power Management (page 165).			

[back to List of values](#)

Actual Power Band

Value group	Power Management	Related FW	1.0.0
Units	[-]		
Comm object	8974	Related applications	MCB, MGCB
Description Required state of the Controllers with CAN address between 1 .. 32 in the actual power band of Power Management (page 165) . <ul style="list-style-type: none"> > Log 0: Controller should be stopped > Log 1: Controller should be running <p>Note: Actual power band = group of Controllers which should be running with actual load.</p> <p>Note: Value is taken into account only if #Priority Auto Swap (page 316) = Efficient.</p>			

⬅ back to List of values

Next Power Band

Value group	Power Management	Related FW	1.0.0
Units	-		
Comm object	8975	Related applications	MCB, MGCB
Description Required state of the Gen-sets with CAN address between 1 .. 32 in the next power band of Power Management (page 165) . <ul style="list-style-type: none"> > Log 0: Gen-set should be stopped if load is decreased > Log 1: Gen-set should be started if load is increased <p>Note: Next power band = group of Gen-sets which should be running after load change.</p> <p>Note: Value is taken into account only if #Priority Auto Swap (page 316) = Efficient.</p>			

⬅ back to List of values

Group: Load Control

Required P Target

Value group	Load Control	Related FW	1.0.0
Units	kW		
Comm object	8663	Related applications	MCB, MGCB
Description This value shows required active power at the end of ramping.			

⬅ back to List of values

Required P

Value group	Load Control	Related FW	1.0.0
Units	kW		
Comm object	13105	Related applications	MCB, MGCB
Description			
This value shows required active power relative to the ramping procedure i.e. required active power right now.			

⬅ back to List of values

System Load Control

Value group	Load Control	Related FW	1.0.0										
Units	[-]												
Comm object	10792	Related applications	MCB, MGCB										
Description													
This value contains the actual LoadControl mode that the System is currently using. This value may differ from setpoint Load Control PTM Mode (page 240) which contains requested Load Control mode.													
List of possible states:													
<table><tr><td>None</td><td>The system is not operating.</td></tr><tr><td>Island</td><td>The system operates in the Island mode.</td></tr><tr><td>Baseload</td><td>The system operates in Baseload mode which is adjusted by the setpoint #System Baseload (page 241).</td></tr><tr><td>Baseload with I/E Limit</td><td>The system operates in Baseload mode with import/export limitation. Requested load is adjusted by the setpoint #System Baseload (page 241) but it is limited by the setpoint Import Load (page 242).</td></tr><tr><td>Import/Export</td><td>The system operates in Import/Export mode which is adjusted by the setpoint Import Load (page 242).</td></tr></table>				None	The system is not operating.	Island	The system operates in the Island mode.	Baseload	The system operates in Baseload mode which is adjusted by the setpoint #System Baseload (page 241) .	Baseload with I/E Limit	The system operates in Baseload mode with import/export limitation. Requested load is adjusted by the setpoint #System Baseload (page 241) but it is limited by the setpoint Import Load (page 242) .	Import/Export	The system operates in Import/Export mode which is adjusted by the setpoint Import Load (page 242) .
None	The system is not operating.												
Island	The system operates in the Island mode.												
Baseload	The system operates in Baseload mode which is adjusted by the setpoint #System Baseload (page 241) .												
Baseload with I/E Limit	The system operates in Baseload mode with import/export limitation. Requested load is adjusted by the setpoint #System Baseload (page 241) but it is limited by the setpoint Import Load (page 242) .												
Import/Export	The system operates in Import/Export mode which is adjusted by the setpoint Import Load (page 242) .												

⬅ back to List of values

Group: PF Control

System PF/Q Control

Value group	PF Control	Related FW	1.0.0
Units	[-]		
Comm object	10793	Related applications	MCB, MGCB
Description			
This value contains the actual PF/Q Control mode that the System is currently using. This value may differ from setpoint PF/Q Control PTM Mode (page 244) which contains requested PF/Q Control mode.			
List of possible states:			

⬅ back to List of values

Required Q

Value group	PF Control	Related FW	1.0.0
Units	kVAr		
Comm object	12877	Related applications	MCB, MGCB
Description			
Required reactive power.			

[back to List of values](#)

Required Qrel

Value group	PF Control	Related FW	1.0.0
Units	%		
Comm object	13169	Related applications	MCB, MGCB
Description			
Required relative reactive power.			

[back to List of values](#)

Required PF

Value group	PF Control	Related FW	1.0.0
Units	[-]		
Comm object	16159	Related applications	MCB, MGCB
Description			
Required Power Factor.			

[back to List of values](#)

Required PF Character

Value group	PF Control	Related FW	1.0.0
Units	[-]		
Comm object	9033	Related applications	MCB, MGCB
Description			
Required Power Factor Character.			

[back to List of values](#)

Group: Control Loops

Loadsharing Output

Value group	Control Loops	Related FW	1.0.0
Units	%		
Comm object	10924	Related applications	MCB, MGCB
Description			
Internal request of internal loadsharing regulator.			

[back to List of values](#)

Varsharing Output

Value group	Control Loops	Related FW	1.0.0
Units	%		
Comm object	10925	Related applications	MCB, MGCB
Description			
Internal request of internal varsharing regulator.			

[back to List of values](#)

Group: Controller I/O

Battery Voltage

Value group	Controller I/O	Related FW	1.0.0
Units	V		
Comm object	8213	Related applications	MCB, MGCB
Description			
Controller's supply voltage.			

[back to List of values](#)

Binary Inputs

Value group	Controller I/O	Related FW	1.0.0
Units	[-]		
Comm object	8235	Related applications	MCB, MGCB
Description			
States of the binary inputs of the controller.			
01. CU-BIN-01			
02. CU-BIN-02			
03. CU-BIN-03			
04. CU-BIN-04			
05. CU-BIN-05			
06. CU-BIN-06			
07. CU-BIN-07			
08. CU-BIN-08			
09. CU-BIN-09			
10. CU-BIN-10			
11. CU-BIN-11			
12. CU-BIN-12			
<p>Note: Names are changed based on names of representative binary inputs. See Default configuration (page 58) to see default binary inputs names.</p>			

[back to List of values](#)

Binary Outputs

Value group	Controller I/O	Related FW	1.0.0
Units	[-]		
Comm object	8239	Related applications	MCB, MGCB
Description State of the binary outputs of the controller. 01. CU-BOUT-01 02. CU-BOUT-02 03. CU-BOUT-03 04. CU-BOUT-04 05. CU-BOUT-05 06. CU-BOUT-06 07. CU-BOUT-07 08. CU-BOUT-08 09. CU-BOUT-09 10. CU-BOUT-10 11. CU-BOUT-11 12. CU-BOUT-12 <i>Note: Names are changed based on names of representative binary outputs. See Default configuration (page 58) to see default binary outputs names.</i>			

[back to List of values](#)

Group: Statistics

Sum MWh

Value group	Statistics	Related FW	1.0.0
Units	MWh		
Comm object	8980	Related applications	MCB, MGCB
Description This value is the sum of kWh from all Gen-sets (Genset kWh) which are communicating on the intercontroller CAN (CAN2A or CAN2B) and are in the same control group as the IM1010 controller.			

[back to List of values](#)

Sum MVarh

Value group	Statistics	Related FW	1.0.0
Units	MVarh		
Comm object	8981	Related applications	MCB, MGCB
Description This value is the sum of kVarh from all Gen-sets (Genset kVarh) which are communicating on the intercontroller CAN (CAN2A or CAN2B) and are in the same control group as the IM1010 controller.			

[back to List of values](#)

Sum MVAh

Value group	Statistics	Related FW	1.0.0
Units	MVAh		
Comm object	14021	Related applications	MCB, MGCB
Description			
This value is the sum of kVAh from all Gen-sets (Genset kVAh) which are communicating on the intercontroller CAN (CAN2A or CAN2B) and are in the same control group as the IM1010 controller.			

🔍 back to List of values

Mains kVAh

Value group	Statistics	Related FW	1.0.0
Units	kVAh		
Comm object	13665	Related applications	MCB, MGCB
Description			
Total apparent energy imported/exported from/to the Mains through the CB.			

🔍 back to List of values

Mains kWh Exported

Value group	Statistics	Related FW	1.0.0
Units	kVAh		
Comm object	11025	Related applications	MCB, MGCB
Description			
Counter of Mains Import P (page 439).			
<i>Note: This value can be also switched into one decimal see Power Formats And Units (page 164).</i>			

🔍 back to List of values

Mains kVArh Exported

Value group	Statistics	Related FW	1.0.0
Units	kVArh		
Comm object	11026	Related applications	MCB, MGCB
Description			
Counter of Mains Import Q (page 439).			
<i>Note: This value can be also switched into one decimal see Power Formats And Units (page 164).</i>			

🔍 back to List of values

Mains kWh Imported

Value group	Statistics	Related FW	1.0.0
Units	kWh		
Comm object	16710	Related applications	MCB, MGCB
Description			
Active energy imported from the Mains to the Load/Bus.			

🔍 back to List of values

Mains kVarh Imported

Value group	Statistics	Related FW	1.0.0
Units	kWh		
Comm object	16711	Related applications	MCB, MGCB
Description			
Reactive energy imported from the Mains to the Load/Bus.			

🔍 back to List of values

Pulse Counter 1

Value group	Statistics	Related FW	1.0.0
Units	[-]		
Comm object	10986	Related applications	MCB, MGCB
Description			
This is the Statistic value of the Pulse Counter 1 which is connected with LBI PULSE COUNTER 1 (PAGE 558) . Change the conversion rate via setpoint Conversion Coefficient Pulse 1 (page 271) . See the chapter Pulse Counters (page 194) for more information. Note: The Value can be set via IntelliConfig in the interface "Set Statistics".			

🔍 back to List of values

Pulse Counter 2

Value group	Statistics	Related FW	1.0.0
Units	[-]		
Comm object	10987	Related applications	MCB, MGCB
Description			
This is the Statistic value of Pulse the Counter 2 which is connected with LBI PULSE COUNTER 2 (PAGE 558) . Change the conversion rate via setpoint Conversion Coefficient Pulse 2 (page 271) . See the chapter Pulse Counters (page 194) for more information. Note: The Value can be set via IntelliConfig in the interface "Set Statistics".			

🔍 back to List of values

Group: Info

Application Mode

Value group	Info	Related FW	1.0.0																				
Units	[-]																						
Comm object	14446	Related applications	MCB, MGCB																				
Description																							
This value reflects which application is used for the controller at the moment.																							
The application is selected based on setpoint Application Mode Select (page 237) , LCI APPLICATION MCB (PAGE 537) and APPLICATION MGCB (PAGE 536)																							
<table><tr><th>LCI APPLICATION MCB (PAGE 537)</th><th>LCI APPLICATION MGCB (PAGE 536)</th><th>LCI APPLICATION SPI (PAGE 1)</th><th>Application Mode</th></tr><tr><td>0</td><td>0</td><td>0</td><td>Based on Application Mode Select (page 237)</td></tr><tr><td>0</td><td>1</td><td>0</td><td>MGCB</td></tr><tr><td>1</td><td>0</td><td>0</td><td>MCB</td></tr><tr><td>1</td><td>1</td><td>0</td><td>MGCB</td></tr></table>				LCI APPLICATION MCB (PAGE 537)	LCI APPLICATION MGCB (PAGE 536)	LCI APPLICATION SPI (PAGE 1)	Application Mode	0	0	0	Based on Application Mode Select (page 237)	0	1	0	MGCB	1	0	0	MCB	1	1	0	MGCB
LCI APPLICATION MCB (PAGE 537)	LCI APPLICATION MGCB (PAGE 536)	LCI APPLICATION SPI (PAGE 1)	Application Mode																				
0	0	0	Based on Application Mode Select (page 237)																				
0	1	0	MGCB																				
1	0	0	MCB																				
1	1	0	MGCB																				
IMPORTANT: Application Mode can be changed only if Controller Mode (page 472) = OFF.																							

⬅ back to List of values

Controller Mode

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	9887	Related applications	MCB, MGCB
Description			
Controller mode.			

⬅ back to List of values

Load Shedding Status

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	9591	Related applications	MCB, MGCB
Description			
This value contains actual active highest stage of Load shedding stages (page 134) . Value has range from 0 to 8, where 0 means no load shedding stage is active.			

⬅ back to List of values

Breaker state

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	9245	Related applications	MCB, MGCB
Description			
This value contains actual breaker state message.			

[back to List of values](#)

Timer Text

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	10040	Related applications	MCB, MGCB
Description			
This value contains actual timer text message.			

[back to List of values](#)

Connection Type

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	12944	Related applications	MCB, MGCB
Description			
This value contains name of currently selected connection type, which is adjusted via Connection type (page 261).			

[back to List of values](#)

Timer Value

Value group	Info	Related FW	1.0.0
Units	[MM:SS]		
Comm object	14147	Related applications	MCB, MGCB
Description			
This value contains time of active timer which is counted down, name of the timer is in value Timer Text (page 473).			

[back to List of values](#)

ID String

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	24501	Related applications	MCB, MGCB
Description			
Name of controller which is used in IntelliConfig in command bar.			

[back to List of values](#)

FW Version

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	24339	Related applications	MCB, MGCB
Description			
Major and minor firmware version number.			

[back to List of values](#)

Application

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8480	Related applications	MCB, MGCB
Description			
The value contains actual application in controller.			

[back to List of values](#)

FW Branch

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8707	Related applications	MCB, MGCB
Description			
The value contains actual branch of firmware in controller.			

[back to List of values](#)

Forced Value Status

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	20544	Related applications	MCB, MGCB
Description			
This value contains list of all 32 LBIs for Forced Value (page 131) . Logical 1 means that the respective LBI is currently activated.			

[back to List of values](#)

SPI Module A

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	14447	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

SPI Module B

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	14448	Related applications	MCB, MGCB
Description			
Description.			

🔍 back to List of values

CAN16

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8546	Related applications	MCB, MGCB
Description			
<p>This value contains binary information about controllers connected via CAN2 (page 17) and/or Communication peripherals (page 17) with CAN Controller Address (page 272) = <1,16>. Each bit represent controller with the same CAN address as number of the bit.</p> <ul style="list-style-type: none">➤ Log. 1 - this controller receives messages from the controller with specific CAN address➤ Log. 0 - this controller does not receive messages from the controller with specific CAN address			

🔍 back to List of values

CAN32

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8827	Related applications	MCB, MGCB
Description			
<p>This value contains binary information about controllers connected via CAN2 (page 17) and/or Communication peripherals (page 17) with CAN Controller Address (page 272) = <17,32>. Each bit represent controller with the same CAN address as number of the bit.</p> <ul style="list-style-type: none">➤ Log. 1 - this controller receives messages from the controller with specific CAN address➤ Log. 0 - this controller does not receive messages from the controller with specific CAN address			

🔍 back to List of values

Reg16

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	11081	Related applications	MCB, MGCB
Description			
This value contains binary information about controllers connected via CAN2 (page 17) and/or Communication peripherals (page 17) with CAN Controller Address (page 272) = <1,16>. Each bit represent controller with the same CAN address as number of the bit. <ul style="list-style-type: none">➤ Log. 1 - controller with this CAN address is in the same group (is connected to the same bus).➤ Log. 0 - controller with this CAN address is NOT in the same group (is NOT connected to the same bus).			

🔍 back to List of values

Reg32

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	11082	Related applications	MCB, MGCB
Description			
This value contains binary information about controllers connected via CAN2 (page 17) and/or Communication peripherals (page 17) with CAN Controller Address (page 272) = <17,32>. Each bit represent controller with the same CAN address as number of the bit. <ul style="list-style-type: none">➤ Log. 1 - controller with this CAN address is in the same group (is connected to the same bus).➤ Log. 0 - controller with this CAN address is NOT in the same group (is NOT connected to the same bus).			

🔍 back to List of values

Gen Loaded 16

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	10196	Related applications	MCB, MGCB
Description			
This value contains binary information about controllers connected via CAN2 (page 17) and/or Communication peripherals (page 17) with CAN Controller Address (page 272) = <1,16>. Each bit represent controller with the same CAN address as number of the bit. <ul style="list-style-type: none">➤ Log. 1 - controller with this CAN address is currently loaded➤ Log. 0 - controller with this CAN address is currently not loaded			

🔍 back to List of values

Gen Loaded 32

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	10197	Related applications	MCB, MGCB
Description			
<p>This value contains binary information about controllers connected via CAN2 (page 17) and/or Communication peripherals (page 17) with CAN Controller Address (page 272) = <17,32>. Each bit represent controller with the same CAN address as number of the bit.</p> <ul style="list-style-type: none"> ➤ Log. 1 - controller with this CAN address is currently loaded ➤ Log. 0 - controller with this CAN address is currently not loaded 			

🔍 back to List of values

Group: User Buttons

User Buttons

Value group	User Buttons	Related FW	1.0.0																																								
Units	[-]																																										
Comm object	20743	Related applications	MCB, MGCB																																								
Description																																											
State of User Buttons (page 199) .																																											
<table border="0"> <tr> <td>1. User Button 1</td><td>11. User Button 11</td><td>21. User Button 21</td><td>31. User Button 31</td></tr> <tr> <td>2. User Button 2</td><td>12. User Button 12</td><td>22. User Button 22</td><td>32. User Button 32</td></tr> <tr> <td>3. User Button 3</td><td>13. User Button 13</td><td>23. User Button 23</td><td></td></tr> <tr> <td>4. User Button 4</td><td>14. User Button 14</td><td>24. User Button 24</td><td></td></tr> <tr> <td>5. User Button 5</td><td>15. User Button 15</td><td>25. User Button 25</td><td></td></tr> <tr> <td>6. User Button 6</td><td>16. User Button 16</td><td>26. User Button 26</td><td></td></tr> <tr> <td>7. User Button 7</td><td>17. User Button 17</td><td>27. User Button 27</td><td></td></tr> <tr> <td>8. User Button 8</td><td>18. User Button 18</td><td>28. User Button 28</td><td></td></tr> <tr> <td>9. User Button 9</td><td>19. User Button 19</td><td>29. User Button 29</td><td></td></tr> <tr> <td>10. User Button 10</td><td>20. User Button 20</td><td>30. User Button 30</td><td></td></tr> </table>				1. User Button 1	11. User Button 11	21. User Button 21	31. User Button 31	2. User Button 2	12. User Button 12	22. User Button 22	32. User Button 32	3. User Button 3	13. User Button 13	23. User Button 23		4. User Button 4	14. User Button 14	24. User Button 24		5. User Button 5	15. User Button 15	25. User Button 25		6. User Button 6	16. User Button 16	26. User Button 26		7. User Button 7	17. User Button 17	27. User Button 27		8. User Button 8	18. User Button 18	28. User Button 28		9. User Button 9	19. User Button 19	29. User Button 29		10. User Button 10	20. User Button 20	30. User Button 30	
1. User Button 1	11. User Button 11	21. User Button 21	31. User Button 31																																								
2. User Button 2	12. User Button 12	22. User Button 22	32. User Button 32																																								
3. User Button 3	13. User Button 13	23. User Button 23																																									
4. User Button 4	14. User Button 14	24. User Button 24																																									
5. User Button 5	15. User Button 15	25. User Button 25																																									
6. User Button 6	16. User Button 16	26. User Button 26																																									
7. User Button 7	17. User Button 17	27. User Button 27																																									
8. User Button 8	18. User Button 18	28. User Button 28																																									
9. User Button 9	19. User Button 19	29. User Button 29																																									
10. User Button 10	20. User Button 20	30. User Button 30																																									

🔍 back to List of values

Group: Log Bout

Log Bout 1

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9143	Related applications	MCB, MGCB
Description			
State of binary outputs.			

🔍 back to List of values

Log Bout 2

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9144	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[◀ back to List of values](#)

Log Bout 3

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9145	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[◀ back to List of values](#)

Log Bout 4

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9146	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[◀ back to List of values](#)

Log Bout 5

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9147	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[◀ back to List of values](#)

Log Bout 6

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9148	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[◀ back to List of values](#)

Log Bout 7

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9149	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[back to List of values](#)

Log Bout 8

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9150	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[back to List of values](#)

Log Bout 9

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	11896	Related applications	MCB, MGCB
Description			
State of binary outputs.			

[back to List of values](#)

Group: Plug-in

EM BIO A

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	14291	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM BIO B

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	14292	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Group: Plug-In I/O

EM Analog Input A 1

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14293	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 2

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14294	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 3

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14295	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 4

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14296	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 5

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14297	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 6

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14298	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 7

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14299	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 8

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14300	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 9

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14301	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 10

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14302	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 11

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14303	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 12

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14303	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 13

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14305	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 14

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14306	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 15

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14307	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input A 16

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14308	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 1

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14309	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 2

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14310	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 3

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14311	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 4

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14312	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 5

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14313	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 6

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14314	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 7

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14315	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 8

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14316	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 9

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14317	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 10

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14318	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 11

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14319	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 12

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14320	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 13

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14321	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 14

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14322	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 15

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14323	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

EM Analog Input B 16

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14324	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Group: CM-4G-GPS

Modem Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24288	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

AirGate Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23967	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Network Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23972	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

GPS Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23973	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Signal Strength

Value group	CM-4G-GPS	Related FW	1.0.0
Units	[%]		
Comm object	24302	Related applications	MCB, MGCB
Description			
This value represents signal strenght in the percentage.			

[back to List of values](#)

IP Address

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23971	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Secondary DNS

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23983	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Primary DNS

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23984	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

AirGate Servicing Node

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23991	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Network Mode

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24146	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Network Name

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24147	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Modem FW Version

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24149	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Speed

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24264	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Active Satellites

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24265	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Longitude

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24267	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Latitude

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24268	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Last E-mail Result

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24307	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

AirGate ID

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24309	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Group: CM-Ethernet

AirGate Status

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23910	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Ethernet PHY mode

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23916	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

ETH Interface Status

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23924	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

AirGate Servicing Node

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23915	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Last E-mail Result

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23925	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

AirGate ID

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23926	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Secondary DNS

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23927	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Primary DNS

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23928	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Current Gateway

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23929	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Current Subnet Mask

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23930	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Current IP Address

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23931	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

MAC Address

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23932	Related applications	MCB, MGCB
Description			
Description.			

[back to List of values](#)

Group: Ethernet

MAC Address

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24333	Related applications	MCB, MGCB
Description			
Current MAC address of the controller's ethernet interface.			

[back to List of values](#)

Ethernet PHY mode

Value group	Ethernet	Related FW	1.0.0								
Units	[-]										
Comm object	24088	Related applications	(missing or bad snippet)								
Description											
This value represents Communication peripherals (page 17) interface mode:											
<table><tr><td>10- HD</td><td>10 Mbit Half-Duplex</td></tr><tr><td>10- FD</td><td>10 Mbit Full-Duplex</td></tr><tr><td>100- HD</td><td>100 Mbit Half-Duplex</td></tr><tr><td>100- FD</td><td>100 Mbit Full-Duplex</td></tr></table>				10- HD	10 Mbit Half-Duplex	10- FD	10 Mbit Full-Duplex	100- HD	100 Mbit Half-Duplex	100- FD	100 Mbit Full-Duplex
10- HD	10 Mbit Half-Duplex										
10- FD	10 Mbit Full-Duplex										
100- HD	100 Mbit Half-Duplex										
100- FD	100 Mbit Full-Duplex										

🔍 back to List of values

Current IP Address

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24184	Related applications	MCB, MGCB
Description			
Current IP address of the Communication peripherals (page 17) interface.			

🔍 back to List of values

Current Subnet Mask

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24183	Related applications	MCB, MGCB
Description			
Current subnet mask of the Communication peripherals (page 17) interface.			

🔍 back to List of values

Current Gateway

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24182	Related applications	MCB, MGCB
Description			
Current IP gateway address of the Communication peripherals (page 17) communications.			

🔍 back to List of values

Primary DNS

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24181	Related applications	MCB, MGCB
Description			
Current domain name server of the Communication peripherals (page 17) interface.			

[back to List of values](#)

Secondary DNS

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24100	Related applications	MCB, MGCB
Description			
Backup domain name server of the Communication peripherals (page 17) interface.			

[back to List of values](#)

ETH Interface Status

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24180	Related applications	MCB, MGCB
Description			
Current status of the Communication peripherals (page 17) communication.			

[back to List of values](#)

AirGate Status

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24007	Related applications	MCB, MGCB
Description			
Diagnostic code for AirGate connection. Helps with troubleshooting.			
IMPORTANT: If the AirGate key in the Access Administration is empty the controller will not connect to the AirGate despite the function is enabled. Access Administration is available in Tools of the IntelliConfig.			
Code	Value	Description	
0	Not defined	Not trying to connect to AirGate. This is initial value of the status.	
1	Waiting to connect	Waiting for the next attempt to connect to a node.	
2	Resolving	Resolving the domain name of the node to which it is attempting to connect.	
3	Connecting	Attempting to establish TCP link to the node.	
4	Creating secure channel	Encrypted channel is being negotiated.	
5	Registration	Encrypted channel has been established.	
6	Connected, inoperable	AirGate server has not sent an authorization yet.	
7	Connected, operable	AirGate server authorized the connection and the AirGate connection is up and running.	
8	Suspended, empty key	The service is enabled but suspended due to empty AirGate key.	

[back to List of values](#)

AirGate ID

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24345	Related applications	MCB, MGCB
Description			
Identification string generated by AirGate server for the purpose of establishing communication via IntelliConfig or any other supported PC tool.			

[back to List of values](#)

AirGate Servicing Node

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	24010	Related applications	MCB, MGCB
Description			
This value displays the IP address to Servicing node to which is controller connected in order to use AirGate connection.			

 [back to List of values](#)

Last E-mail Result

Value group	Ethernet	Related FW	1.0.0																																																																
Units	[-]																																																																		
Comm object	24332	Related applications	MCB, MGCB																																																																
Description																																																																			
Result of last email, which was sent by controller.																																																																			
<table><tr><th>Code</th><th>Description</th></tr><tr><td>0</td><td>Email was successfully sent.</td></tr><tr><td>1</td><td>SIMCom declined connection request.</td></tr><tr><td>2</td><td>It is not possible to establish connection with SMTP server.</td></tr><tr><td>3</td><td>SMTP server is not ready for communication.</td></tr><tr><td>4</td><td>Maximum transmitted data length not defined.</td></tr><tr><td>5</td><td>No response from SMTP server.</td></tr><tr><td>6</td><td>Command to SMTP server not sent.</td></tr><tr><td>7</td><td>Did not receive data from SMTP server.</td></tr><tr><td>8</td><td>HELO command was refused.</td></tr><tr><td>9</td><td>EHLO command was refused.</td></tr><tr><td>10</td><td>SMTP server does not support 8-bit encoding.</td></tr><tr><td>11</td><td>AUTH LOGIN command was refused.</td></tr><tr><td>12</td><td>Wrong user name.</td></tr><tr><td>13</td><td>Wrong password.</td></tr><tr><td>14</td><td>MAIL FROM command was refused.</td></tr><tr><td>15</td><td>RCPT TO command was refused.</td></tr><tr><td>16</td><td>DATA command was refused.</td></tr><tr><td>17</td><td>Sending of email failed.</td></tr><tr><td>18</td><td>SMTP server rejected email data.</td></tr><tr><td>19</td><td>SMTP server rejected email data.</td></tr><tr><td>20</td><td>QUIT command was refused.</td></tr><tr><td>21</td><td>There is no valid server IP address.</td></tr><tr><td>22</td><td>Process of sending email aborted.</td></tr><tr><td>23</td><td>Closing connection error.</td></tr><tr><td>24</td><td>Failed to accept server response after connection is established.</td></tr><tr><td>25</td><td>It is impossible to create data for command DATA.</td></tr><tr><td>26</td><td>It is impossible to read data for command DATA.</td></tr><tr><td>27</td><td>Email address can't be read.</td></tr><tr><td>28</td><td>Error during encoding process.</td></tr><tr><td>29</td><td>Error during HMAC MD5 encoding process.</td></tr><tr><td>30</td><td>There is no attempt for sending email yet.</td></tr></table>				Code	Description	0	Email was successfully sent.	1	SIMCom declined connection request.	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.	9	EHLO command was refused.	10	SMTP server does not support 8-bit encoding.	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.	21	There is no valid server IP address.	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.	27	Email address can't be read.	28	Error during encoding process.	29	Error during HMAC MD5 encoding process.	30	There is no attempt for sending email yet.
Code	Description																																																																		
0	Email was successfully sent.																																																																		
1	SIMCom declined connection request.																																																																		
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.																																																																		
9	EHLO command was refused.																																																																		
10	SMTP server does not support 8-bit encoding.																																																																		
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.																																																																		
21	There is no valid server IP address.																																																																		
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.																																																																		
27	Email address can't be read.																																																																		
28	Error during encoding process.																																																																		
29	Error during HMAC MD5 encoding process.																																																																		
30	There is no attempt for sending email yet.																																																																		

31	Cannot resolve SMTP server's IP address.
32	Error while reading CO 24327 (base64 email data)
33	Problem with authorization type (i.e. smtp.gmail.com support only STARTTLS)
34	SMTP server does not support STARTTLS command.
35	STARTTLS command was refused.
36	There is a problem during TLS handshake process.

[back to List of values](#)

Group: Date/Time

Date

Value group	Date/Time	Related FW	1.0.0
Units	DD.MM.YYYY		
Comm object	24553	Related applications	MCB, MGCB
Description			
Shows setup date.			

[back to List of values](#)

Time

Value group	Date/Time	Related FW	1.0.0
Units	HH:MM:SS		
Comm object	24554	Related applications	MCB, MGCB
Description			
Shows setup time.			

[back to List of values](#)

Time Mode

Value group	Date/Time	Related FW	1.0.0
Units	[-]		
Comm object	20252	Related applications	MCB, MGCB
Description			
Shows setup time mode.			
STD - Standard zone time (e.g GMT+1 for Prague)			
DST - Daylight Saving Time = STD+1 (e.g. GMT+2 for Prague)			

[back to List of values](#)

Group: PLC

PLC-AOUT 1

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21248	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 2

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21249	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 3

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21250	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 4

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21251	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 5

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21252	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 6

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21253	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 7

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21254	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 8

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21255	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 9

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21256	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 10

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21257	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 11

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21258	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 12

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21259	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 13

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21260	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 14

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21261	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 15

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21262	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 16

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21263	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 17

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21264	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 18

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21265	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 19

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21266	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 20

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21267	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 21

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21268	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 22

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21269	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 23

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21270	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 24

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21271	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 25

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21272	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 26

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21273	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 27

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21274	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 28

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21275	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 29

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21276	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 30

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21277	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 31

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21278	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 32

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21279	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 33

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21280	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 34

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21281	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 35

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21282	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 36

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21283	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 37

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21284	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 38

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21285	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 39

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21286	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 40

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21287	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 41

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21288	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 42

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21289	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 43

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21290	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 44

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21291	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 45

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21292	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 46

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21293	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 47

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21294	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 48

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21295	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 49

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21296	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 50

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21297	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 51

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21298	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 52

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21299	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 53

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21300	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 54

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21301	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 55

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21302	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 56

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21303	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 57

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21304	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 58

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21305	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 59

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21306	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 60

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21307	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 61

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21308	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 62

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21309	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 63

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21310	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-AOUT 64

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21311	Related applications	MCB, MGCB
Description			
State of analog output of PLC.			

[back to List of values](#)

PLC-BOUT 1

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10424	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 2

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10425	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 3

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10426	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 4

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10427	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 5

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10428	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 6

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10429	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 7

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10430	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 8

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10431	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 9

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10432	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 10

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10433	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 11

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10434	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 12

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10435	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 13

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10436	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 14

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10437	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 15

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10438	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 16

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10439	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 17

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14570	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 18

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14571	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 19

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14572	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 20

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14573	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 21

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14574	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 22

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14575	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 23

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14576	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 24

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14577	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 25

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14578	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 26

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14579	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 27

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14580	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 28

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14581	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 29

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14582	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 30

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14583	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 31

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14584	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 32

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14585	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 33

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16914	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 34

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16915	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 35

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16916	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 36

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16917	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 37

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16918	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 38

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16919	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 39

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16920	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 40

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16921	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 41

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16922	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 42

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16923	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 43

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16924	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 44

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16925	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC-BOUT 45

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16926	Related applications	MCB, MGCB
Description			
State of binary outputs of PLC.			

[back to List of values](#)

PLC Resource 1

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21216	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 2

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21217	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 3

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21218	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 4

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21219	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 5

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21220	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 6

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21221	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 7

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21222	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 8

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21223	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 9

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21224	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

PLC Resource 10

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21225	Related applications	MCB, MGCB
Description			
Internal value of PLC block.			

[back to List of values](#)

Group: SH Modules

SHBIN-1

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10572	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary inputs from SHBIN module 1. <ol style="list-style-type: none">1. SHBIN-1 12. SHBIN-1 23. SHBIN-1 34. SHBIN-1 45. SHBIN-1 56. SHBIN-1 67. SHBIN-1 78. SHBIN-1 8			

[back to List of values](#)

SHBIN-2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10573	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary inputs from SHBIN module 2. <ol style="list-style-type: none">1. SHBIN-2 12. SHBIN-2 23. SHBIN-2 34. SHBIN-2 45. SHBIN-2 56. SHBIN-2 67. SHBIN-2 78. SHBIN-2 8			

[back to List of values](#)

SHBIN-3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10574	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary inputs from SHBIN module 3. 1. SHBIN-3 1 2. SHBIN-3 2 3. SHBIN-3 3 4. SHBIN-3 4 5. SHBIN-3 5 6. SHBIN-3 6 7. SHBIN-3 7 8. SHBIN-3 8			

[◀ back to List of values](#)

SHBIN-4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10575	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary inputs from SHBIN module 4. 1. SHBIN-4 1 2. SHBIN-4 2 3. SHBIN-4 3 4. SHBIN-4 4 5. SHBIN-4 5 6. SHBIN-4 6 7. SHBIN-4 7 8. SHBIN-4 8			

[◀ back to List of values](#)

SHBIN-5

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11341	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary inputs from SHBIN module 5. <ol style="list-style-type: none">1. SHBIN-5 12. SHBIN-5 23. SHBIN-5 34. SHBIN-5 45. SHBIN-5 56. SHBIN-5 67. SHBIN-5 78. SHBIN-5 8			

[◀ back to List of values](#)

SHBIN-6

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11342	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary inputs from SHBIN module 6. <ol style="list-style-type: none">1. SHBIN-6 12. SHBIN-6 23. SHBIN-6 34. SHBIN-6 45. SHBIN-6 56. SHBIN-6 67. SHBIN-6 78. SHBIN-6 8			

[◀ back to List of values](#)

SHBOUT-1

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10576	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 1. <ol style="list-style-type: none">1. SHBOUT-1 12. SHBOUT-1 23. SHBOUT-1 34. SHBOUT-1 45. SHBOUT-1 56. SHBOUT-1 67. SHBOUT-1 78. SHBOUT-1 8			

[◀ back to List of values](#)

SHBOUT-2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10577	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 2. <ol style="list-style-type: none">1. SHBOUT-2 12. SHBOUT-2 23. SHBOUT-2 34. SHBOUT-2 45. SHBOUT-2 56. SHBOUT-2 67. SHBOUT-2 78. SHBOUT-2 8			

[◀ back to List of values](#)

SHBOUT-3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10578	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 3.			
1. SHBOUT-3 1			
2. SHBOUT-3 2			
3. SHBOUT-3 3			
4. SHBOUT-3 4			
5. SHBOUT-3 5			
6. SHBOUT-3 6			
7. SHBOUT-3 7			
8. SHBOUT-3 8			

[◀ back to List of values](#)

SHBOUT-4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10579	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 4.			
1. SHBOUT-4 1			
2. SHBOUT-4 2			
3. SHBOUT-4 3			
4. SHBOUT-4 4			
5. SHBOUT-4 5			
6. SHBOUT-4 6			
7. SHBOUT-4 7			
8. SHBOUT-4 8			

[◀ back to List of values](#)

SHBOUT-5

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11343	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 5. <ol style="list-style-type: none">1. SHBOUT-5 12. SHBOUT-5 23. SHBOUT-5 34. SHBOUT-5 45. SHBOUT-5 56. SHBOUT-5 67. SHBOUT-5 78. SHBOUT-5 8			

[◀ back to List of values](#)

SHBOUT-6

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11344	Related applications	MCB, MGCB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 6. <ol style="list-style-type: none">1. SHBOUT-6 12. SHBOUT-6 23. SHBOUT-6 34. SHBOUT-6 45. SHBOUT-6 56. SHBOUT-6 67. SHBOUT-6 78. SHBOUT-6 8			

[◀ back to List of values](#)

SHAIN-1 1

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10584	Related applications	MCB, MGCB
Description			
This value contains data of first shared analog input from SHAOUT module 1.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-1 2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10585	Related applications	MCB, MGCB
Description			
This value contains data of second shared analog input from SHAOUT module 1.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-1 3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10586	Related applications	MCB, MGCB
Description			
This value contains data of third shared analog input from SHAOUT module 1.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-1 4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10587	Related applications	MCB, MGCB
Description			
This value contains data of fourth shared analog input from SHAOUT module 1.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-2 1

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11390	Related applications	MCB, MGCB
Description			
This value contains data of first shared analog input from SHAOUT module 2.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-2 2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11391	Related applications	MCB, MGCB
Description			
This value contains data of second shared analog input from SHAOUT module 2.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-2 3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11392	Related applications	MCB, MGCB
Description			
This value contains data of third shared analog input from SHAOUT module 2.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

SHAIN-2 4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11393	Related applications	MCB, MGCB
Description			
This value contains data of fourth shared analog input from SHAOUT module 2.			
IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".			

[back to List of values](#)

8.1.4 Logical binary inputs

What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

Alphabetical groups of Logical binary inputs

LBI: A	536
LBI: E	537
LBI: F	537
LBI: G	542
LBI: H	542
LBI: L	543
LBI: M	545
LBI: N	555
LBI: P	556
LBI: R	558
LBI: S	561
LBI: T	563

For full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 535)**.

Logical binary inputs alphabetically

LBI: A	536	Mains Fail Block	545
Access Lock	536	Manual Load	
AMF Start Block	536	Reconnection	546
Application MGCB	536	MCB Button	546
Application MCB	537	MCB Disable	546
LBI: E	537	MCB Feedback	547
Emergency MAN	537	MCB Feedback Negative	549
LBI: F	537	MCB Isolated	550
Fault Reset Button	537	GCB Button	551
Force Island	537	GCB Disable	551
Force Parallel	538	GCB Feedback	552
Force Protection Disable	538	GCB Feedback Negative	553
Forced Value Input 01	538	Min Run Power Act 1	554
Forced Value Input 02	538	Min Run Power Act 2	554
Forced Value Input 03	539	Min Run Power Act 3	555
Forced Value Input 04	539	LBI: N	555
Forced Value Input 05	539	Not Used	555
Forced Value Input 06	539	LBI: P	556
Forced Value Input 07	539	Protection Force Disable 1	556
Forced Value Input 08	540	Protection Force Disable 2	557
Forced Value Input 09	540	Protection Force Disable 3	557
Forced Value Input 10	540	Pulse Counter 1	558
Forced Value Input 11	540	Pulse Counter 2	558
Forced Value Input 12	540	LBI: R	558
Forced Value Input 13	541	Remote AUTO	558
Forced Value Input 14	541	Remote MAN	559
Forced Value Input 15	541	Remote OFF	559
Forced Value Input 16	541	Remote Start/Stop	560
LBI: G	542	Remote TEST	560
Group link	542	Rem TEST On Load	561
LBI: H	542	LBI: S	561
Horn Reset Button	542	Start Button	561
LBI: L	543	Stop Button	561
Load Res 2 Active	543	Synchronization Disabled	563
Load Res 3 Active	544	LBI: T	563
Load Res 4 Active	545	Time Stamp Act	563
LBI: M	545		

 **back to Controller objects**

LBI: A

Access Lock

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	1		
Description			
When this input is closed, no setpoints can be adjusted from controller's front panel and Mains mode (OFF / MAN / AUTO / TEST) cannot be changed.			
Note: Access Lock does not protect setpoints and mode changing from IntelliConfig. To avoid unqualified changes the selected setpoints have to be password protected. Also the buttons Fault Reset and Horn Reset are not blocked at all and buttons Start and Stop in MAN mode are not blocked.			

⬅ back to Logical binary inputs alphabetically

AMF Start Block

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	211		
Description			
Activation of this LBI blocks AMF function and gen-sets will not be automatically started if the mains failure occurs. In case the load is powered from the bus (gen-sets) and all controllers are in AUTO mode, the gen-sets goes to cooling procedure and stops.			

⬅ back to Logical binary inputs alphabetically

Application MGCB

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	1050		
Description			
Activation of this binary input switches the controller Application Mode (Application Mode Select (page 237)) to MGCB.			
IMPORTANT: The Controller mode (page 267) has to be OFF, otherwise controller application can not be changed.			
Note: <i>This binary input has higher priority than LBI APPLICATION MCB (PAGE 537).</i>			

⬅ back to Logical binary inputs alphabetically

Application MCB

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	1051		
Description			
Activation of this binary input switches the controller Application Mode (Application Mode Select (page 237)) to MCB.			
IMPORTANT: The Controller mode (page 267) has to be OFF, otherwise controller application can not be changed.			
<i>Note: This binary input has lower priority than LBI APPLICATION MGCB (PAGE 536).</i>			

⬅ back to Logical binary inputs alphabetically

LBI: E


Emergency MAN

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	45		
Description			
This input is designed to allow the breakers to be controlled externally (not by the controller). This feature can be useful in case of some failure, which disables the breakers to be controlled by the controller.			
The controller behaves in the following way:			
<ul style="list-style-type: none">➤ Stops all functions regarding the breaker control, deactivates all outputs related to it.➤ When the input is deactivated, the controller takes control according to the situation in the moment of deactivation.			

⬅ back to Logical binary inputs alphabetically

LBI: F

Fault Reset Button

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	191		
Description			
Binary input has the same function as Fault Reset button  on an Internal display.			

⬅ back to Logical binary inputs alphabetically

Force Island

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	787		
Description			
Activation of this LBI starts the System and forces island operation. Transfer method of the load from Mains is adjusted via setpoint Transfer Mains To Gen (page 340).			

⬅ back to Logical binary inputs alphabetically

Force Parallel

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	786		
Description			
Activation of this LBI starts the System and forces parallel operation if MAINS HEALTHY (PAGE 579) is closed. Island operation is not allowed while this LBI is closed.			

⬅ back to Logical binary inputs alphabetically

Force Protection Disable

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	16		
Description			
Selected protections are disabled if LBI: Force Protection Disable is active..			
Activation and deactivation of this binary input will create history record:			
<div><div>></div>Force Protection Disable active</div> <div><div>></div>Force Protection Disable inactive</div>			
Behavior depends on configuration of LBI - normally close or normally open.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 01

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	19		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: <i>This LBI can be renamed during configuration.</i>			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 02

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	20		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: <i>This LBI can be renamed during configuration.</i>			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 03

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	21		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 04

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	22		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 05

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	23		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 06

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	24		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 07

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	25		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 08

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	26		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 09

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	27		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 10

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	28		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 11

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	29		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 12

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	30		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 13

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	31		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 14

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	32		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 15

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	33		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 16

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	34		
Description			
This LBI is used for activation of preconfigured Forced Value (page 131) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

LBI: G


Group link

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	59		
Description			
<p>This input is used for logical connection and disconnection of two gen-set groups selected with setpoints Group Link L (page 337) and Group Link R (page 338). If the input is active, then the two selected groups will perform Power Management (page 165), load sharing and Var sharing together as one large group.</p>			
<p>Note: This function is independent on the group which the particular controller belongs to, i.e. the controller can provide linking function e.g. for groups 3,4 although it belongs to group 2.</p>			

🔍 back to Logical binary inputs alphabetically

LBI: H

Horn Reset Button

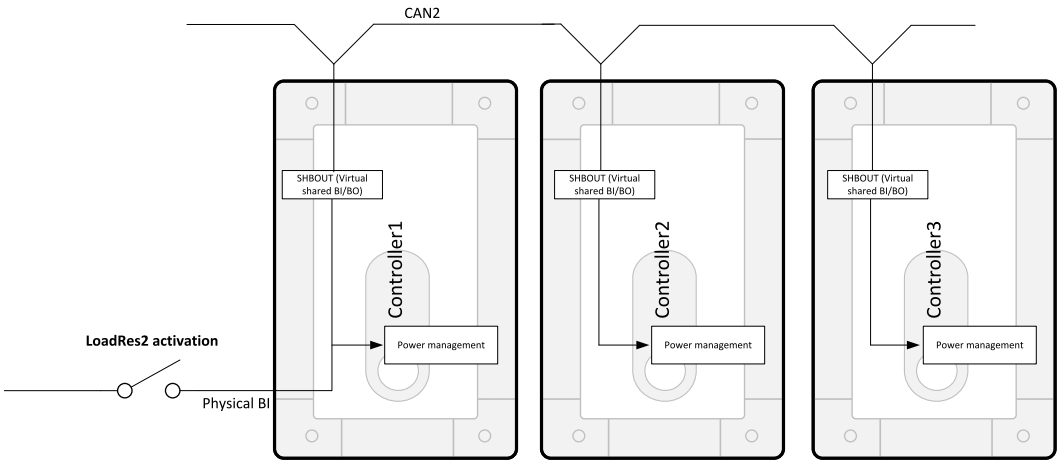
Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	192		
Description			
Binary input has the same function as Horn reset  button on an Internal display.			

🔍 back to Logical binary inputs alphabetically

LBI: L

Load Res 2 Active

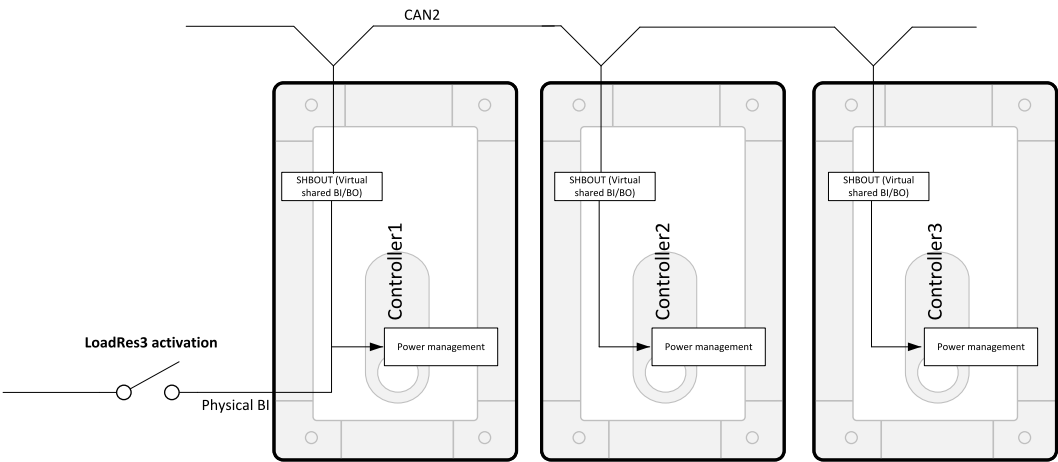
Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	49		
Description			
<p>This input is used to activate the load reserve set #2 (learn more about load reserve in the chapter Power Management (page 165)) instead of the set #1, which is active by default. The set #2 is adjusted by setpoints:</p> <ul style="list-style-type: none">> #Starting Load Reserve 2 (page 322) and #Stopping Load Reserve 2 (page 323) if the power management is switched to absolute mode> #Starting Rel Load Reserve 2 (page 324) and #Stopping Rel Load Reserve 2 (page 324) if the power management is switched to relative mode.			
IMPORTANT: All controllers cooperating together in Power management must have the same load reserve set selected.			
<i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus.</i>			



The diagram illustrates a CAN bus network for load reserve management. A single physical switch, labeled 'Physical BI', is connected to the 'SHBOUT (Virtual shared BI/BO)' input of 'Controller1'. This switch is also connected to a 'LoadRes2 activation' signal line. The 'SHBOUT' block of 'Controller1' is connected to the 'CAN2' bus. The 'CAN2' bus is connected to the 'SHBOUT' blocks of 'Controller2' and 'Controller3'. Each controller's 'SHBOUT' block is connected to its 'Power management' block. The 'CAN2' bus is also connected to the 'Power management' blocks of 'Controller2' and 'Controller3'.

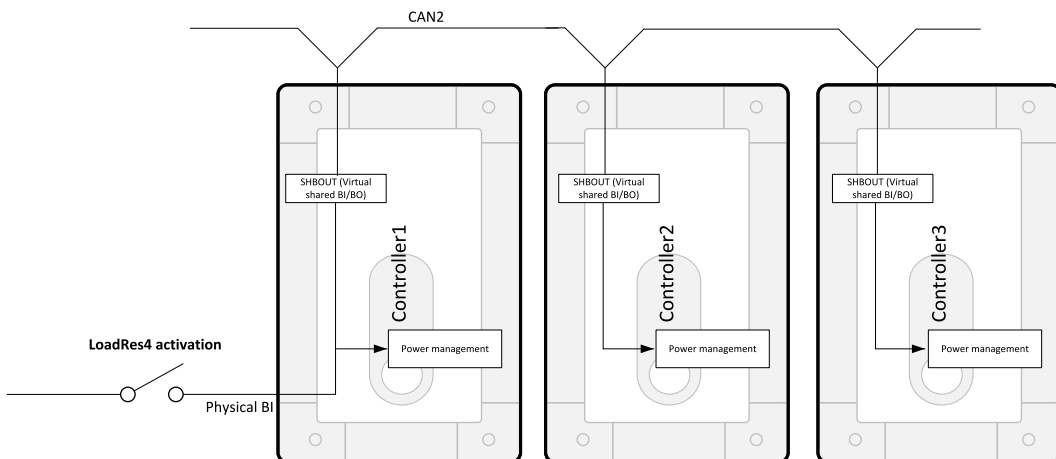
⬅ back to Logical binary inputs alphabetically

Load Res 3 Active

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	50		
Description			
<p>This input is used to activate the load reserve set #3 (learn more about load reserve in the chapter Power Management (page 165)) instead of the set #1, which is active by default. The set #3 is adjusted by setpoints:</p> <ul style="list-style-type: none">> #Starting Load Reserve 3 (page 325) and #Stopping Load Reserve 3 (page 326) if the power management is switched to absolute mode> #Starting Rel Load Reserve 3 (page 327) and #Stopping Rel Load Reserve 3 (page 327) if the power management is switched to relative mode.			
IMPORTANT: All controllers cooperating together in Power management must have the same load reserve set selected.			
<i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus.</i>			
			

⬅ back to Logical binary inputs alphabetically

Load Res 4 Active

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	51		
Description			
<p>This input is used to activate the load reserve set #4 (learn more about load reserve in the chapter Power Management (page 165)) instead of the set #1, which is active by default. The set #4 is adjusted by setpoints:</p> <ul style="list-style-type: none">> #Starting Load Reserve 4 (page 328) and #Stopping Load Reserve 4 (page 329) if the power management is switched to absolute mode> #Starting Rel Load Reserve 4 (page 330) and #Stopping Rel Load Reserve 4 (page 330) if the power management is switched to relative mode.			
<p>IMPORTANT: All controllers cooperating together in Power management must have the same load reserve set selected.</p>			
<p><i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus.</i></p>			
			

⬅ back to Logical binary inputs alphabetically

LBI: M

Mains Fail Block

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	622		
Description			
<p>This logical input simulates healthy Mains even if the Mains parameters are not OK.</p> <p>If this LBI is active, the automatic start of the System during Mains Failure is blocked. In case of running System in AUTO mode, timer Mains Return Delay (page 287) is started. After it elapses behavior is adjusted by Transfer Gen To Mains (page 341).</p>			


⬅ back to Logical binary inputs alphabetically

Manual Load Reconnection

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	60		
Description			
This input is used for manual reconnection of the last disconnected part of the load, if the load has dropped below the setpoint Load Reconnection Level (page 313) . This works only if automatic reconnection is disabled, i.e. the setpoint Auto Load Reconnection (page 314) = Disabled.			

⬆ back to Logical binary inputs alphabetically

MCB Button

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	194		
Description			
This binary input has the same function as MCB button  on an Internal display.			

⬆ back to Logical binary inputs alphabetically

MCB Disable

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	124		
Description			
This binary input is used to prevent MCB closing and opening. <ul style="list-style-type: none">➤ If the input is active during synchronizing, the controller will continue synchronizing without issuing the MCB closing command until the input is deactivated or Sync timeout is elapsed.➤ If the input is active and the MCB Button is pressed in MAN mode to close the MCB to dead bus, the MCB will not be closed until this input is deactivated and the MCB Button is pressed again.➤ If the input is active and the MCB is to be closed to dead bus automatically, the MCB will not be closed until this input is deactivated.➤ If the input is active and MCB is already closed, the breaker will not open.			

⬆ back to Logical binary inputs alphabetically

MCB Feedback

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	65		

Description

Use this input to indicate whether the mains circuit breaker is opened or closed.

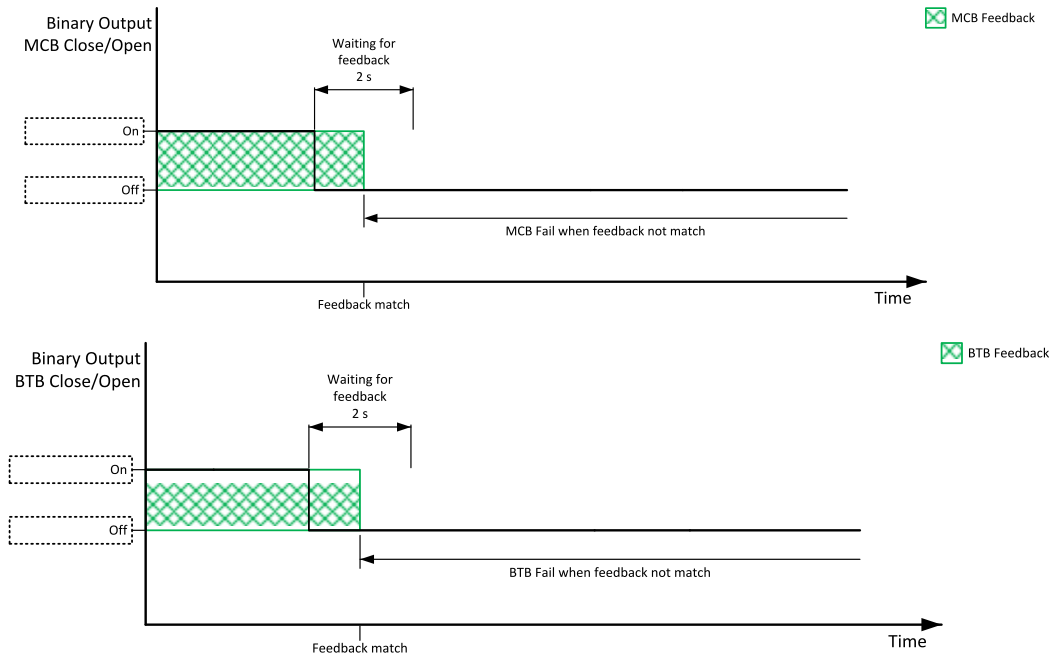
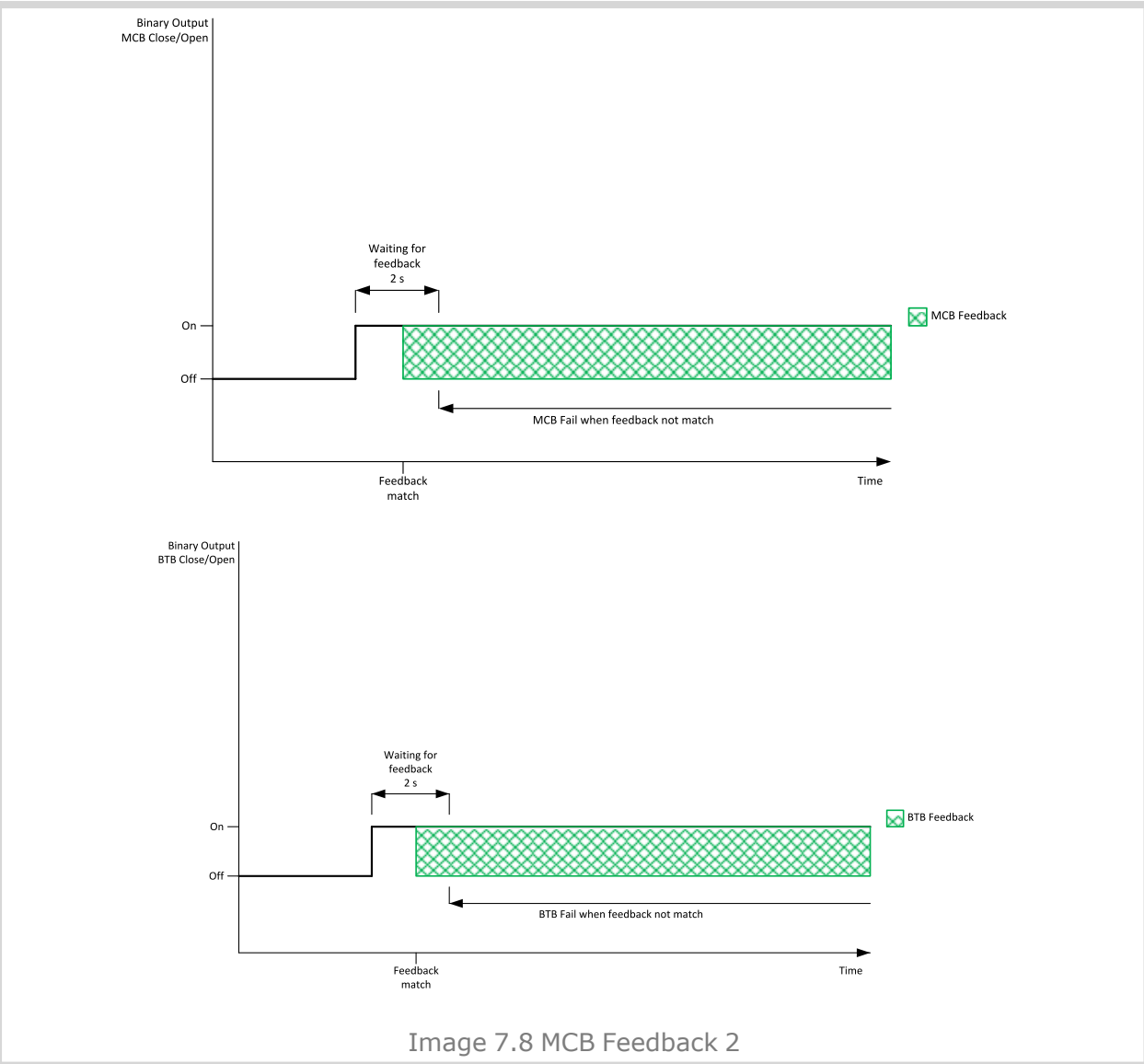


Image 7.7 MCB Feedback 1



🔍 back to Logical binary inputs alphabetically

MCB Feedback Negative

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	66		

Description

Use this input to indicate whether the mains circuit breaker is opened or closed.
This input is logically inverted against LBI **MCB FEEDBACK** (PAGE 547).

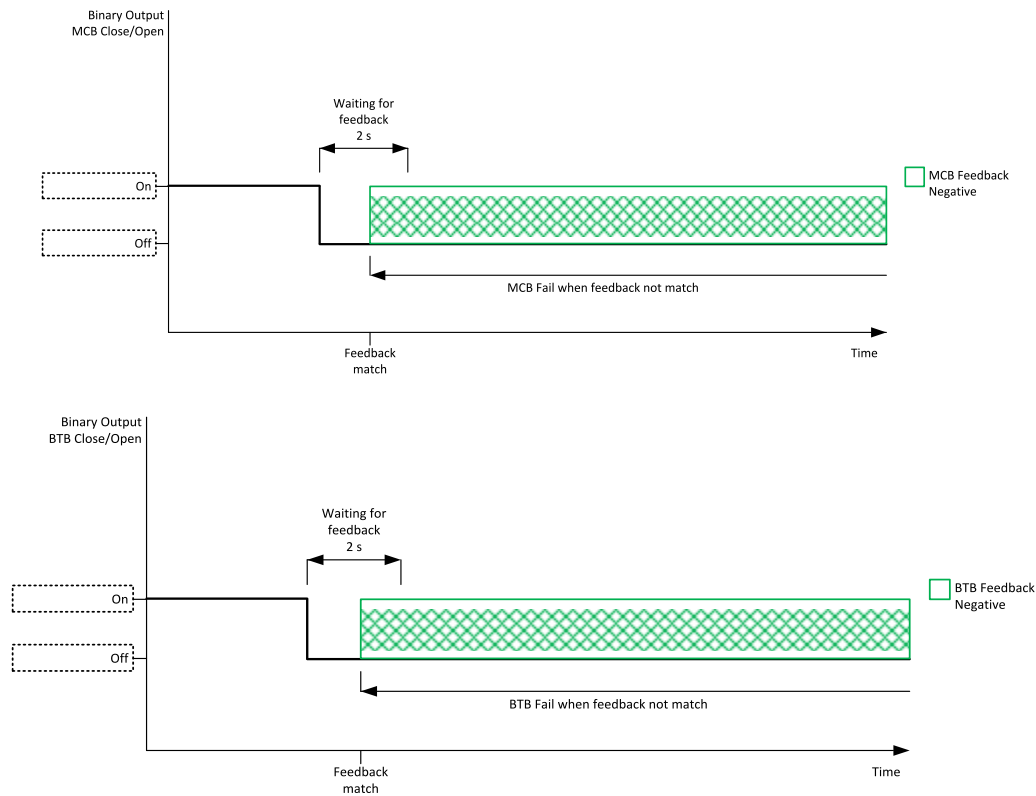


Image 7.9 MCB Feedback 1

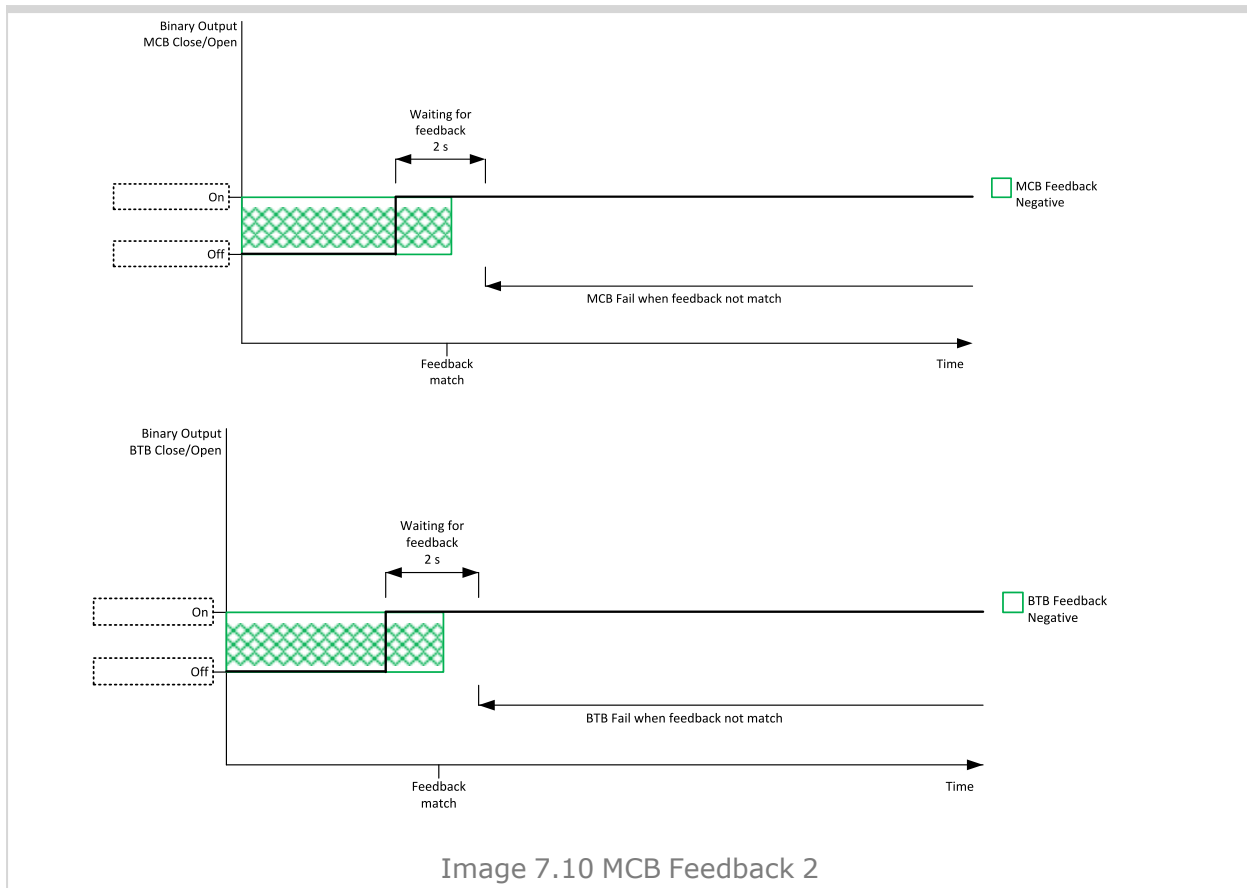


Image 7.10 MCB Feedback 2



back to Logical binary inputs alphabetically

MCB Isolated

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	601		
Description			
This binary input is used as signalization to the CU that Load is cut off from the MCB by the external isolator. That can be useful in case the MCB fails to open, and it is required to run the Systems in Island/Multiple Island operation.			
Note: The alarm <i>Wrn MCB Isolated (page 659)</i> is turned on when the MCB Isolated is active and the MCB is disabled.			

back to Logical binary inputs alphabetically

GCB Button

Related FW	1.0.0	Related applications	MGCB
LBI ID	193		
Description			
Binary input has the same function as MGCB button  on an Internal display.			
IMPORTANT: Control of MGCB is affected by SYSTEM START/STOP (PAGE 591) even in Controller mode (page 267) = MAN. SYSTEM START/STOP (PAGE 591) has to be active before MGCB can be closed. You can activate SYSTEM START/STOP (PAGE 591) for example by pressing the  Start Button.			

⬆ back to Logical binary inputs alphabetically

GCB Disable

Related FW	1.0.0	Related applications	MGCB
LBI ID	62		
Description			
This function is used to prevent MGCB closing and opening.			
<ul style="list-style-type: none"> ➤ If the input is active during synchronizing, the controller will continue synchronizing without issuing the MGCB closing command until the input is deactivated or Sync timeout is elapsed. ➤ If the input is active and the MGCB button is pressed in MAN mode to close the MGCB to dead bus, the MGCB will not be closed until the input is deactivated and the MGCB button pressed again. ➤ If the input is active and the MGCB should be closed to dead bus automatically, the MGCB will not be closed until the input is deactivated. ➤ If the input is active and the MGCB is already closed, the breaker will not open. 			

⬆ back to Logical binary inputs alphabetically

GCB Feedback

Related FW	1.0.0	Related applications	MGCB
LBI ID	63		

Description

Use this input to indicate whether the master generator circuit breaker is opened or closed.

Image 7.11 MGCB Feedback 1

Image 7.12 MGCB Feedback 2

This input is used for connection of the normally open feedback contact from the generator circuit breaker or contactor. If the input is active, the controller will consider the MGCB as closed and vice versa.

- > If the feedback does not respond to a change of the control output **LBO MGCB CLOSE/OPEN (PAGE 584)** within time adjusted in Setpoint **Waiting For Breaker Feedback (page 1)**, and it was already last attempt the specific alarm based on current breaker position is issued.
- > If the feedback changes it's position unexpectedly without any command given by the control output, the Alarm **Wrn MGCB Fail (page 660)** will be issued immediately.

⬅ back to Logical binary inputs alphabetically

GCB Feedback Negative

Related FW	1.0.0	Related applications	MGCB
LBI ID	64		

Description

Use this input to indicate whether the master generator circuit breaker is opened or closed.

This input is used for connection of the normally closed feedback contact from the generator circuit breaker or contactor. This input is optional and if it is configured, it must be always in inverse position to the normally open input LBI **GCB FEEDBACK** (PAGE 552). Maximal allowed time the both inputs are in the same position is 500ms, after this time the Alarm **Wrn MGCB Fail** (page 660) is issued.

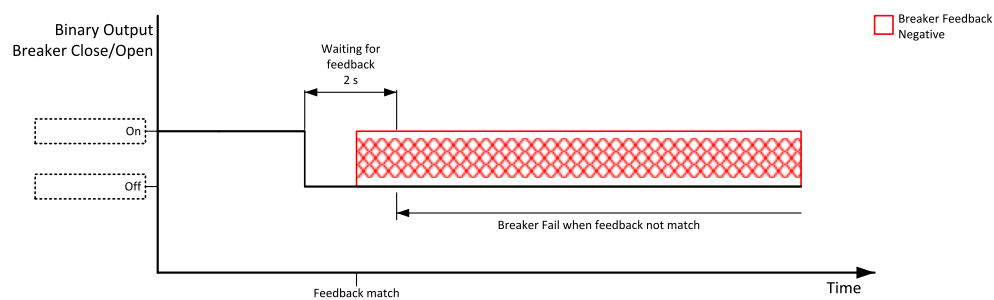


Image 7.13 MGCB Feedback Negative 1

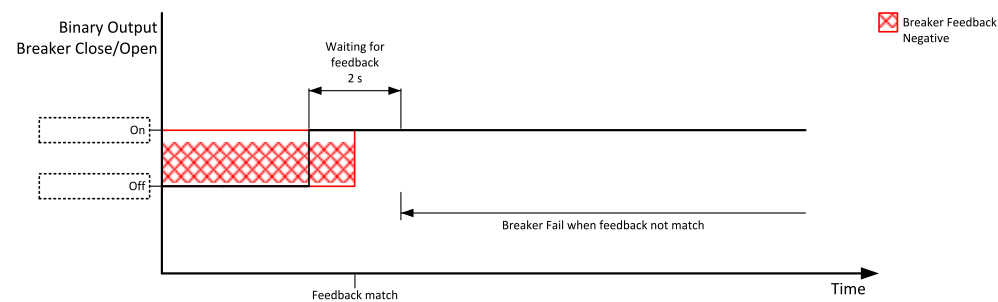


Image 7.14 MGCB Feedback Negative 2

⬅ back to Logical binary inputs alphabetically

Min Run Power Act 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	52		
Description			
This input is used to activate the function Minimal running power #1, which is adjusted by setpoint #Min Run Power 1 (page 331).			
<i>Note: The default value of minimal running power, which takes place while none of the inputs Min Run Power x Act, is 0 kW.</i>			
<i>Note: If more then one binary input for Min Run Power is activated, the one with the higher index has higher priority and it is used.</i>			
IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.			
<i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the diagram of such distribution in the description of the input LOAD RES 2 ACTIVE (PAGE 543).</i>			

⬅ back to Logical binary inputs alphabetically

Min Run Power Act 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	53		
Description			
This input is used to activate the function Minimal running power #2, which is adjusted by setpoint #Min Run Power 2 (page 331).			
Note: The default value of minimal running power, which takes place while none of the inputs Min Run Power x Act, is 0 kW.			
Note: If more then one binary input for Min Run Power is activated, the one with the higher index has higher priority and it is used.			
IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.			
Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the diagram of such distribution in the description of the input LOAD RES 2 ACTIVE (PAGE 543) .			

⬅ back to Logical binary inputs alphabetically

Min Run Power Act 3

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	54		
Description			
This input is used to activate the function Minimal running power #3, which is adjusted by setpoint #Min Run Power 3 (page 332).			
<i>Note: The default value of minimal running power, which takes place while none of the inputs Min Run Power x Act, is 0 kW.</i>			
<i>Note: If more then one binary input for Min Run Power is activated, the one with the higher index has higher priority and it is used.</i>			
IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.			
<i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the diagram of such distribution in the description of the input LOAD RES 2 ACTIVE (PAGE 543).</i>			

◀ back to Logical binary inputs alphabetically

LBI: N

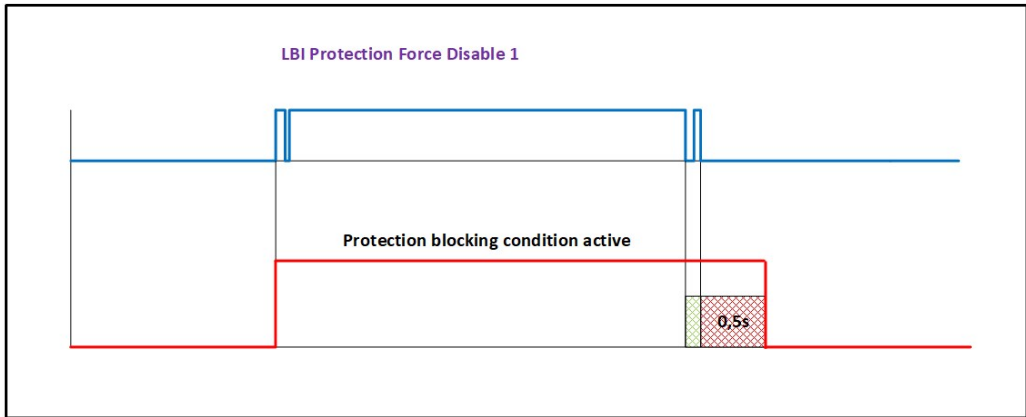
Not Used

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	184		
Description			
Binary input has no function. Use this configuration when binary input is not used.			

◀ back to Logical binary inputs alphabetically

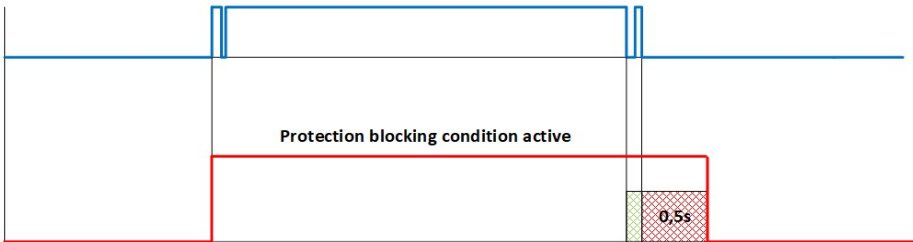
LBI: P

Protection Force Disable 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	16		
Description			
Activation of this LBI disables selected protections.			
Proper history record is written to the history log.			
<div>> Protection Force Disable 1 active</div> <div>> Protection Force Disable 1 inactive</div>			
<div><div><div>LBI Protection Force Disable 1</div></div></div>			

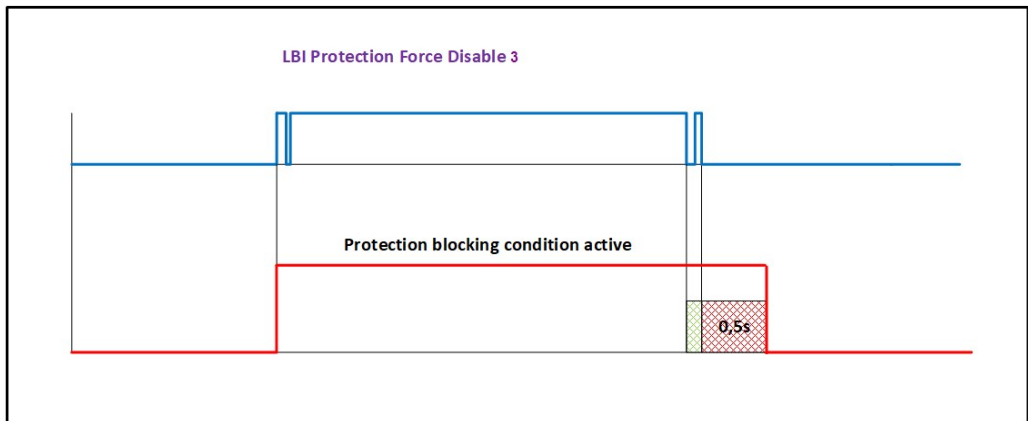
⬆ back to Logical binary inputs alphabetically

Protection Force Disable 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	17		
Description			
Activation of this LBI disables selected protections.			
Proper history record is written to the history log.			
<div>> Protection Force Disable 2 active</div> <div>> Protection Force Disable 2 inactive</div>			
<div><div><div>LBI Protection Force Disable 2</div></div></div>			

⬅ back to Logical binary inputs alphabetically

Protection Force Disable 3

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	18		
Description			
Activation of this LBI disables selected protections.			
Proper history record is written to the history log.			
<div>> Protection Force Disable 3 active</div> <div>> Protection Force Disable 3 inactive</div>			
<div><div>LBI Protection Force Disable 3</div></div>			

⬅ back to Logical binary inputs alphabetically

Pulse Counter 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	87		
Description			
This is the input of the "slow" Pulse Counters (page 194) function which is connected with LBI PULSE COUNTER 1 (PAGE 558).			

⬅ back to Logical binary inputs alphabetically

Pulse Counter 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	88		
Description			
This is the input of the "slow" Pulse Counters (page 194) function which is connected with LBI PULSE COUNTER 2 (PAGE 558).			

⬅ back to Logical binary inputs alphabetically

LBI: R

Remote AUTO

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	620		
Description			
The controller is switched to the AUTO mode when this binary input is closed. When opens controller is switched back to previous mode.			
This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs			
Remote control priority:			
➤ Remote OFF (Highest priority)			
➤ Remote TEST			
➤ Remote MAN			
➤ Remote AUTO (Lowest Priority)			

⬅ back to Logical binary inputs alphabetically

Remote Ctrl Lock

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	4		
Description			
If the input is active, the controller will not accept any actions regarding the system control – e.g. writing of commands and setpoint changes via remote communication interfaces.			

⬅ back to Logical binary inputs alphabetically

Remote MAN

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	618		
Description			
<p>The controller is switched to the MAN mode when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none">➤ Remote OFF (Highest priority)➤ Remote TEST➤ Remote MAN➤ Remote AUTO (Lowest Priority)			

⬅ back to Logical binary inputs alphabetically

Remote OFF

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	617		
Description			
<p>The controller is switched to the OFF mode when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none">➤ Remote OFF (Highest priority)➤ Remote TEST➤ Remote MAN➤ Remote AUTO (Lowest Priority)			

⬅ back to Logical binary inputs alphabetically

Remote Start/Stop

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	38		
Description			
Use this input to start and stop theSystem in AUTO and TEST mode. This information is shared to all controllers in the same group connected to the master controller via CAN.			
Taken action in SPTM application (AUTO Mode)			
Active	Start Bus, synchronization, parallel operation (baseload/Imp/Exp), Regardless the Mains parameters OK. <div><div>➤</div> Start the Bus to Island if Mains Not OK <div>➤</div> Reverse synchronization when Mains gets restored</div>		
Inactive	Unloading of the Bus if it is running in parallel, stop the Bus.		
Taken action in MINT application (AUTO Mode)			
Active	Starts the Bus after #System Start Delay (page 317) if Power Management = Enabled, otherwise it is started immediately.		
Inactive	Stops the Bus after #System Start Delay (page 317) if Power Management = Enabled, otherwise it is stopped immediately.		

Note: In the SPTM application there are more LBIs that can influence the state of the application and can be in the collision with the Common LBI Remote Start/Stop.

⬅ back to Logical binary inputs alphabetically

Remote TEST

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	621		
Description			
<p>The controller is switched to the TEST mode when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none">➤ Remote OFF (Highest priority)➤ Remote TEST➤ Remote MAN➤ Remote AUTO (Lowest Priority)			

⬅ back to Logical binary inputs alphabetically


Rem TEST On Load

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	61		
Description			
Activation of this LBI will start the Gen-sets, close their GCBs and transfer the load from the Mains to the Gen-sets. The MGCB is also closed if selected application mode is MGCB.			
The behavior is the same like if the LBI FORCE ISLAND (PAGE 537) is activated. The load transfer according to the settings is performed.			
IMPORTANT: Do not activate this LBI if the controller is in the OFF mode. When the LBI is deactivated the controller will switch to the OFF mode and the MGCB will be opened without load transfer.			

⬆ back to Logical binary inputs alphabetically


LBI: S

Start Button

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	189		
Description			
Binary input has the same function as Start Button  on an Internal display.			

⬆ back to Logical binary inputs alphabetically

Stop Button

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	190		
Description			
Binary input has the same function as Stop Button  on an Internal display.			

⬆ back to Logical binary inputs alphabetically

Switch To AUT

Related FW	1.0.0	Related applications	MCB, MGCB								
Comm object	1112										
Description											
<p>When the first rising edge appears on the binary input, the MODE is changed to AUTO. Falling edge has no effect and controller stays in AUTO MODE.</p> <p>There is no blocking between these "Switch To" LBIs.</p> <p>Example: CU is in OFF mode. LBI Switch To AUTO is activated – CU goes to AUTO Mode (LBI stays active). Then LBI SWITCH To MAN (PAGE 562) is activated – CU goes to MAN Mode (at this moment, LBIs Switch To OFF and Switch To AUTO are active – CU reacts only on rising edges).</p> <p>When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.</p>											
<table><tr><th colspan="2">"GO to" control priority</th></tr><tr><td>Highest</td><td>OFF</td></tr><tr><td></td><td>MAN</td></tr><tr><td>Lowest</td><td>AUTO</td></tr></table>				"GO to" control priority		Highest	OFF		MAN	Lowest	AUTO
"GO to" control priority											
Highest	OFF										
	MAN										
Lowest	AUTO										

🔍 back to Logical binary inputs alphabetically

Switch To MAN

Related FW	1.0.0	Related applications	MCB, MGCB								
Comm object	1111										
Description											
When the first rising edge appears on the binary input, the MODE is changed to MAN. Falling edge has no effect and controller stays in MAN MODE.											
There is no blocking between these "Switch To" LBIs.											
<div>Example: CU is in OFF mode. LBI Switch To MAN is activated – CU goes to MAN Mode (LBI stays active). Then LBI SWITCH To AUT (PAGE 562) is activated – CU goes to AUTO Mode (at this moment, LBIs Switch To MAN and Switch To AUTO are active – CU reacts only on rising edges).</div>											
When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.											
<table><tr><th colspan="2">"GO to" control priority</th></tr><tr><td>Highest</td><td>OFF</td></tr><tr><td></td><td>MAN</td></tr><tr><td>Lowest</td><td>AUTO</td></tr></table>				"GO to" control priority		Highest	OFF		MAN	Lowest	AUTO
"GO to" control priority											
Highest	OFF										
	MAN										
Lowest	AUTO										

🔍 back to Logical binary inputs alphabetically

Switch To OFF

Related FW	1.0.0	Related applications	MCB, MGCB								
Comm object	1110										
Description											
When the first rising edge appears on the binary input, the MODE is changed to OFF. Falling edge has no effect and controller stays in OFF MODE.											
There is no blocking between these "Switch To" LBIs.											
<div>Example:</div> CU is in MAN mode. LBI Switch To OFF is activated – CU goes to OFF Mode (LBI stays active). Then LBI SWITCH To AUT (PAGE 562) is activated – CU goes to AUTO Mode (at this moment, LBIs Switch To OFF and Switch To AUTO are active – CU reacts only on rising edges).											
When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.											
<table><tr><th colspan="2">"GO to" control priority</th></tr><tr><td>Highest</td><td>OFF</td></tr><tr><td></td><td>MAN</td></tr><tr><td>Lowest</td><td>AUTO</td></tr></table>				"GO to" control priority		Highest	OFF		MAN	Lowest	AUTO
"GO to" control priority											
Highest	OFF										
	MAN										
Lowest	AUTO										

🔍 back to Logical binary inputs alphabetically

Synchronization Disabled

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	277		
Description			
This binary input is used to disable the forward and reverse synchronization process so the controller won't attempt to close breaker(s) if synchronization would be needed.This LBI is useful if user want to set the additional condition for start of the synchronization.			

🔍 back to Logical binary inputs alphabetically

LBI: T

Time Stamp Act

Related FW	1.0.0	Related applications	MCB, MGCB
LBI ID	125		
Description			
This binary input is used as activation condition for periodic history records if setpoint Time Stamp Act (page 1) is set to Condition.			

🔍 back to Logical binary inputs alphabetically

8.1.5 Logical binary outputs

What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

Alphabetical groups of Logical binary outputs

LBO: A	566
LBO: B	569
LBO: C	569
LBO: D	571
LBO: E	572
LBO: F	574
LBO: H	575
LBO: I	576
LBO: L	576
LBO: M	579
LBO: N	589
LBO: P	589
LBO: R	590
LBO: S	590

For full list of Logical binary outputs go to the chapter **Logical binary outputs alphabetically (page 565)**.

Logical binary outputs alphabetically

LBO: A	566	LBO: E	572	MCB Status	582
AL Common Breaker Open		Electrical Alarm	572	MCB UV Coil	583
and Cooldown	566	Engines Swapped	572	MGCB Button Echo	584
AI Common Fls	566	Exercise Timer 1	572	MGCB Close/Open	584
Alarm	566	Exercise Timer 2	573	MGCB OFF Coil	585
Alarm Bus Frequency	566	Exercise Timer 3	573	MGCB ON Coil	586
Alarm Bus Voltage	566	Exercise Timer 4	573	MGCB Status	587
AL Common Shutdown		Exercise Timer 5	574	MGCB UV Coil	587
Override	567	Exercise Timer 6	574	Minimal Power PTM	
Alarm Flashing	567	LBO: F	574	Limitation	588
Alarm Bus	567	FltRes Button Echo	574	Mode AUTO	588
Alarm Bus Frequency	567	Forward Synchronization	574	Mode MAN	588
Alarm Bus Voltage	567	LBO: H	575	Mode OFF	589
Alarm Overcurrent	568	Heartbeat	575	Mode TEST	589
All Available Gen-sets Run	568	History Record Indication	575	LBO: N	589
Any GCB Closed	568	Horn	575	Not In Auto	589
Any Other GCB Closed	568	Horn Flashing	575	Not Used	589
LBO: B	569	HornRes Button Echo	575	LBO: P	589
Bus Healthy	569	LBO: I	576	Peak Shaving Active	589
LBO: C	569	In Mains Parallel	576	Peripheral Module Comm	
Common Alarm Active		In Synchronism	576	Fail	590
Level 1	569	Initialized	576	Process Power Limitation	590
Common Alarm Active		LBO: L	576	LBO: R	590
Level 2	569	Load Reduction Active	576	Reverse Synchronization	590
Common Alarm Level 1	569	Load Shedding Stage 1	577	LBO: S	590
Common Alarm Level 2	569	Load Shedding Stage 2	577	Start Button Echo	590
Common Alarm Only	570	Load Shedding Stage 3	577	Stop Button Echo	590
Common History Record	570	Load Shedding Stage 5	578	System Ready	591
Common Mains Protection	570	Load Shedding Stage 6	578	System Reserve OK	591
Common Mains Protection		Logical 0	578	System Start/Stop	591
+ FltRes	570	Logical 1	579	Sync To Mains Allowed	592
Common System Stop	571	LBO: M	579		
Common Warning	571	Mains Healthy	579		
Controller HeartBeat Fail		MCB Button Echo	579		
Detect	571	MCB Close/Open	579		
LBO: D	571	MCB OFF Coil	580		
Deadbus	571	MCB ON Coil	581		
Display Fail	572				

🔍 back to Controller objects

LBO: A

AL Common Breaker Open and Cooldown

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	9		
Description			
This output is closed when there is at least one alarm of type BOC present in the alarmlist.			
Note: When any BOC alarm is activated the GCB opens immediately and the Controller stops by standard stopping sequence.			

⬆ back to Logical binary outputs alphabetically

AI Common FIs

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	6		
Description			
description.			

⬆ back to Logical binary outputs alphabetically

Alarm

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2		
Description			
The output is designed to be used as external alarm indication such as a red bulb in the control room etc.			
The output is active when at least one unconfirmed alarm is present in the alarmlist and remains active until confirmation of alarm.			

⬆ back to Logical binary outputs alphabetically

Alarm Bus Frequency

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1266		
Description			
This output is active when at least 1 protection caused by Bus <>f Protection (page 302) is active.			

⬆ back to Logical binary outputs alphabetically

Alarm Bus Voltage

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1263		
Description			
This output is active when at least 1 alarm caused by Bus <>V Protection (page 299) is present in the alarmlist.			

⬆ back to Logical binary outputs alphabetically

AL Common Shutdown Override

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	251		
Description			
This output is closed 2 seconds after there is at least one alarm of type Protection types (page 186) present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Alarm Flashing

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	28		
Description			
This is the flashing alternative of the output ALARM (PAGE 566) , i.e. the output flashes with 1 Hz period while the output Alarm is closed.			

⬅ back to Logical binary outputs alphabetically

Alarm Bus

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	197		
Description			
This output is active when at least 1 protection caused by , Mains <>V Protection (page 296) , Mains <>f Protection (page 301) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Bus Frequency

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1271		
Description			
This output is closed when at least 1 protection caused by Mains <>f Protection (page 301) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Bus Voltage

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1270		
Description			
This output is closed when at least 1 protection caused by Mains <>V Protection (page 296) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Overcurrent

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	109		
Description			
This output is active while at least one of the following overcurrent protection is active IDMT Mains Overcurrent Protection (page 293) .			

◀ back to Logical binary outputs alphabetically

All Available Gen-sets Run

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	122		
Description			
This output is closed when all available Gen-sets within the Control Group (page 337) are loaded.			
Note: Gen-set is available if Power Management = Enabled, Controller Mode (page 472) = AUTO and there is not present Alarms level 2 (page 677) in the alarmlist.			

◀ back to Logical binary outputs alphabetically

Any GCB Closed

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	222		
Description			
This output is active when a GCB of any controller connected via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) is closed.			
Note: This function works on CAN16 (page 475) - CAN32 (page 475) values, therefore it ignores Control Groups (page 112).			

◀ back to Logical binary outputs alphabetically

Any Other GCB Closed

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1827		
Description			
This output is active when a GCB of any other controller connected via Terminal Diagram (page 33) and/or Terminal Diagram (page 33) is closed.			
Note: This function works on CAN16 (page 475) - CAN32 (page 475) values, therefore it ignores Control Groups (page 112).			

◀ back to Logical binary outputs alphabetically

LBO: B

Bus Healthy

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	77		
Description			
This output is closed while Gen parameters (voltage & frequency) are considered as healthy, i.e. within limits.			

🔍 back to Logical binary outputs alphabetically

LBO: C

Common Alarm Active Level 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	13		
Description			
This output is closed when there is at least one Alarms level 1 (page 633) in the alarmlist.			

🔍 back to Logical binary outputs alphabetically

Common Alarm Active Level 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	15		
Description			
This output is closed when there is at least one Alarms level 2 (page 677) in the alarmlist.			

🔍 back to Logical binary outputs alphabetically

Common Alarm Level 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	14		
Description			
This output is closed when there is at least one unconfirmed Alarms level 1 (page 633) in the alarmlist.			

🔍 back to Logical binary outputs alphabetically

Common Alarm Level 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	16		
Description			
This output is closed when there is at least one unconfirmed Alarms level 2 (page 677) in the alarmlist.			

🔍 back to Logical binary outputs alphabetically

Common Alarm Only

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	11		
Description			
This output is closed when there is at least one alarm of type Alarm Only present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common History Record

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	12		
Description			
This output is closed for 1 second every time alarm of type History Record Only (page 672) occurs.			
Note: When any History Record alarm is activated the history record is logged into history.			

⬅ back to Logical binary outputs alphabetically

Common Mains Protection

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	10		
Description			
This output is closed when there is at least one active alarm of type Mains Protection (page 186) .			

⬅ back to Logical binary outputs alphabetically

Common Mains Protection + FltRes

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	4		
Description			
This output is closed when there is at least one active alarm of type Mains Protection + FltRes (page 186) present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common System Stop

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	5		
Description			
This output is closed when there is at least one alarm of type System Stop (page 688) present in the alarmlist.			
<p>Note: When any Stp alarm is activated and there is another Bus that is currently not running loaded and it is Ready for Power management the controller will wait for #Slow Stop Delay (page 333) and then starts unloading if it is possible. If there is no other Bus in such state the controller starts unloading immediately without the delay.</p>			
<p>Note: When any Stp alarm is activated LBO System Start/Stop is immediately set to 0 and MGCB breaker is opened according to the Load Transfer settings.</p>			

⬅ back to Logical binary outputs alphabetically

Common Warning

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	3		
Description			
This output is closed when there is at least one alarm of type Warning (page 636) present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Controller HeartBeat Fail Detect

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1177		
Description			
description.			

⬅ back to Logical binary outputs alphabetically

LBO: D

Deadbus

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2675		
Description			
This output is active when the Bus is considered to be dead (Bus voltage is below relative value set by the setpoint Bus Dead Level (page 265)).			

⬅ back to Logical binary outputs alphabetically

Display Fail

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2223		
Description			
This output indicates controller display failure.			

⬆ back to Logical binary outputs alphabetically

LBO: E

Electrical Alarm

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2410		
Description			
LBO Electrical Alarm is active when any of generator protections of any alarm level type is active. LBO Electrical Alarm is deactivated by confirmation of Mains protection alarms in alarmlist and simultaneously Mains protections alarms has to be inactive.			

⬆ back to Logical binary outputs alphabetically

Engines Swapped

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	208		
Description			
When the master controller (controller with the lowest Controller Address) swaps priority of two Controllers, the master controller generates 100 ms pulse with the output. The output works with the setpoint #Priority Auto Swap (page 316) if it is setup to Run Hours Equal.			

⬆ back to Logical binary outputs alphabetically

Exercise Timer 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1250		
Description			
This output is closed when the Exercise timer 1 is activated. The output can be used to make periodic tests of the System, breakers, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 1 (page 365) subgroup.			
Note: If more than one timer is active at the same time, timer with selected higher priority function is applied.			

⬆ back to Logical binary outputs alphabetically

Exercise Timer 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1251		
Description			
<p>This output is closed when the Exercise timer 2 is activated. The output can be used to make periodic tests of the System, breakers, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 2 (page 367) subgroup.</p>			
<p>Note: <i>If more than one timer is active at the same time, timer with selected higher priority function is applied.</i></p>			

⬅ back to Logical binary outputs alphabetically

Exercise Timer 3

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1946		
Description			
<p>This output is closed when the Exercise timer 3 is activated. The output can be used to make periodic tests of the System, breakers, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 3 (page 369) subgroup.</p>			
<p>Note: <i>If more than one timer is active at the same time, timer with selected higher priority function is applied.</i></p>			

⬅ back to Logical binary outputs alphabetically

Exercise Timer 4

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1947		
Description			
<p>This output is closed when the Exercise timer 4 is activated. The output can be used to make periodic tests of the System, breakers, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 4 (page 371) subgroup.</p>			
<p>Note: <i>If more than one timer is active at the same time, timer with selected higher priority function is applied.</i></p>			

⬅ back to Logical binary outputs alphabetically

Exercise Timer 5

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1948		
Description			
This output is closed when the Exercise timer 5 is activated. The output can be used to make periodic tests of the System, breakers, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 5 (page 373) subgroup.			
<i>Note: If more than one timer is active at the same time, timer with selected higher priority function is applied.</i>			

⬅ back to Logical binary outputs alphabetically


Exercise Timer 6

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1949		
Description			
<p>This output is closed when the Exercise timer 6 is activated. The output can be used to make periodic tests of the System, breakers, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 6 (page 375) subgroup.</p>			
<p>Note: <i>If more than one timer is active at the same time, timer with selected higher priority function is applied.</i></p>			

⬅ back to Logical binary outputs alphabetically

LBO: F

FltRes Button Echo

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	30		
Description			
This output provides 1 s pulse when:			
<div><div>></div><div>Fault Reset button  is pressed on an Internal display.</div></div>			
<div><div>></div><div>Fault Reset command is received via communication line</div></div>			
<div><div>></div><div>LBI FAULT RESET BUTTON (PAGE 537) is activated.</div></div>			

⬅ back to Logical binary outputs alphabetically

Forward Synchronization

Related FW	1.0.0	Related applications	, MGCB
LBO ID	68		
Description			
This output is closed when forward synchronization is active (synchronization via MGCB breaker) and opens when LBO MGCB STATUS (PAGE 587) closes.			

⬅ back to Logical binary outputs alphabetically

LBO: H

Heartbeat

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	81		
Description			
This output toggles on/off in a period of 500 ms whenever the controller is switched on and functional.			



⬅ back to Logical binary outputs alphabetically

History Record Indication

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2762		
Description			
description.			

⬅ back to Logical binary outputs alphabetically

Horn

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1		
Description			
This output is closed when any Alarms (page 633) is activated and stays closed until:			
<ul style="list-style-type: none">> Fault reset  is pressed> Horn reset  is pressed> Horn Timeout (page 268) elapses			

⬅ back to Logical binary outputs alphabetically

Horn Flashing

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	29		
Description			
This is the flashing alternative of the output HORN (PAGE 575), i.e. the output flashes with 1 Hz period while the output Horn is closed.			

⬅ back to Logical binary outputs alphabetically

HornRes Button Echo

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	31		
Description			
This output is closed for 1 s every time Horn Reset Button is pressed.			

⬅ back to Logical binary outputs alphabetically

LBO: I

In Mains Parallel

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2132		
Description			
This output is closed when the parallel bus voltage and Mains voltage is present and breakers are closed.			

⬅ back to Logical binary outputs alphabetically

In Synchronism

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	80		
Description			
This output is closed during synchronization when Slip Angle, Slip Frequency and Voltages are inside required windows.			
Required windows are:			
<ul style="list-style-type: none">➤ Slip Angle (page 448) between Mains and Bus Voltage is within range given by Phase Window (page 349) for time longer than Dwell Time (page 349). Required if Synchronization Type (page 347) = PhaseMatch.➤ Slip Frequency (page 448) between between Mains and Bus Frequency is withing range given by Slip Frequency Window (page 350) for time longer than Dwell Time (page 349). Required if Synchronization Type (page 347) = SlipSynchr.➤ Voltage difference between Mains and Bus voltage in all phases must be lower or equal to Voltage Window (page 348) for time longer than Dwell Time (page 349). Required always.			

⬅ back to Logical binary outputs alphabetically

Initialized

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1222		
Description			
This output is activated after the controller is initialized. It can be used to block some PLC logic blocks while controller initialization is being proceeded.			

⬅ back to Logical binary outputs alphabetically

LBO: L

Load Reduction Active

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1245		
Description			
This output is closed when Load reduction is active.			

⬅ back to Logical binary outputs alphabetically

Load Shedding Stage 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	51		
Description			
This is an output of Load Shedding (page 134) .			
<div><div>></div>The load shedding outputs are activated in the order 1, 2, 3, ..., X.</div> <div><div>></div>The load shedding outputs are deactivated in the order X, ..., 3, 2, 1.</div> <div><div>></div>The load disconnected by this LBO is the least essential load.</div>			
Note: <i>X is the highest configured Load shedding outputs (page 135).</i>			

🔍 back to Logical binary outputs alphabetically

Load Shedding Stage 2

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	52		
Description			
This is an output of Load Shedding (page 134) .			
<div><div>></div><div>The load shedding outputs are activated in the order 1, 2, 3, ..., X.</div></div>			
<div><div>></div><div>The load shedding outputs are deactivated in the order X, ..., 3, 2, 1.</div></div>			
<div><div>></div><div>The load disconnected by LBO LOAD SHEDDING STAGE 1 (PAGE 577) is the least essential load.</div></div>			
Note: X is the highest configured Load shedding outputs (page 135) .			

🔍 back to Logical binary outputs alphabetically

Load Shedding Stage 3

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	53		
Description			
This is an output of Load Shedding (page 134) .			
<div><div>></div><div>The load shedding outputs are activated in the order 1, 2, 3, ..., X.</div></div>			
<div><div>></div><div>The load shedding outputs are deactivated in the order X, ..., 3, 2, 1.</div></div>			
<div><div>></div><div>The load disconnected by LBO LOAD SHEDDING STAGE 1 (PAGE 577) is the least essential load.</div></div>			
Note: X is the highest configured Load shedding outputs (page 135) .			

🔍 back to Logical binary outputs alphabetically

Load Shedding Stage 4

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	452		
Description			
This is an output of Load Shedding (page 134) .			
<ul style="list-style-type: none">➤ The load shedding outputs are activated in the order 1, 2, 3, ..., X.➤ The load shedding outputs are deactivated in the order X, ..., 3, 2, 1.➤ The load disconnected by LBO LOAD SHEDDING STAGE 1 (PAGE 577) is the least essential load.			
Note: X is the highest configured Load shedding outputs (page 135).			

⬅ back to Logical binary outputs alphabetically

Load Shedding Stage 5

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	453		
Description			
This is an output of Load Shedding (page 134) .			
<ul style="list-style-type: none">➤ The load shedding outputs are activated in the order 1, 2, 3, ..., X.➤ The load shedding outputs are deactivated in the order X, ..., 3, 2, 1.➤ The load disconnected by LBO LOAD SHEDDING STAGE 1 (PAGE 577) is the least essential load.			
Note: X is the highest configured Load shedding outputs (page 135).			

⬅ back to Logical binary outputs alphabetically

Load Shedding Stage 6

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	454		
Description			
This is an output of Load Shedding (page 134) .			
<ul style="list-style-type: none">➤ The load shedding outputs are activated in the order 1, 2, 3, ..., X.➤ The load shedding outputs are deactivated in the order X, ..., 3, 2, 1.➤ The load disconnected by LBO LOAD SHEDDING STAGE 1 (PAGE 577) is the least essential load.			
Note: X is the highest configured Load shedding outputs (page 135).			

⬅ back to Logical binary outputs alphabetically

Logical 0

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	26		
Description			
Logical binary output which is still in logical 0.			

⬅ back to Logical binary outputs alphabetically

Logical 1

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	27		
Description			
Logical binary output which is still in logical 1.			

⬆ back to Logical binary outputs alphabetically

LBO: M

Mains Healthy

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	78		
Description			
This output is closed while Mains parameters (voltage & frequency) are considered as healthy, i. e. within limits.			

⬆ back to Logical binary outputs alphabetically


MCB Button Echo

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	34		
Description			
This output is closed for 1 s every time MCB Button is pressed.			

⬆ back to Logical binary outputs alphabetically

MCB Close/Open

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	45		
Description			
The output controls the mains circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 2 seconds to a close or open command, otherwise an alarm is issued.			

 MCB Feedback

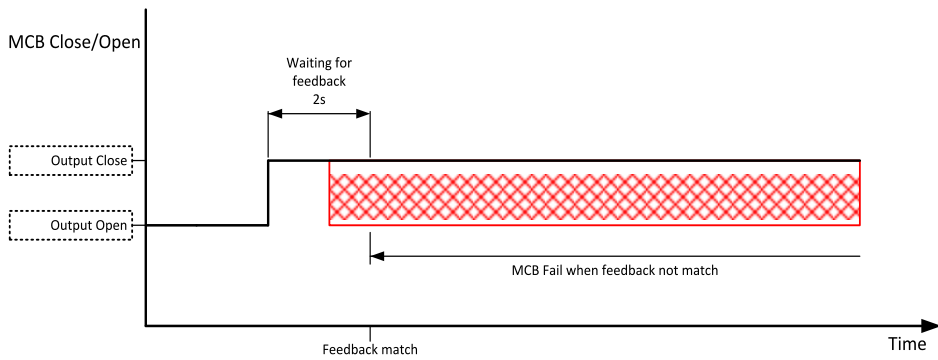


Image 7.15 MCB Close command

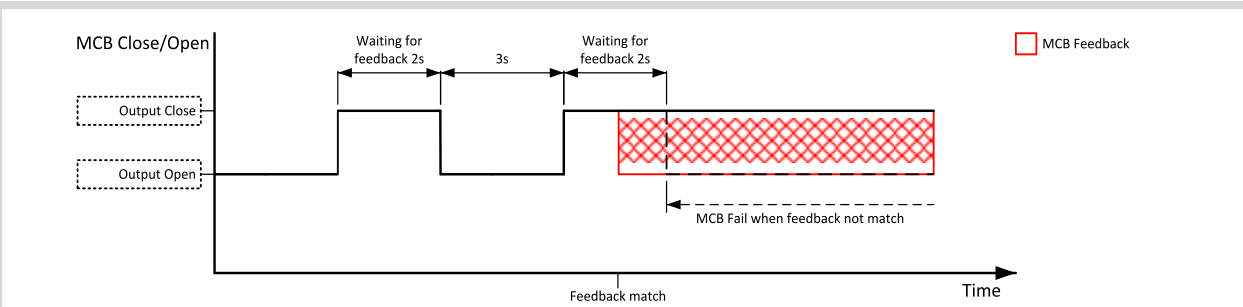


Image 7.16 Repeated MCB Close command

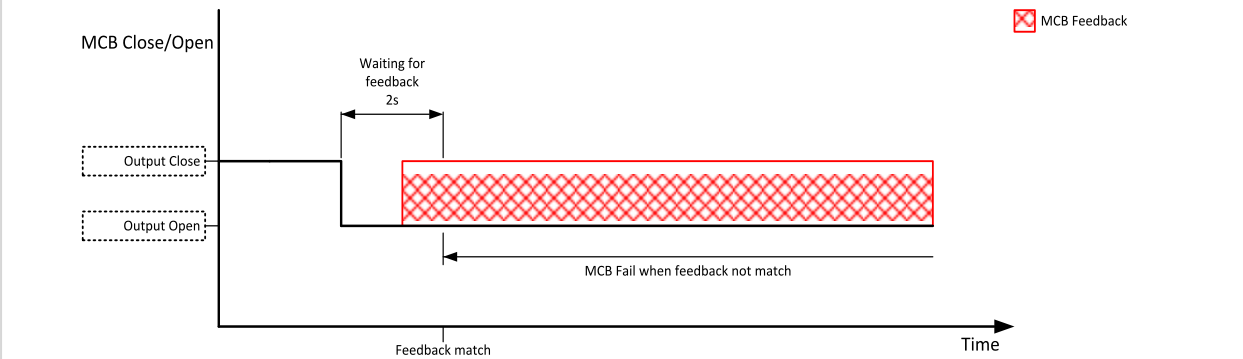


Image 7.17 MCB Open command

back to Logical binary outputs alphabetically

MCB OFF Coil

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	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 2 seconds.

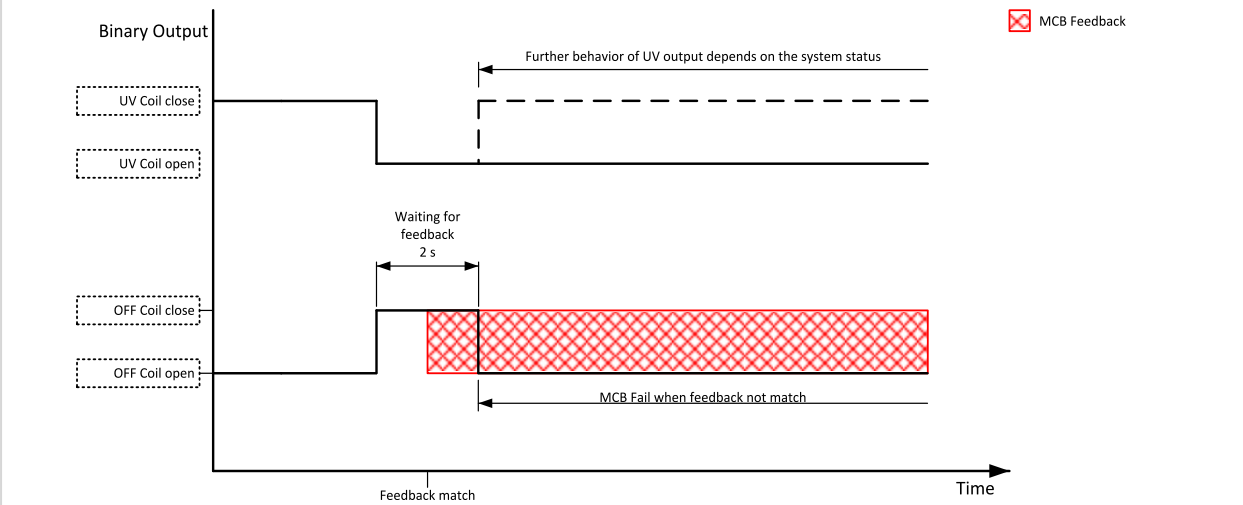


Image 7.18 MCB OFF Coil command

back to Logical binary outputs alphabetically

MCB ON Coil

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	46		

Description

The output is intended for control of close coil of mains circuit breaker. The output gives at least 2 second pulse in the moment the breaker has to be closed.

Image 7.19 MCB ON Coil close command

Image 7.20 Repeated MCB ON coil close command

[back to Logical binary outputs alphabetically](#)

MCB Status

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	85		
Description			
<p>This output indicates the MCB position as it is internally considered by the controller. The position is based on MCB FEEDBACK (PAGE 547) and MCB FEEDBACK NEGATIVE (PAGE 549).</p> <ul style="list-style-type: none">➤ In case that only MCB FEEDBACK (PAGE 547) is used, this output mirrors the input.➤ In case that both MCB FEEDBACK (PAGE 547) and MCB FEEDBACK NEGATIVE (PAGE 549) are used and<ul style="list-style-type: none">➤➤ Feedback match - output indicates MCB position according to feedbacks.➤➤ Feedback do not match - output indicates last position when feedbacks matched.			

🔍 back to Logical binary outputs alphabetically

MCB UV Coil

Related FW	1.0.0	Related applications	MCB, MGCb
LBO ID	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 2 seconds in the moment the breaker has to be switched off.

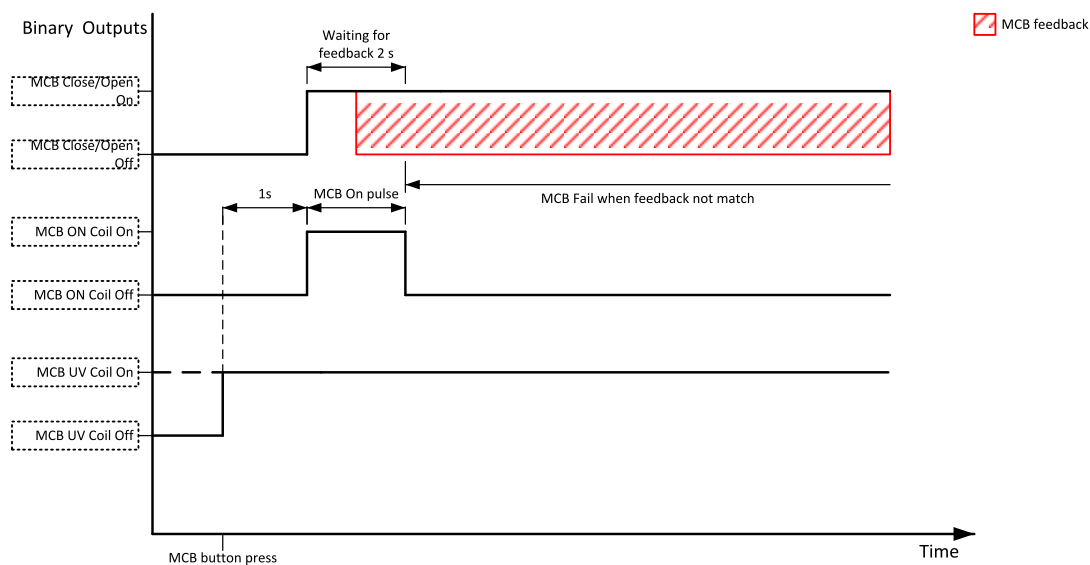


Image 7.21 MCB UV Coil close command

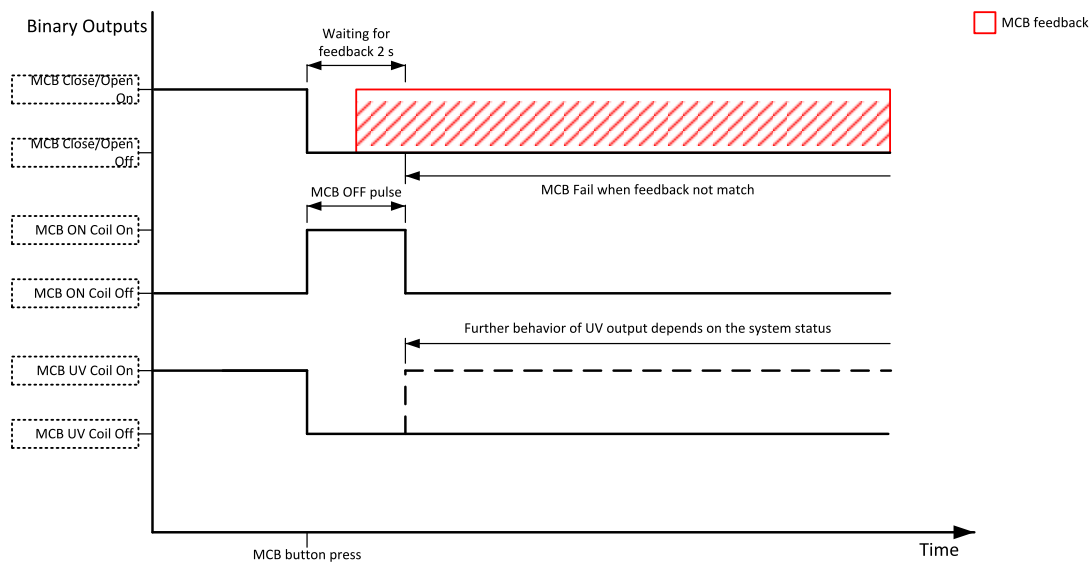


Image 7.22 MCB UV Coil open command

⬅ back to Logical binary outputs alphabetically

MGCB Button Echo

Related FW	1.0.0	Related applications	, MGCB
LBO ID	35		
Description			
<p>This output is closed for 1s every time MGCB Button is pressed.</p> <p>That means:</p> <ul style="list-style-type: none">MGCB button is pressed on the controller front panel orMGCB button is pressed on any of external local/remote terminals orMGCB close/open command is received via communication line			

⬅ back to Logical binary outputs alphabetically

MGCB Close/Open

Related FW	1.0.0	Related applications	, MGCB
LBO ID	41		
Description			
<p>The output controls the primary master generator circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 2 seconds to a close or open command, otherwise an alarm Wrn MGCB Fail (page 660) is activated.</p>			

Image 7.23 MGCB Close command

Image 7.24 Repeated MGCB Close command

⬅ back to Logical binary outputs alphabetically

MGCB OFF Coil

Related FW	1.0.0	Related applications	, MGCB
LBO ID	43		
Description			
<p>The output is intended for control of open coil of primary master generator circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 2 seconds.</p>			
<p>The diagram illustrates the timing of the MGCB OFF Coil command. It features a vertical axis for 'Binary Output' and a horizontal axis for 'Time'. Four output lines are shown: 'UV Coil close' (dashed box), 'UV Coil open' (solid line), 'OFF Coil close' (dashed box), and 'OFF Coil open' (solid line). The 'UV Coil close' signal transitions from high to low, followed by a 'Waiting for feedback 2s' period. The 'OFF Coil close' signal transitions from high to low, and the 'OFF Coil open' signal transitions from low to high. A red hatched area indicates the 'Breaker Feedback' signal, which is active during the 'Waiting for feedback 2s' period. A legend shows a red hatched box with an 'X' labeled 'Breaker Feedback'. A 'Feedback match' event is marked on the time axis. A dashed line indicates 'Further behavior of UV output depends on the system status'. A horizontal arrow at the bottom indicates 'Fail when feedback not match'.</p>			
Image 7.25 MGCB OFF Coil command			

⬆ back to Logical binary outputs alphabetically

MGCB ON Coil

Related FW	1.0.0	Related applications	, MGCB
LBO ID	42		

Description

The output is intended for control of close coil of **primary** master generator circuit breaker. The output gives at least 2 second pulse in the moment the breaker has to be closed.

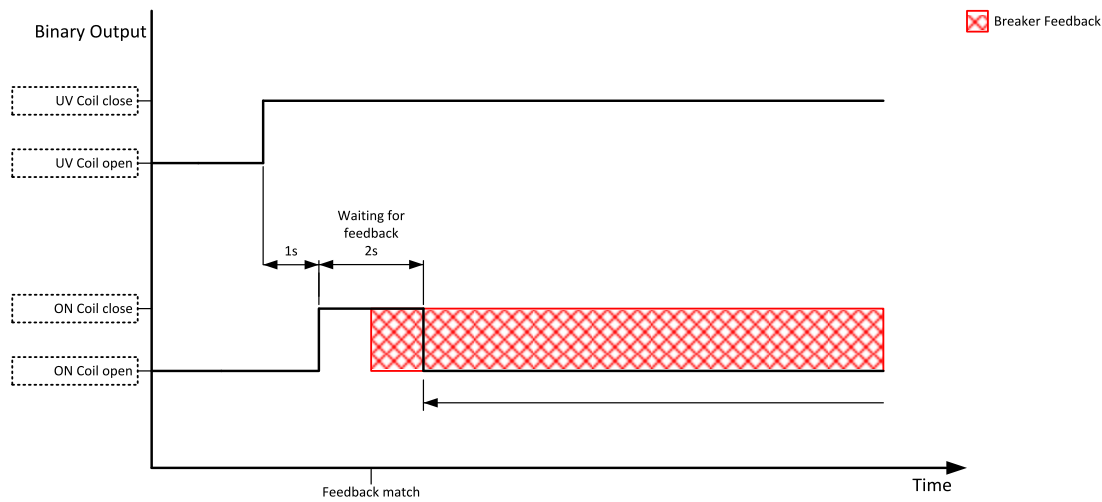


Image 7.26 MGCB ON Coil close command

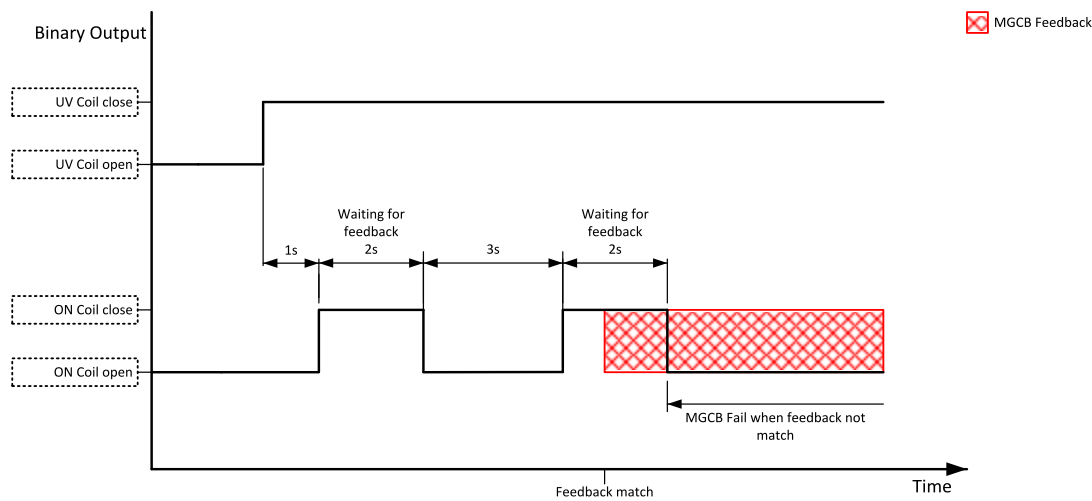


Image 7.27 Repeated MGCB ON coil close command

⬅ back to Logical binary outputs alphabetically

MGCB Status

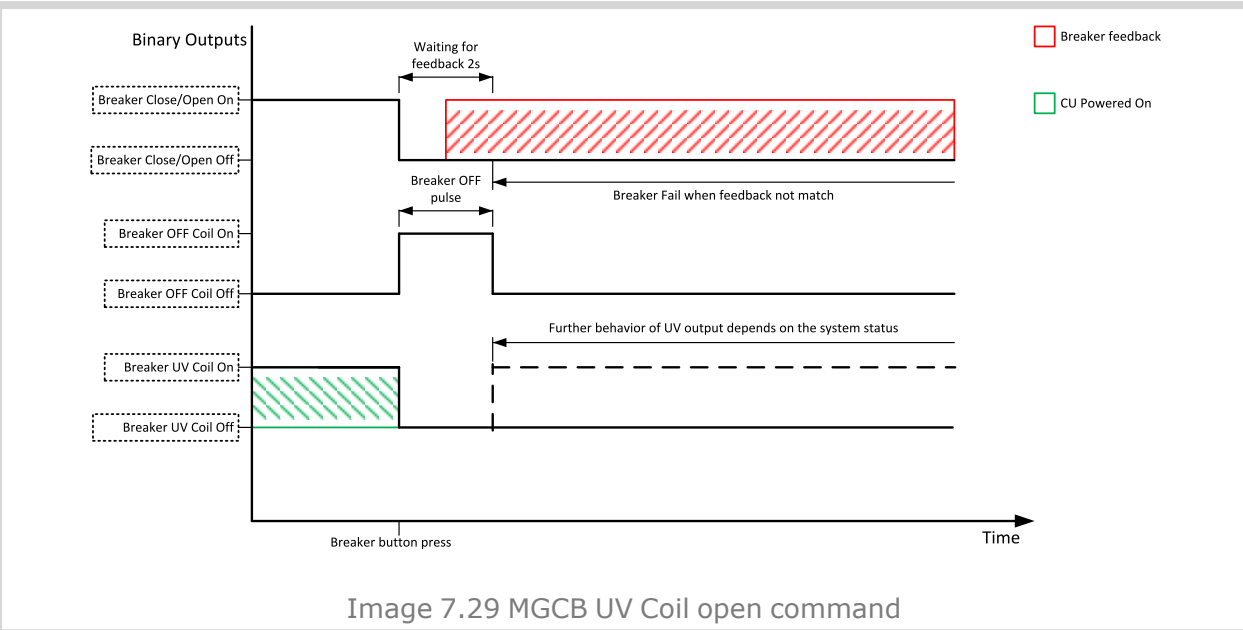
Related FW	1.0.0	Related applications	, MGCB
LBO ID	84		
Description			
This output indicates the MGCB position as it is internally considered by the controller. The position is based on GCB FEEDBACK (PAGE 552) and GCB FEEDBACK NEGATIVE (PAGE 553) .			
<ul style="list-style-type: none">> In case that only positive feedback is used, this output mirrors the feedback.> In case that both feedbacks are used and<ul style="list-style-type: none">>> Feedbacks match each other - the output indicates MGCB position according to feedbacks.>> Feedbacks do not match each other - output indicates last position when feedbacks matched.			

⬅ back to Logical binary outputs alphabetically

MGCB UV Coil

Related FW	1.0.0	Related applications	, MGCB
LBO ID	44		
Description			
The output is intended for control of undervoltage coil of primary master generator circuit breaker. The output is active the whole time when the controller is switched on. The output is deactivated for at least 2 seconds in the moment the breaker has to be switched off.			
<p>Binary Outputs</p> <p>Waiting for feedback 2s</p> <p>Breaker Close/Open On</p> <p>Breaker Close/Open Off</p> <p>Breaker ON Coil On</p> <p>Breaker ON Coil Off</p> <p>Breaker UV Coil On</p> <p>Breaker UV Coil Off</p> <p>Breaker button press</p> <p>Time</p> <p>Breaker feedback</p> <p>CU Powered On</p> <p>Breaker On pulse</p> <p>Breaker Fail when feedback not match</p>			

Image 7.28 MGCB UV Coil close command



⬆ back to Logical binary outputs alphabetically

Minimal Power PTM Limitation

Related FW	1.0.0	Related applications	MCB, MGCb
LBO ID	2638		
Description			
This output is closed always when the controller detects that the System go below Minimal Power PTM (page 277). It does not matter if the Minimal Power PTM Protection (page 303) is Enabled or not.			

⬆ back to Logical binary outputs alphabetically

Mode AUTO

Related FW	1.0.0	Related applications	MCB, MGCb
LBO ID	19		
Description			
This output is active whenever Controller Mode (page 472) = AUTO, i.e. when LBO NOT IN AUTO (PAGE 589) is opened.			

⬆ back to Logical binary outputs alphabetically

Mode MAN

Related FW	1.0.0	Related applications	MCB, MGCb
LBO ID	18		
Description			
This output is active whenever Controller Mode (page 472) = MAN.			

⬆ back to Logical binary outputs alphabetically

Mode OFF

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	17		
Description			
This output is active whenever Controller Mode (page 472) = OFF.			

⬅ back to Logical binary outputs alphabetically

Mode TEST

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	20		
Description			
This output is active whenever Controller Mode (page 472) = TEST.			

⬅ back to Logical binary outputs alphabetically

LBO: N

Not In Auto

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1248		
Description			
This output is closed whenever Controller Mode (page 472) != AUTO, i.e. when LBO Mode AUTO (PAGE 588) is opened.			

⬅ back to Logical binary outputs alphabetically

Not Used

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	286		
Description			
Output has no function.			

⬅ back to Logical binary outputs alphabetically

LBO: P

Peak Shaving Active

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2118		
Description			
This output is closed when Peak shaving (page 152) is activated.			

⬅ back to Logical binary outputs alphabetically

Peripheral Module Comm Fail

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	115		
Description			
This output is closed when there is no communication with at least one configured peripheral module.			

⬅ back to Logical binary outputs alphabetically

Process Power Limitation

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	2241		
Description			
This output is closed while Total Running P (page 462) is being reduced due to: Import/Export Limitation (page 241) = Enabled .			

⬅ back to Logical binary outputs alphabetically

LBO: R

Reverse Synchronization

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	69		
Description			
The output is closed when reverse synchronization is active (synchronization via MCB breaker) and opens when LBO MCB STATUS (PAGE 582) closes.			

⬅ back to Logical binary outputs alphabetically

LBO: S

Start Button Echo

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	33		
Description			
This output is closed for 1 s every time Start Button is pressed.			

⬅ back to Logical binary outputs alphabetically

Stop Button Echo

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	32		
Description			
This output is closed for 1 s every time Stop Button is pressed.			

⬅ back to Logical binary outputs alphabetically

System Ready

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	86		
Description			
This output is closed if the controller group has enough capacity to fulfill the requested power reserve. If the output is opened, then the group has not enough capacity to fulfill the reserve even if all the units will run.			
Note: Fulfilled reserve means that <i>Available Nominal Power In PM (page 463)</i> is above the <i>Minimal Running Power (page 464)</i>			


⬅ back to Logical binary outputs alphabetically

System Reserve OK

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	87		
Description			
This output is closed when Actual Reserve (page 460) is higher than the Actual Reserve (page 461) .			

⬅ back to Logical binary outputs alphabetically

System Start/Stop

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	190		
Description			
This output reflects whether whole system shall be started or stopped. When this LBO is closed, Gen-sets which are in Controller Mode (page 472) = AUTO and are in the same Control Groups (page 112) are requested to be started.			
LBO is closed when at least on of the following conditions is fulfilled:			
<ul style="list-style-type: none"> ➤ LBI Remote REMOTE START/STOP (PAGE 560) or FORCE ISLAND (PAGE 537) is closed ➤ LBIs FORCE PARALLEL (PAGE 538) and MAINS HEALTHY (PAGE 579) are closed ➤ LBO PEAK SHAVING ACTIVE (PAGE 589) is closed ➤ Controller Mode (page 472) = TEST ➤ AMF Condition is sensed (Mains Fail, Mains Protection) and AMF Start (page 286) is Enabled ➤ Start button is pressed (only if Controller Mode (page 472) = MAN) 			
IMPORTANT: The LBO System Start/Stop affects the control of MGCB even in Controller mode (page 267) = MAN. System Start/Stop has to be active before MGCB can be closed. You can activate it for example by pressing the  Start Button.			

⬅ back to Logical binary outputs alphabetically

Sync To Mains Allowed

Related FW	1.0.0	Related applications	MCB, MGCB
LBO ID	1057		
Description			
This output is closed when synchronization to the mains is allowed or Breaker state (page 473) = ParalOper.			

 [back to Logical binary outputs alphabetically](#)

8.1.6 Logical analog inputs

What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

Alphabetical groups of Logical analog inputs

LAI: C	595
LAI: L	596
LAI: M	597
LAI: P	598

For full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 594)**.

Logical analog inputs alphabetically

LAI: C	595
Cold Temp 1	595
Cold Temp 2	595
Cold Temp 3	595
Cold Temp 4	596
Cold Temp 5	596
LAI: L	596
Load Control: ANEXT	
Baseload	596
Load Control: ANEXT	
Imp/Exp Load	597
LAI: M	597
Mains Measurement P	597
Mains Measurement Q	597
LAI: P	598
PF Control: ANEXT	
Imp/Exp PF	598

 **back to Controller objects**

LAI: C

Cold Temp 1

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	56		
Description			
<p>This LAI is used for compensation of thermocouple temperature measurement. It is used when there is a significant temperature difference between on-board terminal and a module terminal (such as Inteli AIN8TC). This input compensate the CAN module configured with address (index) 1.</p> <p>Note: <i>The compensation is only for thermocouples without internal compensation "Thermo (nc) ..." (not cold junction compensation).</i></p>			

⬅ back to Logical analog inputs alphabetically

Cold Temp 2

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	57		
Description			
<p>This LAI is used for compensation of thermocouple temperature measurement. It is used when there is a significant temperature difference between on-board terminal and a module terminal (such as Inteli AIN8TC). This input compensate the CAN module configured with address (index) 2.</p> <p>Note: <i>The compensation is only for thermocouples without internal compensation "Thermo (nc) ..." (not cold junction compensation).</i></p>			

⬅ back to Logical analog inputs alphabetically

Cold Temp 3

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	58		
Description			
<p>This LAI is used for compensation of thermocouple temperature measurement. It is used when there is a significant temperature difference between on-board terminal and a module terminal (such as Inteli AIN8TC). This input compensate the CAN module configured with address (index) 3.</p> <p>Note: <i>The compensation is only for thermocouples without internal compensation "Thermo (nc) ..." (not cold junction compensation).</i></p>			

⬅ back to Logical analog inputs alphabetically

Cold Temp 4

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	59		
Description			
<p>This LAI is used for compensation of thermocouple temperature measurement. It is used when there is a significant temperature difference between on-board terminal and a module terminal (such as Intel AIN8TC). This input compensate the CAN module configured with address (index) 4.</p>			
<p>Note: The compensation is only for thermocouples without internal compensation "Thermo (nc) ..." (not cold junction compensation).</p>			

⬅ back to Logical analog inputs alphabetically

Cold Temp 5

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	341		
Description			
<p>This LAI is used for compensation of thermocouple temperature measurement. It is used when there is a significant temperature difference between on-board terminal and a module terminal (such as Intel AIN8TC). This input compensate the CAN module configured with address (index) 5.</p> <p>Note: <i>The compensation is only for thermocouples without internal compensation "Thermo (nc) ..." (not cold junction compensation).</i></p>			

⬅ back to Logical analog inputs alphabetically

LAI: L

Load Control: ANEXT Baseload

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	1		
Description			
This LAI is source value for control of Active Power if Load Request Source (page 238) = Analog External Value.			
The Baseload is active if #System Load Control PTM (page 239) = Load Shar and Load Control PTM Mode (page 240) = Baseload.			

⬅ back to Logical analog inputs alphabetically

Load Control: ANEXT Imp/Exp Load

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	2		
Description			
This LAI is source value for control of Active Power if Load Request Source (page 238) = Analog External Value.			
The Import/Export is active if #System Load Control PTM (page 239) = Load Shar and Load Control PTM Mode (page 240) = Import/Export.			

⬅ back to Logical analog inputs alphabetically

LAI: M

Mains Measurement P

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	5		
Description			
This LAI is designed for Mains Import Measurement (page 138) , when Mains Measurement P (page 250) = Analog Input. Value from this input is used in load transfer from Mains to System.			
Load transfer is considered to be finished when this value is lower than Mains Unload MCB Open Window (page 342)			

⬅ back to Logical analog inputs alphabetically

Mains Measurement Q

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	6		
Description			
This LAI is designed for Mains Import Measurement (page 138) , when Mains Measurement Q (page 251) = Analog Input. Value from this input is used in load transfer from mains to System.			
Load transfer is considered to be finished when this value is lower than Mains Unload MCB Open Window (page 342)			

⬅ back to Logical analog inputs alphabetically

LAI: P

PF Control: ANEXT Imp/Exp PF

Related FW	1.0.0	Related applications	MCB, MGCB
LAI ID	4		
Description			
This LAI is a source value for control of the Power Factor if PF/Q Request Source (page 243) = Analog External Value.			
The Import/Export PF is active if #System PF Control PTM (page 244) = Var Shar, PF/Q Control PTM Mode (page 244) = PF Control and PF/Q Regulation Type (page 245) = Import/Export PF/Q Control.			
Analog value		Cos phi factor	
<60		0.6L	
60 .. 100		0.6L .. 1.00	
101 .. 120		0.99C .. 0.80C	

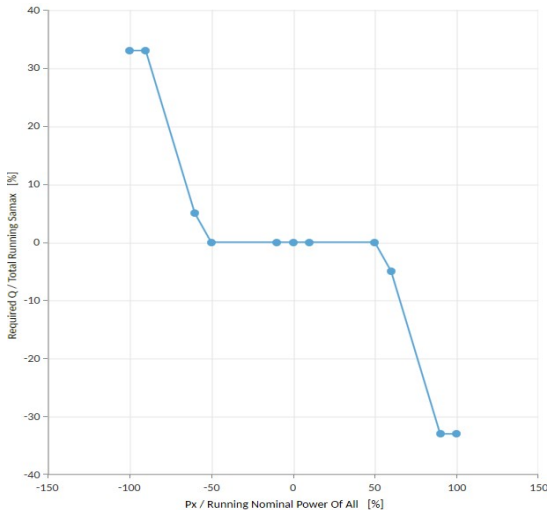
🔍 back to Logical analog inputs alphabetically

8.1.7 Application Curves

Q(P)

Related FW	1.0.0	Related applications	MCB, MGCB
App Curve ID	2		
Description			
This curve is used during Q(P) (page 148) power control.			
X-axis is relative value of Total Running P (page 462) to Running Nominal Power Of All (page 463).			
Y-axis is relative value of Required Q (page 467) to Total Running Samax (page 463).			
Default values			
X-axis [%]		Y-axis [%]	
-100.00		33	
-90.00		33	
-60.00		5	
-50.00		0	
-10.00		0	
0.00		0	
10.00		0	
50.00		0	
60.00		-5	
90.00		-33	
100.00		-33	

Default appearance



The graph displays the relationship between the relative power (Px / Running Nominal Power Of All [%]) on the x-axis and the relative required power (Required Q / Total Running Samax [%]) on the y-axis. The x-axis ranges from -150 to 150, and the y-axis ranges from -40 to 40. The curve is defined by the following data points: (-100, 33), (-90, 33), (-60, 5), (-50, 0), (-10, 0), (0, 0), (10, 0), (50, 0), (60, -5), (90, -33), and (100, -33). The curve is a blue line connecting these points.

[back to Application Curves](#)

8.1.8 Fixed Protection States

List of Fixed Protection States

Fixed Protections States 1	601
Fixed Protections States 2	602
Fixed Protections States 3	603

 [back to Controller objects](#)

Fixed Protections States 1

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20744		
Description			
<p>This is a group of fixed protection states.</p> <p>List of protection states by bits:</p> <ol style="list-style-type: none">1. Not Used2. Not Used3. Not Used4. Not Used5. Not Used6. Not Used7. Not Used8. Not Used9. Not Used10. Not Used11. Wrn MCB Fail (page 657)12. Wrn MGCB Fail (page 660)13. Wrn MCB Fail To Open (page 659)14. Wrn MCB Fail To Close (page 658)15. Wrn MGCB Fail To Close (page 661)16. Wrn MGCB Fail To Open (page 661)17. Hst Bus Overvoltage L1-N (page 672)18. Hst Bus Overvoltage L2-N (page 672)19. Hst Bus Overvoltage L3-N (page 672)20. Hst Bus Overvoltage L1-L2 (page 673)21. Hst Bus Overvoltage L2-L3 (page 673)22. Hst Bus Overvoltage L3-L1 (page 673)23. Hst Bus Undervoltage L1-N (page 673)24. Hst Bus Undervoltage L2-N (page 674)25. Hst Bus Undervoltage L3-N (page 674)26. Hst Bus Undervoltage L1-L2 (page 674)27. Hst Bus Undervoltage L2-L3 (page 674)28. Hst Bus Undervoltage L3-L1 (page 675)29. Hst Bus Voltage Unbalance Ph-Ph (page 676)30. Hst Bus Voltage Unbalance Ph-N (page 675)31. Hst Bus Overfrequency (page 675)32. Hst Bus Underfrequency (page 675)			

[back to Fixed Protection States](#)

Fixed Protections States 2

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20745		
Description			
This is a group of fixed protection states.			
List of protection states by bits:			
<div><div>1.</div><div>MP Mains Overvoltage L1-N (page 678)</div></div> <div><div>2.</div><div>MP Mains Overvoltage L2-N (page 678)</div></div> <div><div>3.</div><div>MP Mains Overvoltage L3-N (page 679)</div></div> <div><div>4.</div><div>MP Mains Undervoltage L1-N (page 681)</div></div> <div><div>5.</div><div>MP Mains Undervoltage L2-N (page 681)</div></div> <div><div>6.</div><div>MP Mains Undervoltage L3-N (page 682)</div></div> <div><div>7.</div><div>MP Mains Overvoltage L1-L2 (page 679)</div></div> <div><div>8.</div><div>MP Mains Overvoltage L2-L3 (page 680)</div></div> <div><div>9.</div><div>MP Mains Overvoltage L3-L1 (page 680)</div></div> <div><div>10.</div><div>MP Mains Undervoltage L1-L2 (page 682)</div></div> <div><div>11.</div><div>MP Mains Undervoltage L2-L3 (page 683)</div></div> <div><div>12.</div><div>MP Mains Undervoltage L3-L1 (page 684)</div></div> <div><div>13.</div><div>MP Mains Voltage Unbalance Ph-Ph (page 684)</div></div> <div><div>14.</div><div>MP Mains Voltage Unbalance Ph-N (page 685)</div></div> <div><div>15.</div><div>MP Mains Overfrequency (page 686)</div></div> <div><div>16.</div><div>MP Mains Underfrequency (page 686)</div></div> <div><div>17.</div><div>Not used</div></div> <div><div>18.</div><div>Not used</div></div> <div><div>19.</div><div>Not used</div></div> <div><div>20.</div><div>Not used</div></div> <div><div>21.</div><div>ALI Bus Ph Rotation Opposite (page 670)</div></div> <div><div>22.</div><div>ALI Mains Ph Rotation Opposite (page 671)</div></div> <div><div>23.</div><div>ALI Bus Ph Rotation Opposite (page 670)</div></div> <div><div>24.</div><div>MP Mains Overload (page 676)</div></div> <div><div>25.</div><div>Hst IDMT Overload (page 687)</div></div> <div><div>26.</div><div>Not used</div></div> <div><div>27.</div><div>Not used</div></div> <div><div>28.</div><div>Not used</div></div> <div><div>29.</div><div>Wrn Soft Transfer Fail (page 668)</div></div>			

 [back to Fixed Protection States](#)

Fixed Protections States 3

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20746		
Description			
<p>This is a group of fixed protection states.</p> <p>List of protection states by bits:</p> <ol style="list-style-type: none">1. Hst Vector Shift (page 676)2. MPR Current Unbalance (page 687)3. MPR Short Circuit (page 687)4. MPR IDMT Mains >A (page 687)5. Wrn Bus Meas Error (page 637)6. Sd Battery Flat (page 688)7. Wrn Parallel Work (page 662)8. Wrn Synchronization Fail (page 664)9. Wrn Synchronisation Fail (page 1)10. Not used11. ALI Manual Restore (page 671)12. Wrn Total Running PQS Value Overflow (page 668)13. Wrn Load IMP/EXP Fail (page 656)14. Not used15. Not used16. Wrn PasswEnterBlock (page 662)17. Wrn Default Password (page 639)18. Wrn Brute Force Protection Active (page 638)19. Wrn Battery Overvoltage (page 637)20. Wrn Battery Undervoltage (page 637)21. Wrn Battery Voltage (page 637)22. Wrn CAN2 Empty (page 639)23. Wrn Alarm e-mail 1 Fail (page 636)24. Wrn Alarm e-mail 2 Fail (page 636)25. Wrn Alarm e-mail 3 Fail (page 636)26. Wrn Alarm e-mail 4 Fail (page 636)27. Wrn SNMP TRAP 1 Fail (page 667)28. Wrn SNMP TRAP 2 Fail (page 668)29. Wrn SHBIN Collision (page 667)30. Wrn SHAIN Collision (page 665)			

 [back to Fixed Protection States](#)

8.1.9 User Protection States

List of User Protection States

User Protections States 1	605
User Protections States 2	605
User Protections States 3	605
User Protections States 4	605
User Protections States 5	605
User Protections States 6	606
User Protections States 7	606
User Protections States 8	606
User Protections States 9	606
User Protections States 10	606

 **back to Controller objects**

User Protections States 1

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20759		
Description			
This is a group of user protection states.			

[back to User Protection States](#)

User Protections States 2

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20760		
Description			
This is a group of user protection states.			

[back to User Protection States](#)

User Protections States 3

Related FW	1.0.0	5Related applications	MCB, MGCB
Comm object	20761		
Description			
This is a group of user protection states.			

[back to User Protection States](#)

User Protections States 4

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20762		
Description			
This is a group of user protection states.			

[back to User Protection States](#)

User Protections States 5

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20763		
Description			
This is a group of user protection states.			

[back to User Protection States](#)

User Protections States 6

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20764		
Description			
This is a group of user protection states.			

[◀ back to User Protection States](#)

User Protections States 7

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20765		
Description			
This is a group of user protection states.			

[◀ back to User Protection States](#)

User Protections States 8

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20766		
Description			
This is a group of user protection states.			

[◀ back to User Protection States](#)

User Protections States 9

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20767		
Description			
This is a group of user protection states.			

[◀ back to User Protection States](#)

User Protections States 10

Related FW	1.0.0	Related applications	MCB, MGCB
Comm object	20768		
Description			
This is a group of user protection states.			

[◀ back to User Protection States](#)

8.1.10 PLC

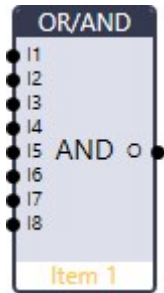
List of PLC blocks

Group: Logical functions	608
OR/AND	608
XOR/RS	610
Group: Comparators	611
Comp Hyst	611
Comp Time	612
Comp Win	613
Group: Time functions	614
Delay	614
Timer	616
Group: Math operations	619
Interpolation	619
Math AxB/C	620
Math Fc.	621
Group: Ramp functions	622
Inc/Dec	622
LowPassFlt	624
Ramp	624
Up/Down	625
Group: Other functions	627
Analog Switch	627
Analog Switch 8	627
Convert	629
Counter	631
Decomp. 4	632

 **back to Controller objects**

Group: Logical functions

OR/AND

PLC group	Basic logical functions	
Related FW	1.0.0	
Related applications	MCB, MGCB	
PLC Block ID	1	

Inputs

Input	Type	Negation	Range	Function
Input 1	Binary	Yes	0/1	Input 1
Input 2	Binary	Yes	0/1	Input 2
Input 3	Binary	Yes	0/1	Input 3 (optional)
Input 4	Binary	Yes	0/1	Input 4 (optional)
Input 5	Binary	Yes	0/1	Input 5 (optional)
Input 6	Binary	Yes	0/1	Input 6 (optional)
Input 7	Binary	Yes	0/1	Input 7 (optional)
Input 8	Binary	Yes	0/1	Input 8 (optional)

Outputs

Output	Type	Negation	Range	Function
Output	Binary	Yes	0/1	Result of the logical operation

Description

The block performs logical operation OR / AND of 2 - 8 binary operands. The inputs as well as the output can be inverted.

Function OR

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

Function AND

Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

There have to be at least 2 inputs every time. There may be up to 8 inputs configured.

PLC Editor: Function block

+

No.	Input		Inv.
1		...	<input type="checkbox"/>
2		...	<input type="checkbox"/>
3		...	<input type="checkbox"/>
4		...	<input type="checkbox"/>
5		...	<input type="checkbox"/>
6		...	<input type="checkbox"/>
7		...	<input type="checkbox"/>
8		...	<input type="checkbox"/>

• Output: PLC-BOUT 1.8

☐ Inverted output

Function type:

AND


OK

Cancel

Image 7.30 Configuration of OR/AND block

[back to List of PLC blocks](#)

XOR/RS

PLC group	Basic logical functions				
Related FW	1.0.0				
Related applications	MCB, MGCB				
PLC Block ID	39				
Inputs					
Input	Type	Negation	Range	Function	
Input 1..2	Binary	Yes	0/1	Inputs 1..2	
Outputs					
Output	Type	Negation	Range	Function	
Output	Binary	Yes	0/1	Result of the logical operation	
Description					
The block performs logical (boolean) XOR operation of two binary operands or several variants of the RS flipflop function. Both Inputs and Output can be inverted.					
Function type XOR					
Input 1	Input 2	Output			
0	0	0			
0	1	1			
1	0	1			
1	1	0			
The result of XOR operation between two binary inputs (Input 1 and Input 2) is defined by table below.					
Function type RS					
Input 2 (R)	Input 1 (S)	R-latch	S-latch	E-latch	JK-latch
		Q			
0	0	Q ⁻¹	Q ⁻¹	Q ⁻¹	Q ⁻¹
0	1	1	1	1	1
1	0	0	0	0	0
1	1	0	1	Q ⁻¹	NOT(Q ⁻¹)
The Q ⁻¹ denotes the state of the RS block output in the last evaluation cycle.					
The block Output value is given by the selected RS flip-flop variant evaluation:					
➤ R-latch: When both inputs (R, S) are set the Reset input is dominant.					
➤ S-latch: When both inputs (R, S) are set the Set input is dominant.					
➤ E-latch: When both inputs (R, S) are set the previous output is preserved.					
➤ JK-latch: When both inputs (R, S) are set the block output is negated.					
The block has the setting for the variant functions of the RS flip-flop circuit. This setting is					

available in the block configuration dialog (i.e. it is done in the configuration and cannot be changed dynamically while the PLC is running).

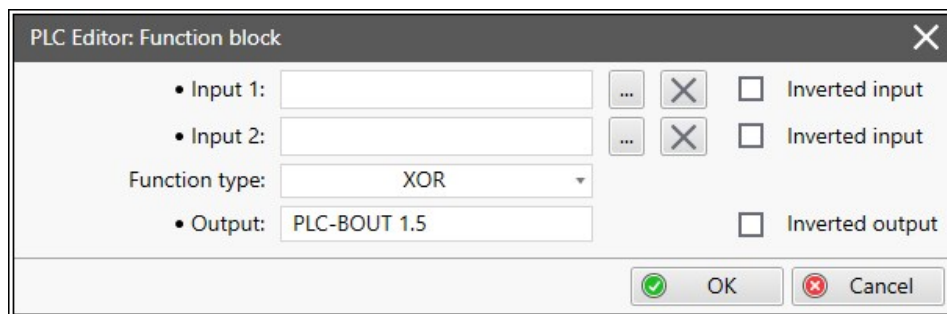



Image 7.31 Configuration of XOR/RS block

⬆ back to List of PLC blocks

Group: Comparators

Comp Hyst

PLC group	Comparison of analog inputs			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	3			
Inputs				
Input	Type	Negation	Range	Function
Input	Analog	No	$-2^{32} .. 2^{32}$	Compared value
Input ON	Analog	No	$-2^{32} .. 2^{32}$	Comparative level for switching on
Input OFF	Analog	No	$-2^{32} .. 2^{32}$	Comparative level for switching off
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output
Description				
TThe block compares the Input value with two comparison levels I-ON and I-OFF. The evaluation of the block depends on whether the I-ON level is higher than the I-OFF level or vice versa.				

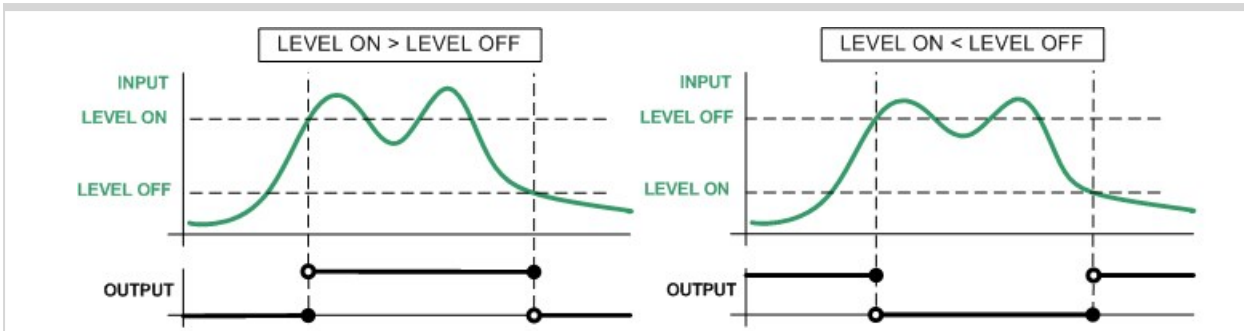


Image 7.32 Different On and Off levels

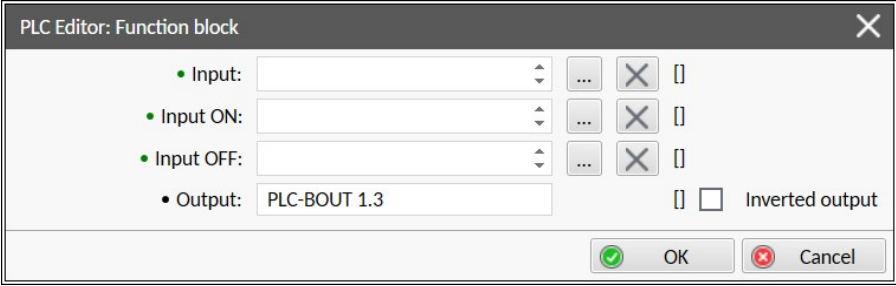
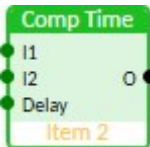


Image 7.33 Configuration of Comp Hyst block

⬅ back to List of PLC blocks

Comp Time

PLC group	Comparison of analog inputs			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	4			
Inputs				
Input	Type	Negation	Range	Function
Input 1	Analog	No	-2147483647..2147483647	Compared value
Input 2	Analog	No	Same as Input 1	Comparative level
Delay	Analog	No	0.0 .. 3000.0 [s]	Comparative delay
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output
Description				
The block works as an analog switch. It compares the input value with the comparative level. The output will switch on if the input is equal or higher than the comparative level for time longer than the delay.				

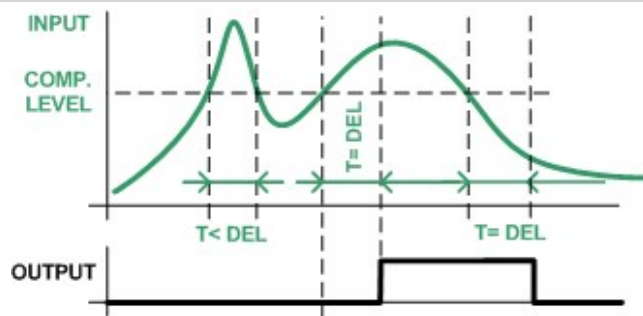


Image 7.34 Principle of delay

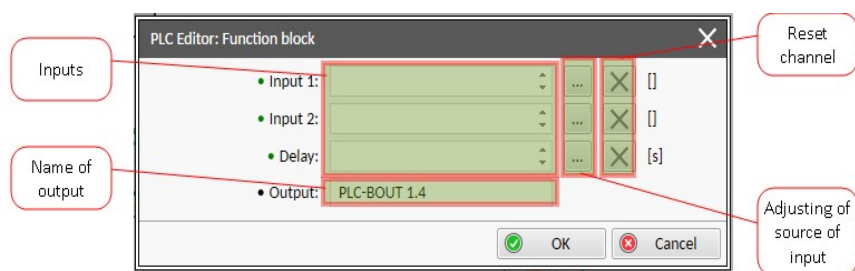



Image 7.35 Configuration of Comp Time block

Note: Input 2 and Delay can be constants or values from controller.

🔍 back to List of PLC blocks

Comp Win

PLC group	Comparison of analog inputs			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	18			
Inputs				
Input	Type	Negation	Range	Function
Input	Analog	No	$-2^{32} \dots 2^{32}$	Compared value
Input HIGH	Analog	No	$-2^{32} \dots 2^{32}$	Upper window limit
Input LOW	Analog	No	$-2^{32} \dots 2^{32}$	Lower window limit
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output
Description				
The block output is switched on whenever the input value is in the range defined by Lo and Hi levels.				

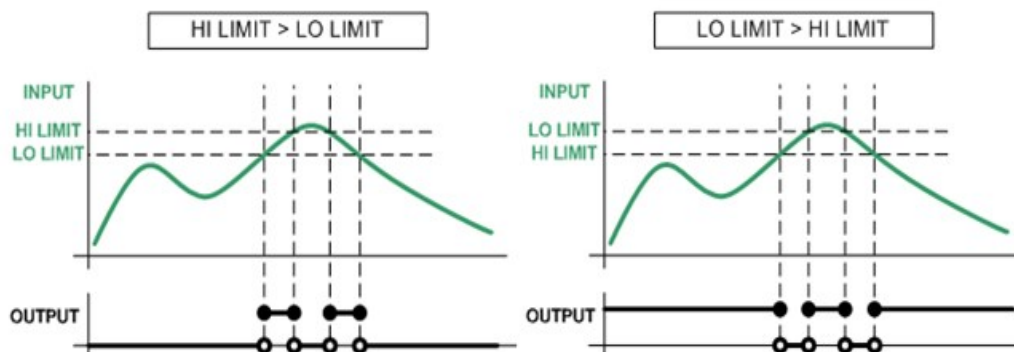


Image 7.36 Principle of delay

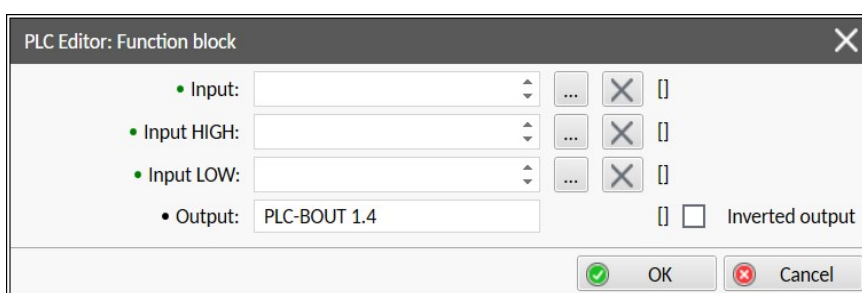


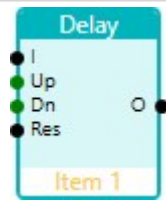
Image 7.37 Configuration of Comp Time block

Note: All inputs and can be constants or values from controller.

⬅ back to List of PLC blocks

Group: Time functions

Delay

PLC group	Time functions			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	33			
Inputs				
Input	Type	Negation	Range	Function
Input	Binary	No	0/1	Input signal to be delayed
Input time up	Analog	No	0 .. 214 748 364,7 [s, m, h]	Delay of the rising edge resp. pulse length generated by rising edge of the input

Input time down	Analog	No	0 .. 214 748 364,7 [s, m, h]	Delay of the falling edge resp. pulse length generated by falling edge of the input
Input reset	Binary	No	0/1	Resets the output to logical 0. The output remains in logical 0 until new rising edge appears on Input (when Input reset is deactivated already)
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output signal
Description				
<p>This block can operate in two operating modes (Delay mode, Pulse mode) = the block mode is defined by the Pulse on edge checkbox option - if checked, the Pulse mode is active.</p> <ul style="list-style-type: none"> ➤ Delay mode - the rising edge at the Output is generated with a delay of the Input time up lenght when arising edge is detected on the Input. A falling edge at the Output is generated with a delay of the Input time down length when a falling edge is detected on the Input. If the delayed falling edge at the Output arrived before the delayed rising edge, then no pulse would be generated at the Output. ➤ Pulse mode - a pulse of Input time up length is generated at the Output when a rising edge is detected, a pulse of Input time down length is generated at the Output when a falling edge is detected. 				
Note: Because of 100 ms tact, the analog inputs are limited to resolution 0,1 s.				
Note: If Input time up or Input time down value is <0, this input is internally set to zero.				
Note: Use Pulse on edge option to choose between delay and pulse mode.				

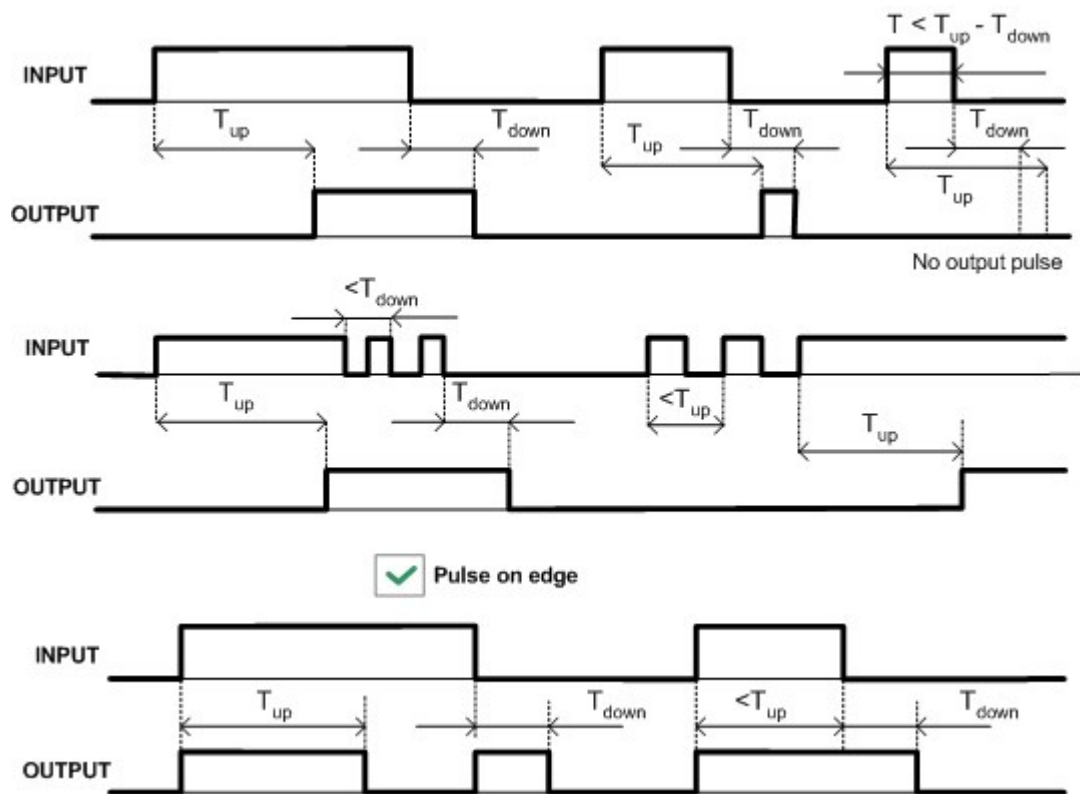


Image 7.38 Delay modes principles

PLC Editor: Function block

• Input: [] [X] [] Inverted input

• Input time up: [] [s] [X] []

• Input time down: [] [s] [X] []

• Input reset: [] [X] []

• Output: PLC-BOUT 1.5 [] Inverted input

[] Pulse on edge [] Inverted output


Time unit: s

OK Cancel

Image 7.39 Configuration of Delay block

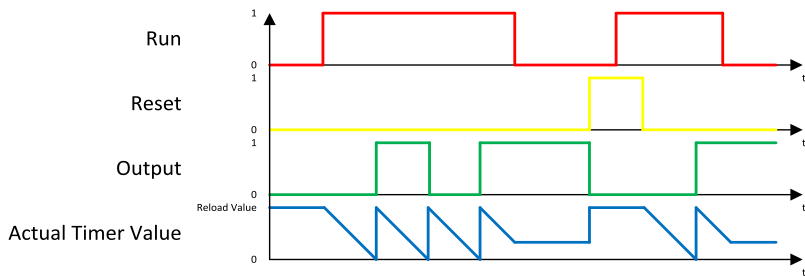
◀ back to List of PLC blocks

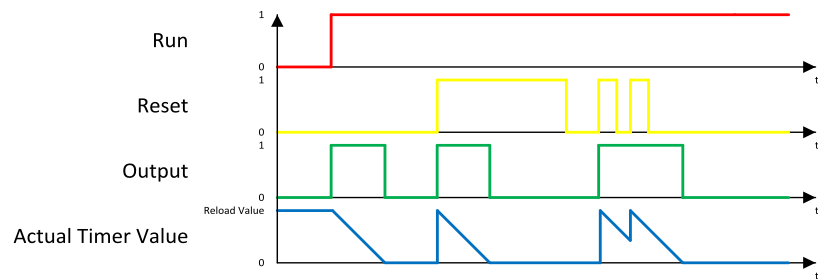
Timer

PLC group	Time functions	
Related FW	1.0.0	
Related applications	MCB, MGCB	
PLC Block ID	38	
Inputs		

Input	Type	Negation	Range	Function
Run	Binary	No	0/1	The timer runs only if this input is active or not connected
Reload	Binary	No	0/1	This input reloads the timer to the initial value
Reload value	Analog	No	0,0 .. 214 748 364,7 [s]	Initial value of the timer

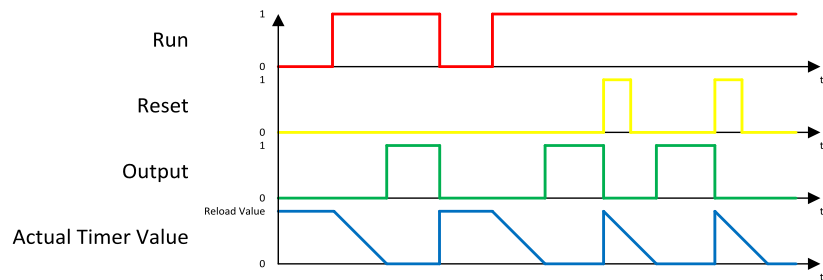
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Timer output
Actual Timer Value	Analog	No	N/A	Analog value that shows Actual Timer Value Lowest available value from: <PLC Resource 1 (page 523) to PLC Resource 10 (page 525)>

Description
<p>The block performs countdown Timer according to the selected Timer mode and actual inputs values.</p> <p>The Timer mode could be selected as:</p> <ul style="list-style-type: none"> ➤ ComAp timer mode = if the Timer block is to generate a periodic signal at its Output ➤ Timer mode TP = if the Timer block is to generate a pulse signal of defined width at its Output ➤ Timer mode TON = if the Timer block is to delay the rising edge of the Input by a defined time. ➤ Timer mode TOFF = if the Timer block is to delay the falling edge of the Input by a defined time. <p>Timer mode ComAp</p> <p>The Timer is counting down only when the Run is on and Reset is off. It is also reset to the Reload value if it reaches 0 or Reset is enabled. The state of the binary Output is negated whenever the Timer value is zero.</p>  <p>The diagram shows four signals over time (t): - Run (red): A square wave that is high (1) during two intervals and low (0) otherwise. - Reset (yellow): A single pulse that is high (1) for a short duration. - Output (green): A square wave that is high (1) when Run is high and the timer is not at zero, and low (0) when Run is high and the timer is at zero, or when Reset is high. - Actual Timer Value (blue): A sawtooth wave that starts at the Reload Value (indicated by a dashed line) when Run is high and Reset is low. It counts down linearly to 0, at which point it resets to the Reload Value. When Run is low or Reset is high, the value remains at 0.</p> <p>Timer mode TP</p> <p>The Timer counts down when Run is on. The Reset accepts only the rising edge and is required to load the Reload value to the actual Timer value. The Output is set as long as the Actual Timer Value is not equal to 0 (the countdown is in progress).</p>



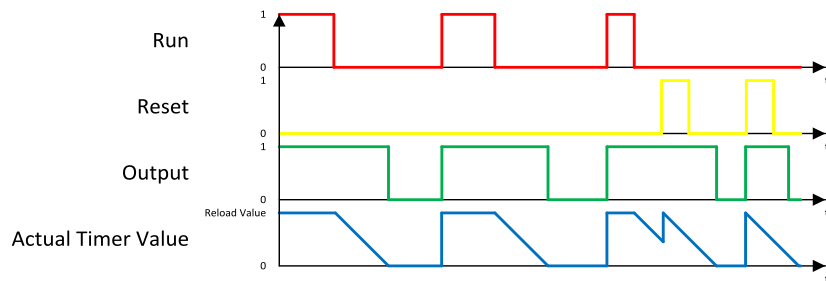
Timer mode TON

The Timer starts counting down with the rising edge of Run. The falling edge of Run, like the rising edge of Reset, reloads the Reload value to actual Timer value. The Output is set when the Actual Timer Value is 0 (the countdown is finished).



Timer mode TOF

The Timer starts counting down with the falling edge of the Run. The rising edge of Run, like the rising edge of Reset, reloads the Reload value to actual Timer value. The Output is set if the Actual Timer Value is not equal to 0 (the countdown is in progress).



PLC Editor: Function block

• Input run:

...

×

• Input reload:

...

×

• Input reload val:

...

×

[s]

• Output:

PLC-BOUT 1.5

...

×

☐ First down

Timer mode:

ComAp

▼

☐ Inverted input

☐ Inverted input

☐ Inverted output

OK

Cancel

Image 7.40 Configuration of Timer block

Note: For ComAp Timer mode: if you want the Output to start at logic 0, check the First down option. Otherwise, the Output will start at logical 1.

IMPORTANT: For ComAp Timer mode: if no inputs are connected and the First down option is not checked, the Output is active.

⬅ back to List of PLC blocks

Group: Math operations

Interpolation

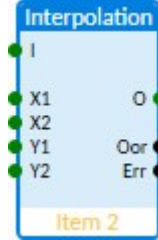
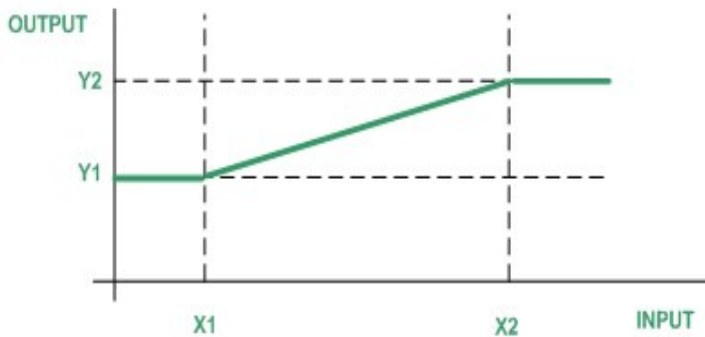
PLC group			
Related FW	1.0.0		
Related applications	MCB, MGCB		
PLC Block ID	34		
Inputs			
Input	Analog	$-2^{32} .. 2^{32}$	Input value
X1	Analog	$-2^{32} .. 2^{32}$	Low X limit of definition
X2	Analog	$-2^{32} .. 2^{32}$	High X limit of definition
Y1	Analog	$-2^{32} .. 2^{32}$	Low Y limit of definition
Y2	Analog	$-2^{32} .. 2^{32}$	High Y limit of definition
Outputs			
Output	Analog	Y1 .. Y2	Transformed value
Out of Range	Binary	0/1	Closed when input is out of range <X1, X2>
Data Invalid	Binary	0/1	Closed when value on analog output is invalid
Description			
<p>This block performs a linear transformation of the input. The transformation function is defined by two pairs of points [X1, Y1] and [X2, Y2]. If the Input lies inside of the interval <X1, X2> the Output is given by the conversion. If the Input is lying outside of this interval, Output is saturated either on high or low limit given by Y1 or Y2 and Out of Range is closed. If any of the inputs gets invalid, Data Invalid is closed and Output is set to invalid value. The Output, Y1, Y2 has resolution and dimension based on settings of the block. The resolution and dimensions of the X1 and X2 is same as resolution of the Input.</p>			
			

Image 7.41 Principle of Interpolation

Image 7.41 Principle of Interpolation

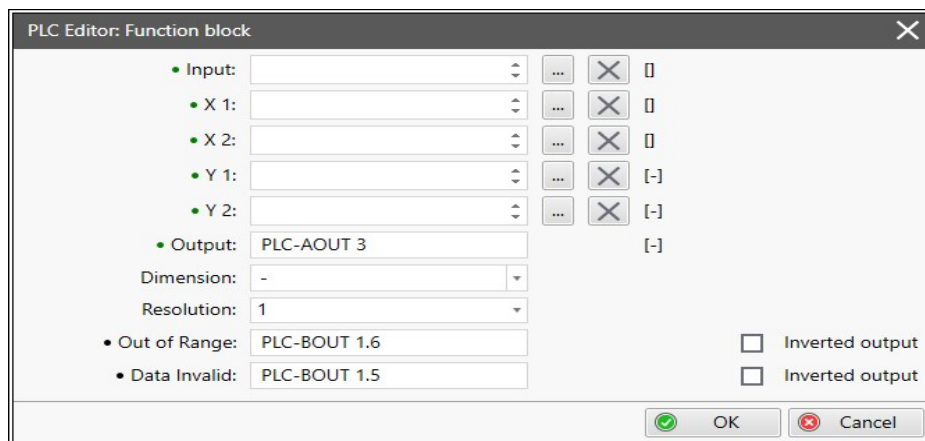
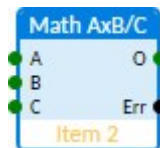


Image 7.42 Configuration of Interpolation block

⬅ back to List of PLC blocks

Math AxB/C

PLC group				
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	35			
Inputs				
Input	Type	Negation	Range	Function
Input A	Analog	No	$-2^{32} \dots 2^{32}$	First multiplicand
Input B	Analog	No	$-2^{32} \dots 2^{32}$	Second multiplicand
Input C	Analog	No	$-2^{32} \dots 2^{32}$	Divider
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	$-2^{32} \dots 2^{32}$	Result of the mathematical operation
Data invalid	Binary	No	0/1	Closed when Output is out of range or when dividing by zero
Description				
The block realizes the mathematical operation AxB/C. In case of any invalid data on any of the inputs, the Output is set to invalid value and Data Invalid is closed. The Output has resolution and dimension based on setting of the block.				

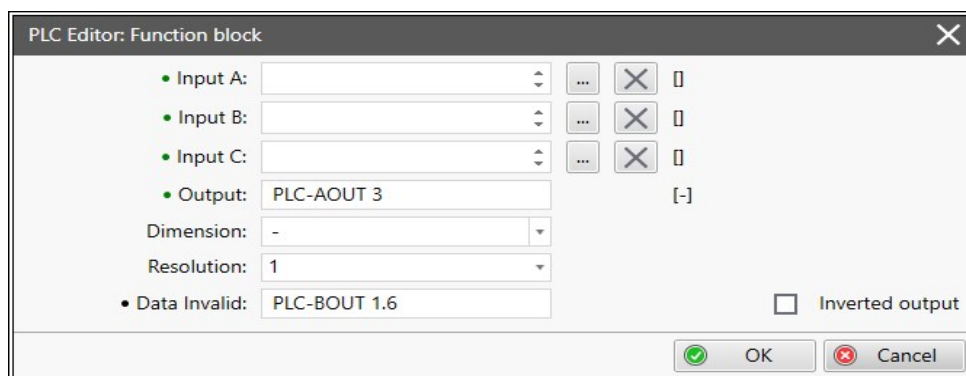
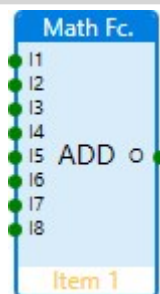


Image 7.43 Configuration of Math AxB/C block

⬅ back to List of PLC blocks

Math Fc.

PLC group				
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	17			
Inputs				
Input	Type	Negation	Range	Function
Input 1	Analog	No	$-2^{32} \dots 2^{32}$	Input 1
Input 2	Analog	No	$-2^{32} \dots 2^{32}$	Input 2
Input 3	Analog	No	$-2^{32} \dots 2^{32}$	Input 3
Input 4	Analog	No	$-2^{32} \dots 2^{32}$	Input 4
Input 5	Analog	No	$-2^{32} \dots 2^{32}$	Input 5
Input 6	Analog	No	$-2^{32} \dots 2^{32}$	Input 6
Input 7	Analog	No	$-2^{32} \dots 2^{32}$	Input 7
Input 8	Analog	No	$-2^{32} \dots 2^{32}$	Input 8
Outputs				
Output	Type	Negation	Range	Function
Output	Analog	No	$-2^{32} \dots 2^{32}$	Result of the mathematical operation
Description				
<p>This block performs basic mathematical operations of 2 to 8 operands based on selected function. All invalid inputs are ignored. If any configured input contains an invalid value and at least one configured input is valid, the output has value counted from only valid configured inputs based on the selected function. If all configured inputs are invalid output has an invalid value.</p> <p>The Output has a Resolution and Dimension according to the block settings.</p>				

Function	Output
ADD - Addition	Input 1 + Input 2 + ... + Input N
SUB - Substraction	Input 1 - Input 2 - ... - Input N
 SUB - Absolute value of subtraction	ABS(Input 1 - Input 2 - ... - Input N)
AVG - Average	Input 1 + Input 2 + ... + Input N) / N
MIN - Minimal value	MIN(Input 1, Input 2, ... ,Input N)
MAX - Maximal value	MAX(Input 1, Input 2, ... ,Input N)

Note: In case of AVG operation type the N is number of inputs with valid value.

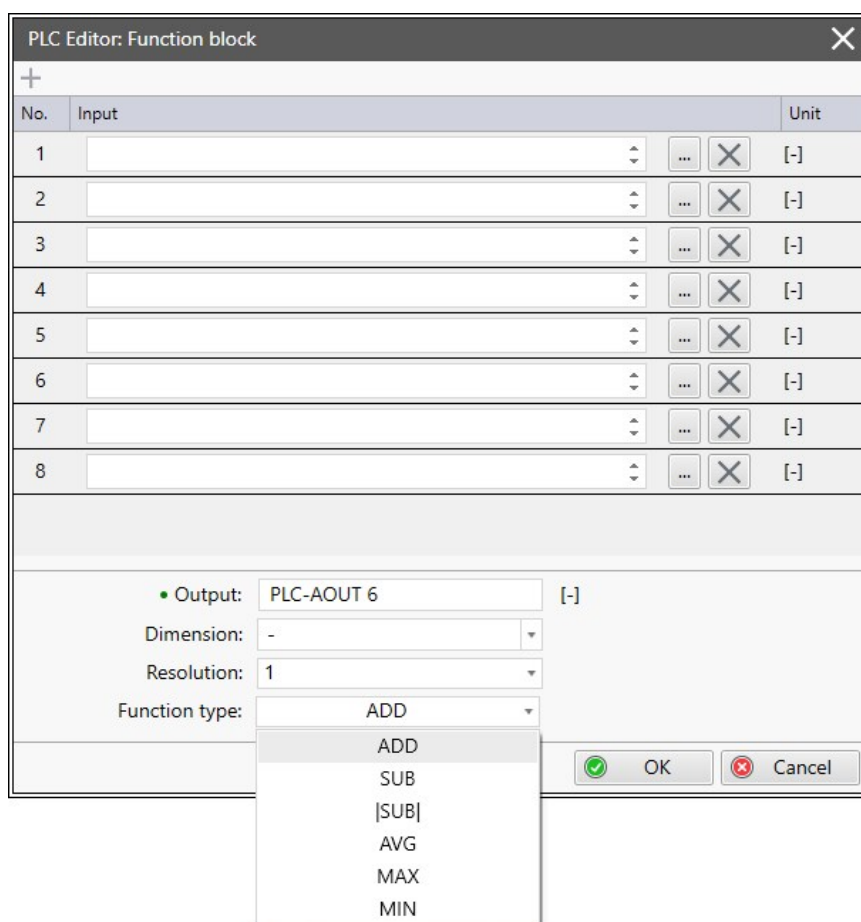


Image 7.44 Configuration of Math Fc. block

🔍 back to List of PLC blocks

Group: Ramp functions

Inc/Dec

PLC group		
Related FW	1.0.0	
Related applications	MCB, MGCB	
PLC Block ID	22	

Inputs

Input	Type	Negation	Range	Function
Increment	Binary	No	0/1	Rising edge increase value of Output by 1
Decrement	Binary	No	0/1	Rising edge decrease value of Output by 1
Reset	Binary	No	0/1	Rising edge resets Output to Default
Maximum	Analog	No	$-2^{32} .. 2^{32}$	Maximum value of Output
Default	Analog	No	$-2^{32} .. 2^{32}$	Initial value of Output

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	$-2^{32} .. \text{Maximum}$	Output value

Description

The block increments/decrements **Output** based on rising edge on **Increment/Decrement**.

If the Increment and Decrement edges arrive simultaneously, the Output value does not change.

- If the counter value is at Maximum and incrementation is coming, the counter will be 0 again.
- If the counter value is at 0 and decrementing is coming, the counter will have be at Maximum.

The Output can be reset by rising edge on Reset.

The Output has a Resolution and Dimension according to the block settings.

Note: If both the inputs Increment and Decrement are active, the Output value is not changed.

IMPORTANT: When the controller is powered off the Output value is not preserved.

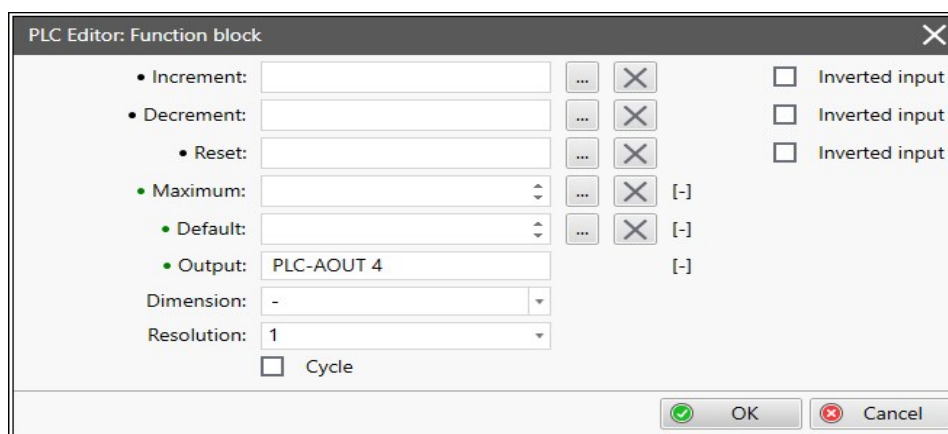


Image 7.45 Configuration of Inc/Dec block

⬅ back to List of PLC blocks

LowPassFit

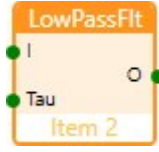
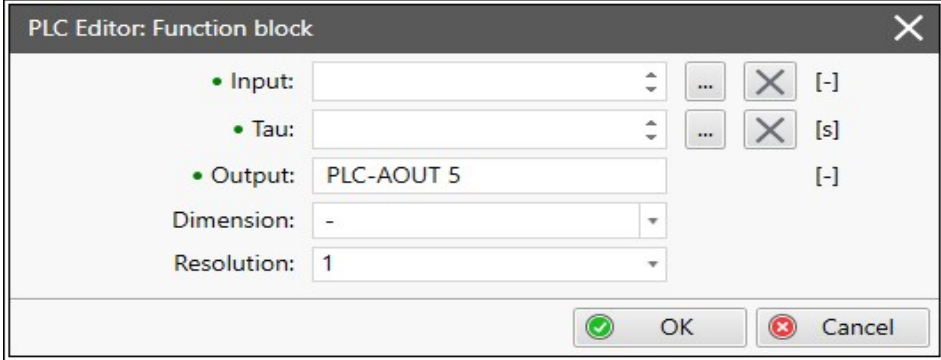
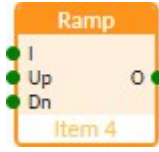
PLC group					
Related FW	1.0.0				
Related applications	MCB, MGCB				
PLC Block ID	40				
Inputs					
Input	Type	Negation	Range	Function	
Input	Analog	No	$-2^{32} .. 2^{32}$	Input Value	
Tau	Analog	No	0,0 .. 60,0 [s]	Time Constant of the filter	
Outputs					
Output	Type	Negation	Range	Function	
Output	Analog	No	$-2^{32} .. 2^{32}$	Filtered Input	
Description					
<p>The block performs the function of the first-order low pass filter. Typical usage of this function is filtering of a value whose instantaneous value fluctuates rapidly around its mean, which is changing slower. The Output has resolution and dimension based on setting of the block.</p>					
					

Image 7.46 Configuration of LowPassFit block

⬅ back to List of PLC blocks

Ramp

PLC group					
Related FW	1.0.0				
Related applications	MCB, MGCB				
PLC Block ID	19				
Inputs					
Input	Type	Negation	Range	Function	
Input	Analog	No	$-2^{32} .. 2^{32}$	Value to be ramped	
Up	Analog	No	$-2^{32} .. 2^{32}$	Maximal rising rate of the Output per second	

Down	Analog	No	$-2^{32} \dots 2^{32}$	Maximal lowering rate of the Output per second
------	--------	----	------------------------	---

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	$-2^{32} \dots 2^{32}$	Ramped value

Description

This block limits maximal rate of change of **Output**. The maximal rates **Up** and **Down** are adjustable separately and ramping is based on enabled ramps. The **Output** has resolution and dimension based on setting of the block.

Function	Description
Enabled Up	Output can be ramped only up.
Enabled Down	Output can be ramped only down.
Enabled Up/Down	Output can be ramped up and down.

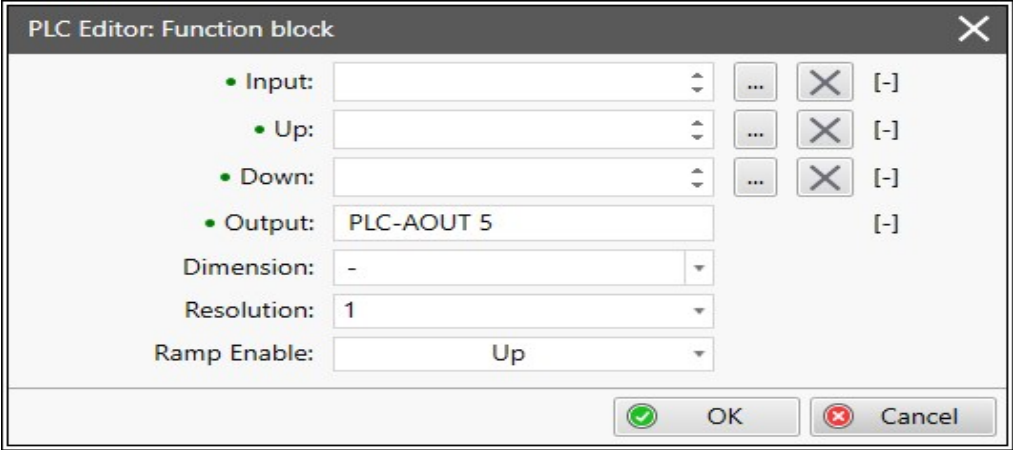



Image 7.47 Configuration of Ramp block

⬅ back to List of PLC blocks

Up/Down

PLC group		
Related FW	1.0.0	
Related applications	MCB, MGCB	
PLC Block ID	20	

Inputs

Input	Type	Negation	Range	Function
Limit 1	Analog	No	$-2^{32} \dots 2^{32}$	First limit of Output
Limit 2	Analog	No	$-2^{32} \dots 2^{32}$	Second limit of Output

Reset	Binary	No	0/1	Resets Output to Default Output Value when active
Speed Up	Analog	No	$-2^{32} \dots 2^{32}$	Rising rate of Output per second
Speed Down	Analog	No	$-2^{32} \dots 2^{32}$	Lowering rate of Output per second
Up	Binary	No	0/1	Activates rising of Output
Down	Binary	No	0/1	Activates lowering of Output
Default Output Value	Analog	No	$-2^{32} \dots 2^{32}$	Initial value of Output

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	Limit 1 .. Limit 2	Output value

Description

This block works as an analog ramp controlled by binary inputs **Up** and **Down** with a defined rate of increase/decrease.

The ramp speed is adjusted by **Speed Up** and **Speed Down**.

The **Output** limitation is set by **Limit 1** and **Limit 2**. The default value of **Output** is set by **Default Output Value**.

Activate **Reset** to reset **Output** to **Default Output Value**. The **Output** has resolution and dimension based on setting of the block.

IMPORTANT: If both the inputs **Up** and **Down** are active, the **Output** is set to **Default Output Value**.

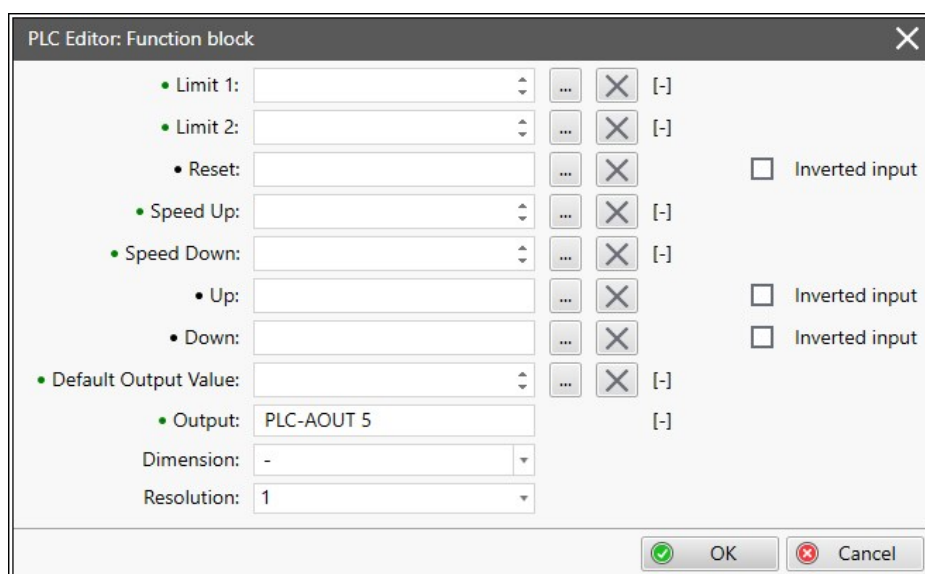
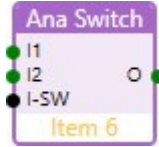


Image 7.48 Configuration of Up/Down block

◀ back to List of PLC blocks

Group: Other functions

Analog Switch

PLC group	Other functions	
Related FW	1.0.0	
Related applications	MCB, MGCB	
PLC Block ID	5	

Inputs

Input	Type	Negation	Range	Function
Input 1	Analog	No	$-2^{32} \dots 2^{32}$	Input value 1
Input 2	Analog	No	$-2^{32} \dots 2^{32}$	Input value 2
Input SW	Binary	No	0/1	Switching between Input value 1 and 2

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	$-2^{32} \dots 2^{32}$	Switch output

Description

The block is switching **Input 1** and **Input 2** based on value of **Input SW**. The **Output** has resolution and dimension based on setting of the block.

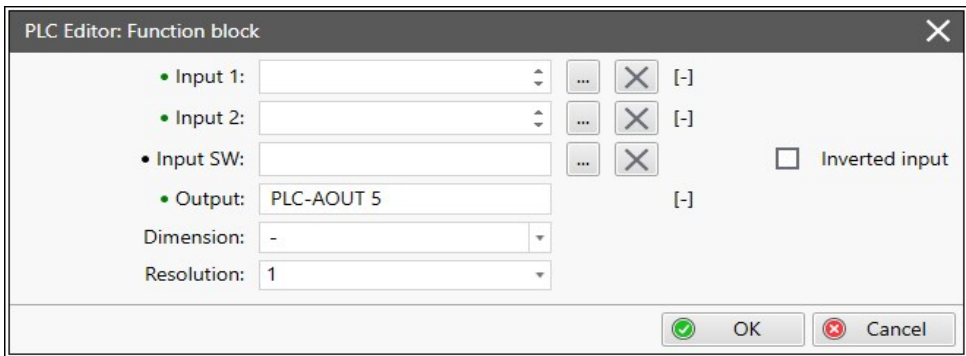
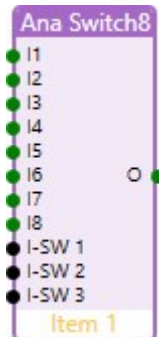


Image 7.49 Configuration of Analog Switch block

◀ back to List of PLC blocks

Analog Switch 8

PLC group	Other functions	
Related FW	1.0.0	
Related applications	MCB, MGCB	
PLC Block ID	45	

Inputs

Input	Type	Negation	Range	Function
Input 1	Analog	No	$-2^{32} \dots 2^{32}$	Input value 1
Input 2	Analog	No	$-2^{32} \dots 2^{32}$	Input value 2
Input 3	Analog	No	$-2^{32} \dots 2^{32}$	Input value 3 (optional)
Input 4	Analog	No	$-2^{32} \dots 2^{32}$	Input value 4 (optional)
Input 5	Analog	No	$-2^{32} \dots 2^{32}$	Input value 5 (optional)
Input 6	Analog	No	$-2^{32} \dots 2^{32}$	Input value 6 (optional)
Input 7	Analog	No	$-2^{32} \dots 2^{32}$	Input value 7 (optional)
Input 8	Analog	No	$-2^{32} \dots 2^{32}$	Input value 8 (optional)
Input SW 1	Binary	No	0/1	Switch input 1
Input SW 2	Binary	No	0/1	Switch input 2
Input SW 3	Binary	No	0/1	Switch input 3

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	$-2^{32} \dots 2^{32}$	Switch output according to the SW 1, SW 2 and SW 3

Description

The block works as an analog multiplexer. The output value could be selected from up to 8 inputs according to the 'Input SW 3', 'Input SW 2' and 'Input SW 1' state is appropriate input value copied to the output, see the table below.

Input SW 3	Input SW 2	Input SW 1	Output
0	0	0	Input 1
0	0	1	Input 2
0	1	0	Input 3
0	1	1	Input 4
1	0	0	Input 5
1	0	1	Input 6
1	1	0	Input 7
1	1	1	Input 8

PLC Editor: Function block

+

No.	Input	Unit
1		[-]
2		[-]
3		[-]
4		[-]
5		[-]
6		[-]
7		[-]
8		[-]

• Input SW 1:

• Input SW 2:

• Input SW 3:

• Output:

Dimension:

Resolution:

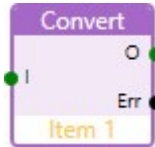
OK

Cancel

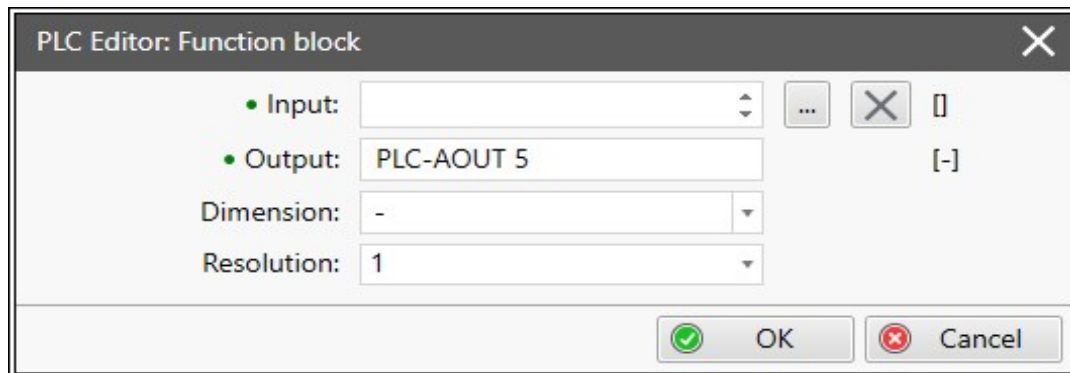
Image 7.50 Configuration of Analog Switch 8 block

⬅ back to List of PLC blocks

Convert

PLC group	Other functions			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	52			
Inputs				
Input	Type	Negation	Range	Function
Input	Analog	No	$-2^{32} .. 2^{32}$	Input value
Outputs				
Output	Type	Negation	Range	Function
Output	Analog	No	$-2^{32} .. 2^{32}$	Converted Input value
Output	Binary	Yes	0/1	The attribute of invalid data on output
Description				
<p>The block converts the Input based on selected resolution and dimension, and reflects it to the Output. Dimension is converted based on user configuration without any extra recalculation. Resolution is converted and recalculation is used.</p> <p>Example: If the input is 100,5 W and the convert block is used to convert dimensions to kW with resolution 1, the output shows 101 kW.</p>				

Note: Conversion is done to Integer32, if the input value is out of Integer32 range, output value is set to invalid status and error output is activated.



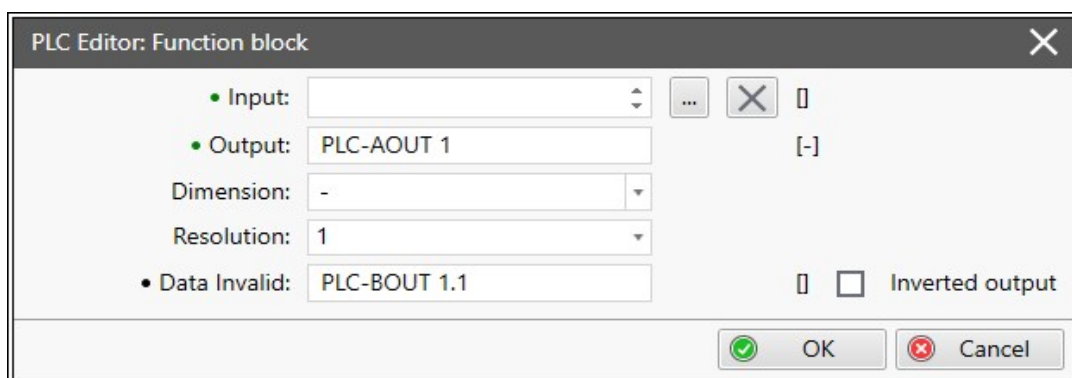
PLC Editor: Function block

• Input: ... ☐

• Output: [-]

Dimension:

Resolution:



PLC Editor: Function block

• Input: ... ☐

• Output: [-]

Dimension:

Resolution:

• Data Invalid: ☐ ☐ Inverted output

Image 7.51 Configuration of Convert block

[back to List of PLC blocks](#)

Counter


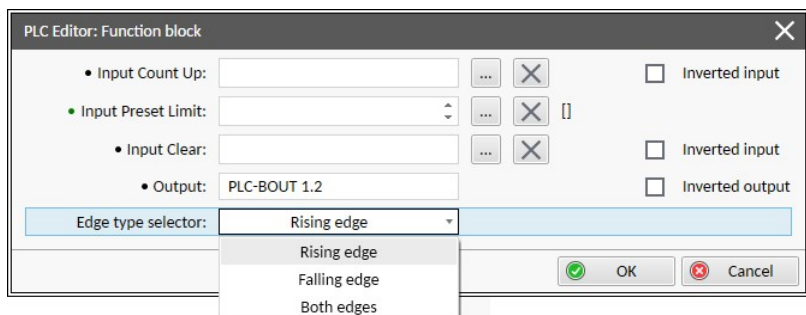
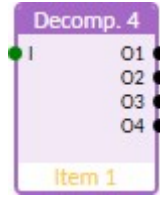
PLC group	Other functions			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	13			
Inputs				
Input	Type	Negation	Range	Function
Input Count Up	Binary	No	0/1	Input at which the edges are counted
Input Preset Limit	Analog	No	0 .. 2 ³²	Counter value limit for activation of the output
Input Clear	Binary	No	0/1	Reset input
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output is activated when the counter value exceeds the limit
Actual Counter Value	Analog	No	N/A	Analog value that shows Actual Counter Value Lowest available value from: <PLC Resource 1 (page 523) to PLC Resource 10 (page 525)>
Description				
<p>The block works as a counter of edges (selectable rising, falling or both) with reset input and adjustable counting limit. The maximal counter value is 2 147 483 647. The counter value is lost when the controller is switched off. The output is activated when the counter value is equal to or higher than Input Preset Limit and stays active until the block reset is done using Input Clear. Activating of the Input Clear resets the counter value to 0 and deactivates the output. Holding the Input Clear active blocks the counting.</p>				
<div>IMPORTANT: The counter value is lost when the controller is switched off.</div>				
				

Image 7.52 Configuration of the Counter block

Image 7.52 Configuration of the Counter block

◀ back to List of PLC blocks

Decomp. 4

PLC group	Other functions			
Related FW	1.0.0			
Related applications	MCB, MGCB			
PLC Block ID	24			
Inputs				
Input	Type	Negation	Range	Function
Input	Analog	No	-2 ³² .. 2 ³²	Value to be "decomposed" to bits
Outputs				
Output	Type	Negation	Range	Function
Output 1	Binary	Yes	0/1	Bit 0,4,8,12,16,20,24,28 - according to selected group of bits.
Output 2	Binary	Yes	0/1	Bit 1,5,9,13,17,21,25,29 - according to selected group of bits.
Output 3	Binary	Yes	0/1	Bit 2,6,10,14,18,22,26,30 - according to selected group of bits.
Output 4	Binary	Yes	0/1	Bit 3,7,11,15,19,23,27,31 - according to selected group of bits.
Description				
The block converts the input analog value to binary form and provides selected bits as binary outputs. The input four bits are selected by bit range selection (Bits).				

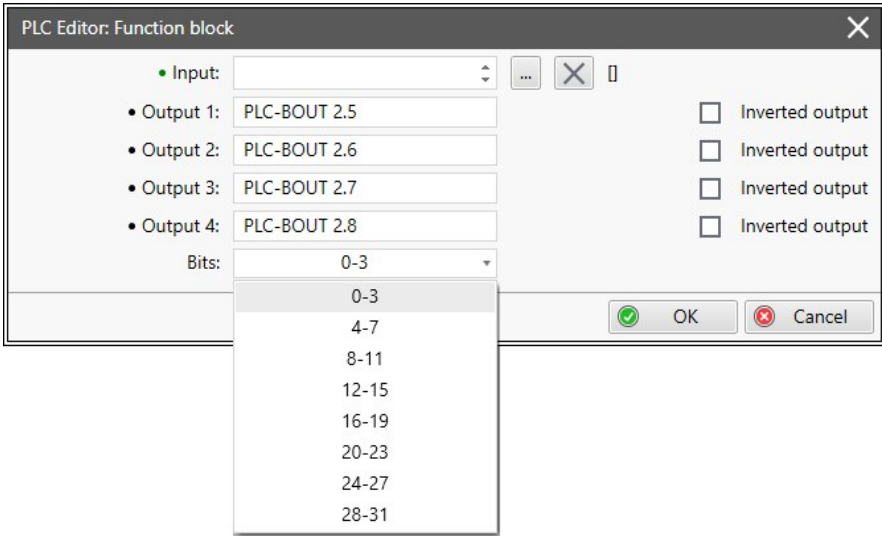


Image 7.53 Configuration of Decomp. 4 block

Image 7.53 Configuration of Decomp. 4 block

◀ back to List of PLC blocks

8.2 Alarms

What alarms are:

The controller evaluates two levels of alarms. For more information **see Alarm Management on page 100.**

8.2.1 Alarm levels in the controller

8.2.2 Alarms level 1	633
8.2.3 Alarms level 2	677

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

Warning	636	Wrn DISTIN 23	645
Wrn Alarm e-mail 1 Fail	636	Wrn DISTIN 24	645
Wrn Alarm e-mail 2 Fail	636	Wrn DISTIN 25	645
Wrn Alarm e-mail 3 Fail	636	Wrn DISTIN 26	646
Wrn Alarm e-mail 4 Fail	636	Wrn DISTIN 27	646
Wrn Battery Overvoltage	637	Wrn DISTIN 28	646
Wrn Battery Undervoltage	637	Wrn DISTIN 29	646
Wrn Battery Voltage	637	Wrn DISTIN 30	647
Wrn Bus Meas Error	637	Wrn DISTIN 31	647
Wrn Default Password	638	Wrn DISTIN 32	647
Wrn Brute Force Protection Active	638	Wrn DISTIN 33	647
Wrn RTC Battery Flat	639	Wrn DISTIN 34	648
Wrn CAN2 Empty	639	Wrn DISTIN 35	648
Wrn Default Password	639	Wrn DISTIN 36	648
Wrn DISTIN 01	639	Wrn DISTIN 37	648
Wrn DISTIN 02	640	Wrn DISTIN 38	649
Wrn DISTIN 03	640	Wrn DISTIN 39	649
Wrn DISTIN 04	640	Wrn DISTIN 40	649
Wrn DISTIN 05	640	Wrn DISTIN 41	649
Wrn DISTIN 06	641	Wrn DISTIN 42	650
Wrn DISTIN 07	641	Wrn DISTIN 43	650
Wrn DISTIN 08	641	Wrn DISTIN 44	650
Wrn DISTIN 09	641	Wrn DISTIN 45	650
Wrn DISTIN 10	642	Wrn DISTIN 46	651
Wrn DISTIN 11	642	Wrn DISTIN 47	651
Wrn DISTIN 12	642	Wrn DISTIN 48	651
Wrn DISTIN 13	642	Wrn DISTIN 49	651
Wrn DISTIN 14	643	Wrn DISTIN 50	652
Wrn DISTIN 15	643	Wrn DISTIN 51	652
Wrn DISTIN 16	643	Wrn DISTIN 52	652
Wrn DISTIN 17	643	Wrn DISTIN 53	652
Wrn DISTIN 18	644	Wrn DISTIN 54	653
Wrn DISTIN 19	644	Wrn DISTIN 55	653
Wrn DISTIN 20	644	Wrn DISTIN 56	653
Wrn DISTIN 21	644	Wrn DISTIN 57	653
Wrn DISTIN 22	645	Wrn DISTIN 58	654

Wrn DISTIN 59	654	Wrn Total Running PQS Value Overflow	668
Wrn DISTIN 60	654	Wrn Unsupported PMS Mode	669
Wrn DISTIN 61	654	Wrong PLC Configuration	669
Wrn DISTIN 62	655	Alarm List Indication	669
Wrn DISTIN 63	655	ALI Bus Ph L1 Inverted	669
Wrn DISTIN 64	655	ALI Bus Ph L2 Inverted	670
Wrn DISTOUT	655	ALI Bus Ph L3 Inverted	670
Wrn Event e-mail 1 Fail	655	ALI Bus Ph Rotation Opposite	670
Wrn Event e-mail 2 Fail	656	ALI Mains Ph L1 Inverted	670
Wrn Event e-mail 3 Fail	656	ALI Mains Ph L2 Inverted	671
Wrn Event e-mail 4 Fail	656	ALI Mains Ph L3 Inverted	671
Wrn Load IMP/EXP Fail	656	ALI Mains Ph Rotation Opposite	671
Wrn MCB Fail	657	ALI Manual Restore	671
Wrn MCB Fail To Close	658	ALI Wrong Power Format	672
Wrn MCB Fail To Open	659	History Record Only	672
Wrn MCB Isolated	659	Hst Bus Overvoltage L1-N	672
Wrn MGCB Fail	660	Hst Bus Overvoltage L2-N	672
Wrn MGCB Fail To Close	661	Hst Bus Overvoltage L3-N	672
Wrn MGCB Fail To Open	661	Hst Bus Overvoltage L1-L2	673
Wrn Password reset e-mail addr is not set	662	Hst Bus Overvoltage L2-L3	673
Wrn PF(Pm) Fail	662	Hst Bus Overvoltage L3-L1	673
Wrn PF/Q IMP/EXP Fail	663	Hst Bus Undervoltage L1-N	673
Wrn Q(P) Fail	664	Hst Bus Undervoltage L2-N	674
Wrn Synchronization Fail	664	Hst Bus Undervoltage L3-N	674
Wrn RTC Battery Flat	665	Hst Bus Undervoltage L1-L2	674
Wrn SHAIN 1	665	Hst Bus Undervoltage L2-L3	674
Wrn SHAIN 2	665	Hst Bus Undervoltage L3-L1	675
Wrn SHAIN Collision	665	Hst Bus Overfrequency	675
Wrn SHBIN 1	666	Hst Bus Underfrequency	675
Wrn SHBIN 2	666	Hst Bus Voltage Unbalance Ph-N	675
Wrn SHBIN 3	666	Hst Bus Voltage Unbalance Ph-Ph	676
Wrn SHBIN 4	666	Hst ROCOF	676
Wrn SHBIN 5	667	Hst Vector Shift	676
Wrn SHBIN 6	667	MP Mains Overload	676
Wrn SHBIN Collision	667		
Wrn SNMP TRAP 1 Fail	667		
Wrn SNMP TRAP 2 Fail	668		
Wrn Soft Transfer Fail	668		
Wrn Synchronization Fail	668		

 **back to Alarms**

Warning

Wrn Alarm e-mail 1 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Alarm e-mail 1 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	815
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted by setpoint E-mail Address 1 (page 427) and email wasn't send.

🔍 back to List of alarms level 1

Wrn Alarm e-mail 2 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Alarm e-mail 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	816
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted by setpoint E-mail Address 2 (page 427) and email wasn't send.

🔍 back to List of alarms level 1

Wrn Alarm e-mail 3 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Alarm e-mail 3 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	817
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted by setpoint E-mail Address 3 (page 427) and email wasn't send.

🔍 back to List of alarms level 1

Wrn Alarm e-mail 4 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Alarm e-mail 4 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	818
Description	The alarm indicates that there was a request to send an alarm email to email

	address which is adjusted by setpoint E-mail Address 4 (page 428) and email wasn't send.
--	---

⬅ back to List of alarms level 1

Wrn Battery Overvoltage

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Battery Overvoltage
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	941
Description	This alarm is activated when Battery Voltage (page 468) is over Battery Overvoltage (page 270) for period longer than Battery Under And Overvoltage Delay (page 270) . This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)

⬅ back to List of alarms level 1

Wrn Battery Undervoltage

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Battery Undervoltage
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	940
Description	This alarm is activated when Battery Voltage (page 468) is bellow Battery Undervoltage (page 270) for period longer than Battery Under And Overvoltage Delay (page 270) . This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)

⬅ back to List of alarms level 1

Wrn Battery Voltage

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Battery Voltage
Alarm evaluated	All the time
Related applications	MCB, MGCB
Description	This alarm is activated when Battery Voltage (page 468) is out of range given by Battery Undervoltage (page 270) and Battery Overvoltage (page 270) for period longer than Battery Under And Overvoltage Delay (page 270)

⬅ back to List of alarms level 1

Wrn Bus Meas Error

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Bus Meas Error
Alarm evaluated	Bus Meas Error Protection (page 304) != Disabled

Related applications	MCB, MGCB
Alarm ID	143
Description	<p>This protection is activated in case that voltage mismatch on Bus side is detected for longer than 20 seconds. The mismatch is detected according to the conditions below:</p> <ul style="list-style-type: none"> ➤ Own MCB and MGCB (in case of MGCB application) was closed and LBO Mains Healthy (page 579) is active ➤ Any other controller in Control Group (page 337) closed MGCB ➤ BTB connected another Control Group with MCB Feedback or controller with closed MGCB <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).</p>

⬅ back to List of alarms level 1

Wrn Default Password

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Default Credentials
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	1071
Description	This alarm is active until the default password for administrator account is changed.

⬅ back to List of alarms level 1

Wrn Brute Force Protection Active

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Brute Force Protection Active
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	1237
Description	<p>This alarm is activated when account break protection detects possible attack and at least one account is blocked according to Account break protection rules.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601).</p> <p>Note: In case that the alarm stays active even that it should already be inactive, do the following to get rid of it:</p> <ol style="list-style-type: none"> 1. Disconnect all peripheries (displays, ethernet, etc.) 2. Wait for 20 minutes - the alarm should become inactive 3. Connect with IntelliConfig using USB - Quick connection 4. Acknowledge the alarm

⬅ back to List of alarms level 1

Wrn RTC Battery Flat

Alarm Type	Warning (page 186)
Alarmlist message	Wrn RTC Battery Flat
Alarm evaluated	Only during power-on of the controller
Related applications	MCB, MGCB
Alarm ID	42
Description	This alarm indicates that the controller detected a flat RTC Battery during power-on. The RTC battery is considered to be flat if its voltage drops below 2.8 V. To remove this alarm follow the Backup battery replacement (page 56) .

🔍 back to List of alarms level 1

Wrn CAN2 Empty

Alarm Type	Warning (page 186)
Alarmlist message	Wrn CAN Intercontroller Empty
Alarm evaluated	Only if CAN Intercontroller Empty Check (page 274) = Enabled
Related applications	MCB, MGCB
Alarm ID	46
Description	This alarm is activated when controller is alone on Intercontroller CAN (Terminal Diagram (page 33) and/or Terminal Diagram (page 33)) and setpoint CAN Intercontroller Empty Check (page 274) = Enabled. This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601).

🔍 back to List of alarms level 1

Wrn Default Password

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Default Credentials
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	1071
Description	This alarm is active until the default password for administrator account is changed.

🔍 back to List of alarms level 1

Wrn DISTIN 01

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 01
Alarm evaluated	Only if DIST-IN 01 is configured
Related applications	MCB, MGCB
Alarm ID	1156
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 1.

🔍 back to List of other alarms

Wrn DISTIN 02

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 02
Alarm evaluated	Only if DIST-IN 02 is configured
Related applications	MCB, MGCB
Alarm ID	1157
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 2.

⬅ back to List of other alarms

Wrn DISTIN 03

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 03
Alarm evaluated	Only if DIST-IN 03 is configured
Related applications	MCB, MGCB
Alarm ID	1158
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 3.

⬅ back to List of other alarms

Wrn DISTIN 04

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 04
Alarm evaluated	Only if DIST-IN 04 is configured
Related applications	MCB, MGCB
Alarm ID	1159
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 4.

⬅ back to List of other alarms

Wrn DISTIN 05

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 05
Alarm evaluated	Only if DIST-IN 05 is configured
Related applications	MCB, MGCB
Alarm ID	1160
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 5.

⬅ back to List of other alarms

Wrn DISTIN 06

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 06
Alarm evaluated	Only if DIST-IN 06 is configured
Related applications	MCB, MGCB
Alarm ID	1161
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 6.

⬅ back to List of other alarms

Wrn DISTIN 07

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 07
Alarm evaluated	Only if DIST-IN 07 is configured
Related applications	MCB, MGCB
Alarm ID	1162
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 7.

⬅ back to List of other alarms

Wrn DISTIN 08

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 08
Alarm evaluated	Only if DIST-IN 08 is configured
Related applications	MCB, MGCB
Alarm ID	1163
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 8.

⬅ back to List of other alarms

Wrn DISTIN 09

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 09
Alarm evaluated	Only if DIST-IN 09 is configured
Related applications	MCB, MGCB
Alarm ID	1164
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 9.

⬅ back to List of other alarms

Wrn DISTIN 10

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 10
Alarm evaluated	Only if DIST-IN 10 is configured
Related applications	MCB, MGCB
Alarm ID	1165
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 10.

⬅ back to List of other alarms

Wrn DISTIN 11

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 11
Alarm evaluated	Only if DIST-IN 11 is configured
Related applications	MCB, MGCB
Alarm ID	1166
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 11.

⬅ back to List of other alarms

Wrn DISTIN 12

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 12
Alarm evaluated	Only if DIST-IN 12 is configured
Related applications	MCB, MGCB
Alarm ID	1167
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 12.

⬅ back to List of other alarms

Wrn DISTIN 13

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 13
Alarm evaluated	Only if DIST-IN 13 is configured
Related applications	MCB, MGCB
Alarm ID	1168
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 13.

⬅ back to List of other alarms

Wrn DISTIN 14

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 14
Alarm evaluated	Only if DIST-IN 14 is configured
Related applications	MCB, MGCB
Alarm ID	1169
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 14.

⬅ back to List of other alarms

Wrn DISTIN 15

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 15
Alarm evaluated	Only if DIST-IN 15 is configured
Related applications	MCB, MGCB
Alarm ID	1170
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 15.

⬅ back to List of other alarms

Wrn DISTIN 16

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 16
Alarm evaluated	Only if DIST-IN 16 is configured
Related applications	MCB, MGCB
Alarm ID	1171
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 16.

⬅ back to List of other alarms

Wrn DISTIN 17

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 17
Alarm evaluated	Only if DIST-IN 17 is configured
Related applications	MCB, MGCB
Alarm ID	1172
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 17.

⬅ back to List of other alarms

Wrn DISTIN 18

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 18
Alarm evaluated	Only if DIST-IN 18 is configured
Related applications	MCB, MGCB
Alarm ID	1173
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 18.

⬅ back to List of other alarms

Wrn DISTIN 19

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 19
Alarm evaluated	Only if DIST-IN 19 is configured
Related applications	MCB, MGCB
Alarm ID	1174
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 19.

⬅ back to List of other alarms

Wrn DISTIN 20

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 20
Alarm evaluated	Only if DIST-IN 20 is configured
Related applications	MCB, MGCB
Alarm ID	1175
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 20.

⬅ back to List of other alarms

Wrn DISTIN 21

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 21
Alarm evaluated	Only if DIST-IN 21 is configured
Related applications	MCB, MGCB
Alarm ID	1176
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 21.

⬅ back to List of other alarms

Wrn DISTIN 22

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 22
Alarm evaluated	Only if DIST-IN 22 is configured
Related applications	MCB, MGCB
Alarm ID	1177
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 22.

⬅ back to List of other alarms

Wrn DISTIN 23

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 23
Alarm evaluated	Only if DIST-IN 23 is configured
Related applications	MCB, MGCB
Alarm ID	1178
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 23.

⬅ back to List of other alarms

Wrn DISTIN 24

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 24
Alarm evaluated	Only if DIST-IN 24 is configured
Related applications	MCB, MGCB
Alarm ID	1179
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 24.

⬅ back to List of other alarms

Wrn DISTIN 25

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 25
Alarm evaluated	Only if DIST-IN 25 is configured
Related applications	MCB, MGCB
Alarm ID	1180
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 25.

⬅ back to List of other alarms

Wrn DISTIN 26

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 26
Alarm evaluated	Only if DIST-IN 26 is configured
Related applications	MCB, MGCB
Alarm ID	1181
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 26.

⬅ back to List of other alarms

Wrn DISTIN 27

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 27
Alarm evaluated	Only if DIST-IN 27 is configured
Related applications	MCB, MGCB
Alarm ID	1182
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 27.

⬅ back to List of other alarms

Wrn DISTIN 28

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 28
Alarm evaluated	Only if DIST-IN 28 is configured
Related applications	MCB, MGCB
Alarm ID	1183
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 28.

⬅ back to List of other alarms

Wrn DISTIN 29

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 29
Alarm evaluated	Only if DIST-IN 29 is configured
Related applications	MCB, MGCB
Alarm ID	1184
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 29.

⬅ back to List of other alarms

Wrn DISTIN 30

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 30
Alarm evaluated	Only if DIST-IN 30 is configured
Related applications	MCB, MGCB
Alarm ID	1185
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 30.

⬅ back to List of other alarms

Wrn DISTIN 31

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 31
Alarm evaluated	Only if DIST-IN 31 is configured
Related applications	MCB, MGCB
Alarm ID	1186
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 31.

⬅ back to List of other alarms

Wrn DISTIN 32

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 32
Alarm evaluated	Only if DIST-IN 32 is configured
Related applications	MCB, MGCB
Alarm ID	1187
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 32.

⬅ back to List of other alarms

Wrn DISTIN 33

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 33
Alarm evaluated	Only if DIST-IN 33 is configured
Related applications	MCB, MGCB
Alarm ID	1344
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 33.

⬅ back to List of other alarms

Wrn DISTIN 34

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 34
Alarm evaluated	Only if DIST-IN 34 is configured
Related applications	MCB, MGCB
Alarm ID	1345
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 34.

⬅ back to List of other alarms

Wrn DISTIN 35

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 35
Alarm evaluated	Only if DIST-IN 35 is configured
Related applications	MCB, MGCB
Alarm ID	1346
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 35.

⬅ back to List of other alarms

Wrn DISTIN 36

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 36
Alarm evaluated	Only if DIST-IN 36 is configured
Related applications	MCB, MGCB
Alarm ID	1347
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 36.

⬅ back to List of other alarms

Wrn DISTIN 37

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 37
Alarm evaluated	Only if DIST-IN 37 is configured
Related applications	MCB, MGCB
Alarm ID	1348
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 37.

⬅ back to List of other alarms

Wrn DISTIN 38

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 38
Alarm evaluated	Only if DIST-IN 38 is configured
Related applications	MCB, MGCB
Alarm ID	1349
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 38.

◀ back to List of other alarms

Wrn DISTIN 39

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 39
Alarm evaluated	Only if DIST-IN 39 is configured
Related applications	MCB, MGCB
Alarm ID	1350
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 39.

◀ back to List of other alarms

Wrn DISTIN 40

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 40
Alarm evaluated	Only if DIST-IN 40 is configured
Related applications	MCB, MGCB
Alarm ID	1351
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 40.

◀ back to List of other alarms

Wrn DISTIN 41

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 41
Alarm evaluated	Only if DIST-IN 41 is configured
Related applications	MCB, MGCB
Alarm ID	1352
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 41.

◀ back to List of other alarms

Wrn DISTIN 42

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 42
Alarm evaluated	Only if DIST-IN 42 is configured
Related applications	MCB, MGCB
Alarm ID	1353
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 42.

⬅ back to List of other alarms

Wrn DISTIN 43

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 43
Alarm evaluated	Only if DIST-IN 43 is configured
Related applications	MCB, MGCB
Alarm ID	1354
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 43.

⬅ back to List of other alarms

Wrn DISTIN 44

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 44
Alarm evaluated	Only if DIST-IN 44 is configured
Related applications	MCB, MGCB
Alarm ID	1355
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 44.

⬅ back to List of other alarms

Wrn DISTIN 45

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 45
Alarm evaluated	Only if DIST-IN 45 is configured
Related applications	MCB, MGCB
Alarm ID	1356
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 45.

⬅ back to List of other alarms

Wrn DISTIN 46

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 46
Alarm evaluated	Only if DIST-IN 46 is configured
Related applications	MCB, MGCB
Alarm ID	1357
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 46.

⬅ back to List of other alarms

Wrn DISTIN 47

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 47
Alarm evaluated	Only if DIST-IN 47 is configured
Related applications	MCB, MGCB
Alarm ID	1358
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 47.

⬅ back to List of other alarms

Wrn DISTIN 48

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 48
Alarm evaluated	Only if DIST-IN 48 is configured
Related applications	MCB, MGCB
Alarm ID	1359
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 48.

⬅ back to List of other alarms

Wrn DISTIN 49

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 49
Alarm evaluated	Only if DIST-IN 49 is configured
Related applications	MCB, MGCB
Alarm ID	1360
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 49.

⬅ back to List of other alarms

Wrn DISTIN 50

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 50
Alarm evaluated	Only if DIST-IN 50 is configured
Related applications	MCB, MGCB
Alarm ID	1361
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 50.

◀ back to List of other alarms

Wrn DISTIN 51

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 51
Alarm evaluated	Only if DIST-IN 51 is configured
Related applications	MCB, MGCB
Alarm ID	1362
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 51.

◀ back to List of other alarms

Wrn DISTIN 52

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 52
Alarm evaluated	Only if DIST-IN 52 is configured
Related applications	MCB, MGCB
Alarm ID	1363
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 52.

◀ back to List of other alarms

Wrn DISTIN 53

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 53
Alarm evaluated	Only if DIST-IN 53 is configured
Related applications	MCB, MGCB
Alarm ID	1364
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 53.

◀ back to List of other alarms

Wrn DISTIN 54

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 54
Alarm evaluated	Only if DIST-IN 54 is configured
Related applications	MCB, MGCB
Alarm ID	1365
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 54.

⬅ back to List of other alarms

Wrn DISTIN 55

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 55
Alarm evaluated	Only if DIST-IN 55 is configured
Related applications	MCB, MGCB
Alarm ID	1366
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 55.

⬅ back to List of other alarms

Wrn DISTIN 56

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 56
Alarm evaluated	Only if DIST-IN 56 is configured
Related applications	MCB, MGCB
Alarm ID	1367
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 56.

⬅ back to List of other alarms

Wrn DISTIN 57

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 57
Alarm evaluated	Only if DIST-IN 57 is configured
Related applications	MCB, MGCB
Alarm ID	1368
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 57.

⬅ back to List of other alarms

Wrn DISTIN 58

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 58
Alarm evaluated	Only if DIST-IN 58 is configured
Related applications	MCB, MGCB
Alarm ID	1369
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 58.

⬅ back to List of other alarms

Wrn DISTIN 59

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 59
Alarm evaluated	Only if DIST-IN 59 is configured
Related applications	MCB, MGCB
Alarm ID	1370
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 59.

⬅ back to List of other alarms

Wrn DISTIN 60

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 60
Alarm evaluated	Only if DIST-IN 60 is configured
Related applications	MCB, MGCB
Alarm ID	1371
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 60.

⬅ back to List of other alarms

Wrn DISTIN 61

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 61
Alarm evaluated	Only if DIST-IN 61 is configured
Related applications	MCB, MGCB
Alarm ID	1372
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 61.

⬅ back to List of other alarms

Wrn DISTIN 62

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 62
Alarm evaluated	Only if DIST-IN 62 is configured
Related applications	MCB, MGCB
Alarm ID	1373
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 62.

◀ back to List of other alarms

Wrn DISTIN 63

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 63
Alarm evaluated	Only if DIST-IN 63 is configured
Related applications	MCB, MGCB
Alarm ID	1374
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 63.

◀ back to List of other alarms

Wrn DISTIN 64

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTIN 64
Alarm evaluated	Only if DIST-IN 64 is configured
Related applications	MCB, MGCB
Alarm ID	1375
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 272) = 64.

◀ back to List of other alarms

Wrn DISTOUT

Alarm Type	Warning (page 186)
Alarmlist message	Wrn DISTOUT
Alarm evaluated	Only if DIST-OUT is configured
Related applications	MCB, MGCB
Description	This alarm is activated when failure of virtual module DIST-OUT is detected.

◀ back to List of other alarms

Wrn Event e-mail 1 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Event e-mail 1 Fail

Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	734
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted by setpoint E-mail Address 1 (page 427) and email wasn't send.

⬆ back to List of alarms level 1

Wrn Event e-mail 2 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Event e-mail 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	735
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted by setpoint E-mail Address 2 (page 427) and email wasn't send.

⬆ back to List of alarms level 1

Wrn Event e-mail 3 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Event e-mail 3 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	736
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted by setpoint E-mail Address 3 (page 427) and email wasn't send.

⬆ back to List of alarms level 1

Wrn Event e-mail 4 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Event e-mail 4 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	737
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted by setpoint E-mail Address 4 (page 428) and email wasn't send.

⬆ back to List of alarms level 1

Wrn Load IMP/EXP Fail

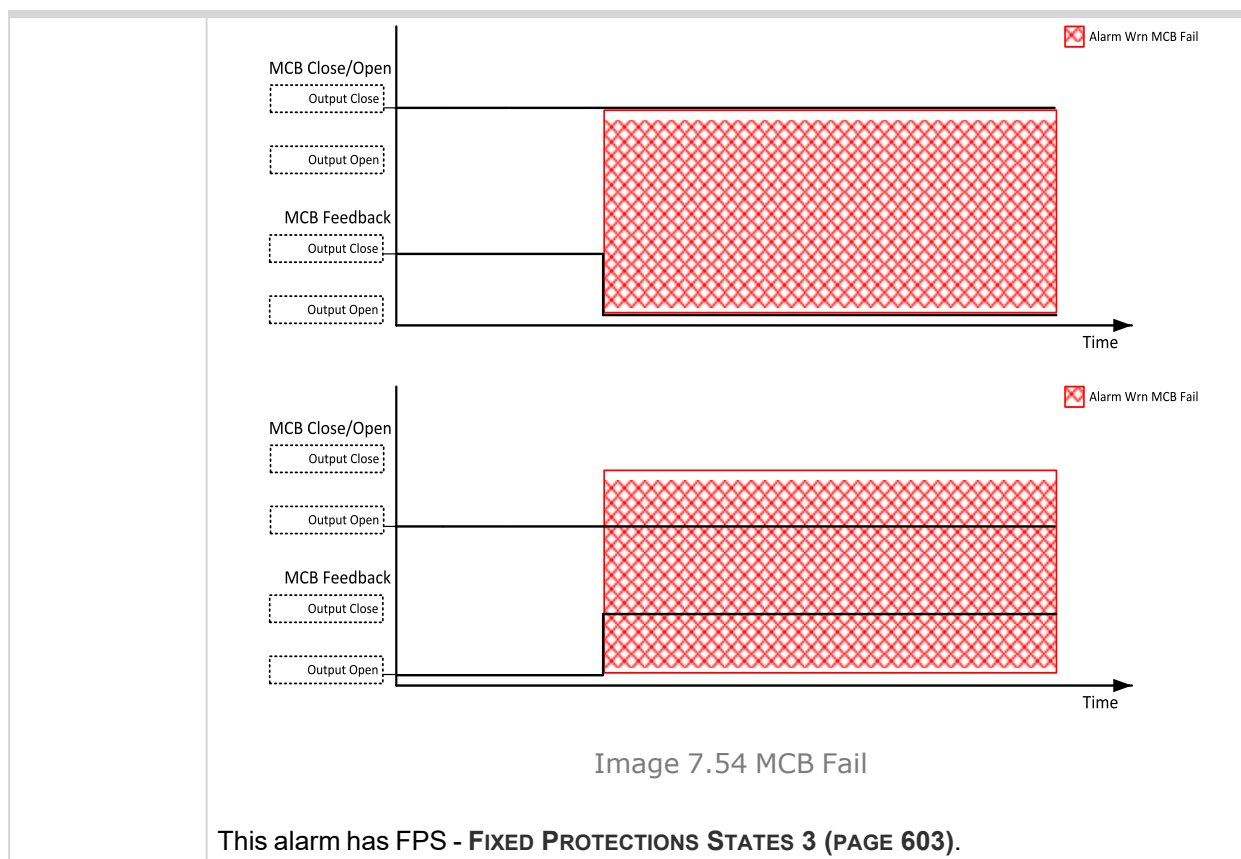
Alarm Type	Warning (page 186)
-------------------	---------------------------

Alarmlist message	Wrn Load IMP/EXP Fail
Alarm evaluated	Always
Related applications	MCB, MGCB
Alarm ID	1448
Description	<p>This alarm is active when Load Control PTM Mode (page 240) = Imp/Exp and #System Load Control PTM (page 239) = Load Shar but Mains Measurement P is unavailable.</p> <p>When this alarm is active, load is controlled as if Load Control PTM Mode (page 240) = Baseload and #System Load Control PTM (page 239) = Baseload.</p> <p>Alarm is caused by:</p> <ul style="list-style-type: none"> > Mains Measurement P (page 250) = None > Mains Measurement P (page 250) = Analog Input and <ul style="list-style-type: none"> >> LAI MAINS MEASUREMENT P (PAGE 597) is not configured >> Value from LAI Mains Measurement P (page 250) has Invalid flag (page 434) <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)</p>

🔍 back to List of alarms level 1

Wrn MCB Fail

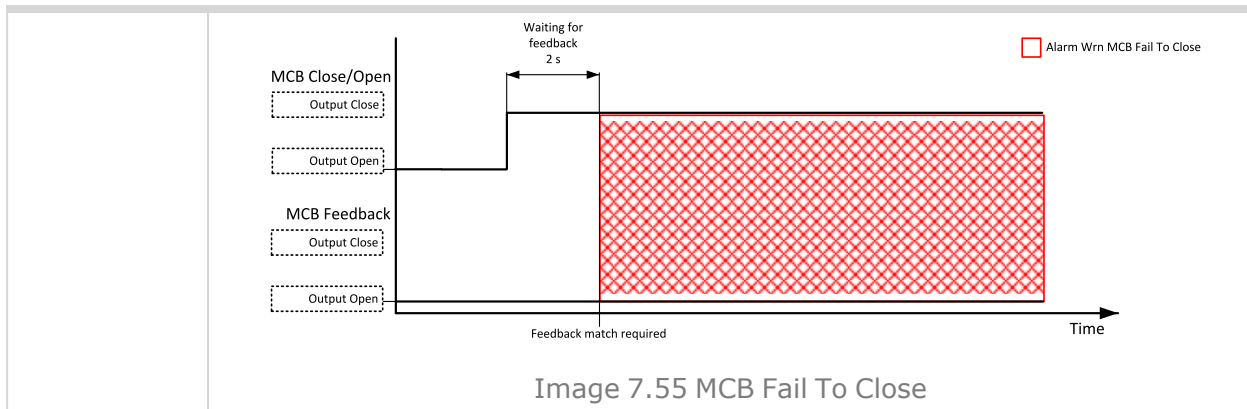
Alarm Type	Warning (page 186)
Alarmlist message	Wrn MCB Fail
Alarm evaluated	Only if MCB Control Mode (page 253) = Internal
Related applications	MCB, MGCB
Alarm ID	90
Description	<p>This alarm is activated when there is a problem with position of the circuit breaker.</p> <ul style="list-style-type: none"> > LBI MCB FEEDBACK (PAGE 547) does not match expected position given by LBO MCB CLOSE/OPEN (PAGE 579). > There is a mismatch between LBI MCB FEEDBACK (PAGE 547) and MCB FEEDBACK NEGATIVE (PAGE 549). > Self-opening of breaker with mains parameters without limits – not considered as fault, MCB open command is issued when Mains fails according to the setpoint MCB Opens On (page 290). > Self-closing of breaker with mains parameters with limits – not considered as fault, MCB close command is issued after MCB Close Delay (page 288).



🔍 back to List of alarms level 1

Wrn MCB Fail To Close

Alarm Type	Warning (page 186)
Alarmlist message	Wrn MCB Fail To Close
Alarm evaluated	Only if MCB Control Mode (page 253) = Internal
Related applications	MCB, MGCB
Alarm ID	1553
Description	<p>This alarm is activated when there is a problem with circuit breaker position while closing.</p> <ul style="list-style-type: none"> ➤ LBO MCB CLOSE/OPEN (PAGE 579) closed but LBI MCB FEEDBACK (PAGE 547) did not closed in 2 seconds. ➤ Self-closing of breaker with mains parameters with limits – not considered as fault, MCB close command is issued according to the setpoint MCB Opens On (page 290).



⬅ back to List of alarms level 1

Wrn MCB Fail To Open

Alarm Type	Warning (page 186)
Alarmlist message	Wrn MCB Fail To Open
Alarm evaluated	Only if MCB Control Mode (page 253) = Internal
Related applications	MCB, MGCB
Alarm ID	1552
Description	<p>This alarm is activated when there is a problem with circuit breaker position while opening.</p> <ul style="list-style-type: none"> ➤ LBO MCB CLOSE/OPEN (PAGE 579) opened but LBI MCB FEEDBACK (PAGE 547) did not opened in 2 seconds. ➤ Self-opening of breaker with mains parameters without limits - not considered as fault, MCB open command is issued according to the setpoint MCB Opens On (page 290). <p>Image 7.56 MCB Fail To Open</p>

⬅ back to List of alarms level 1

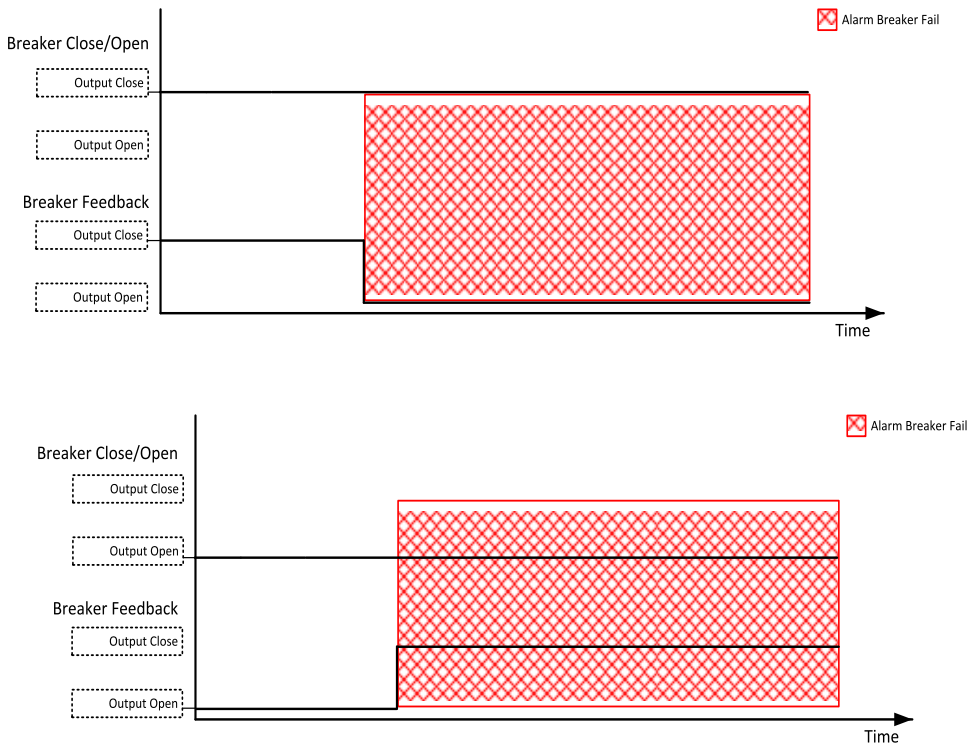
Wrn MCB Isolated

Alarm Type	Warning (page 186)
Alarmlist message	Wrn MCB Isolated

Alarm evaluated	Only if MCB ISOLATED (PAGE 550) is configured
Related applications	MCB, MGCB
Alarm ID	548
Description	This alarm is activated by the LBI MCB ISOLATED (PAGE 550) and it signalizes that Load is cut off from Mains by an external isolator.

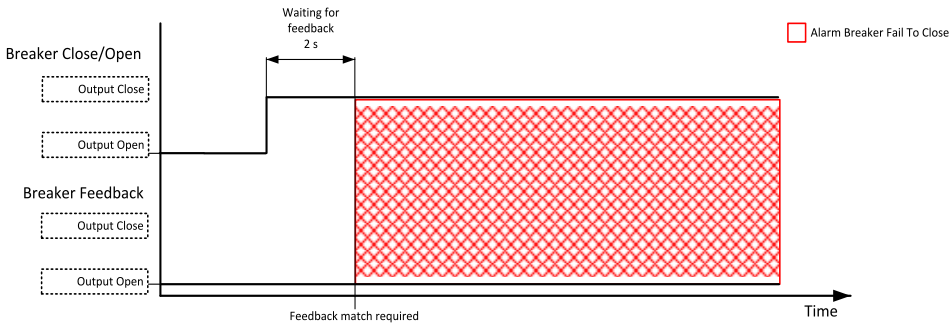
⬅ back to List of alarms level 1

Wrn MGCB Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn MGCB Fail
Alarm evaluated	Only if Application Mode (page 472) = MGCB and GCB Control Mode (page 254) != External
Related applications	MGCB
Alarm ID	91
Description	<p>This alarm is activated when there is a problem with position of the circuit breaker.</p> <ul style="list-style-type: none"> ➤ LBI GCB FEEDBACK (PAGE 552) does not match expected position given by LBO MGCB CLOSE/OPEN (PAGE 584). ➤ There is a mismatch between LBI GCB FEEDBACK (PAGE 552) and GCB FEEDBACK NEGATIVE (PAGE 553).  <p style="text-align: center;">Image 7.57 MGCB Fail</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).</p>

⬅ back to List of alarms level 2

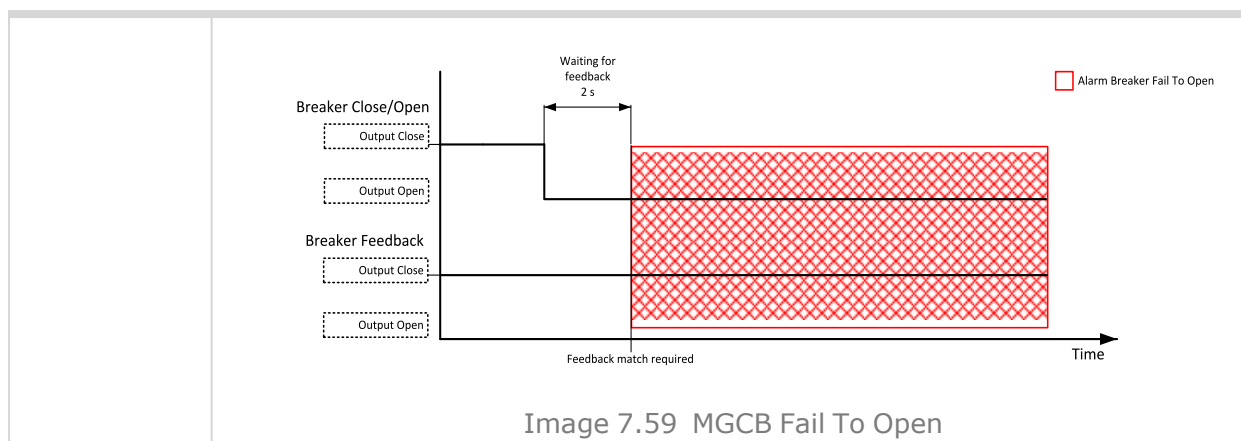
Wrn MGCB Fail To Close

Alarm Type	Warning (page 186)
Alarmlist message	Wrn MGCB Fail To Close
Alarm evaluated	Only if Application Mode (page 472) = MGCB and GCB Control Mode (page 254) != External
Related applications	MGCB
Alarm ID	1555
Description	<p>This alarm is activated when there is a problem with circuit breaker position while closing.</p> <p>➤ LBO MGCB CLOSE/OPEN (PAGE 584) closed but LBI GCB FEEDBACK (PAGE 552) did not closed in Waiting For Breaker Feedback (page 1) seconds.</p>  <p style="text-align: center;">Image 7.58 MGCB Fail To Close</p>

⬅ back to List of alarms level 2

Wrn MGCB Fail To Open

Alarm Type	Warning (page 186)
Alarmlist message	Wrn MGCB Fail To Open
Alarm evaluated	Only if Application Mode (page 472) = MGCB and GCB Control Mode (page 254) != External
Related applications	MGCB
Alarm ID	1554
Description	<p>This alarm is activated when there is a problem with circuit breaker position while opening.</p> <p>➤ LBO MGCB CLOSE/OPEN (PAGE 584) opened but LBI GCB FEEDBACK (PAGE 552) did not opened in 2 seconds.</p>



⬅ back to List of alarms level 2

Wrn Password reset e-mail addr is not set

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Password reset e-mail addr is not set
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	1292
Description	This alarm is active when password reset e-mail address is not filled. Fill out the password reset e-mail via IntelliConfig to remove this alarm.

⬅ back to List of alarms level 1

Wrn Parallel Work

Alarm Type	Warning
Alarmlist message	Wrn Parallel Work
Alarm evaluated	All the time
Related applications	MCB, MGCB
Description	This alarm is active when MGCB is closed externally while MCB is closed.

⬅ back to List of alarms level 2

Wrn PasswEnterBlock

Alarm Type	WRN
Alarmlist message	PasswEnterBlock
Alarm evaluated	All the time
Related applications	MCB, MGCB
Description	<p>This alarm is issued to indicate that user will not be able to type in password for set amount of time.</p> <p>Note: This is cause by too many invalid attempts.</p>

⬅ back to List of alarms level 1

Wrn PF(Pm) Fail

Alarm Type	Warning (page 186)
------------	--------------------

Alarmlist message	Wrn PF(Pm) Fail
Alarm evaluated	Only when PF/Q Control PTM Mode (page 244) = PF(Pm) and at least one Gen-set is excited
Related applications	MCB, MGCB
Alarm ID	1048
Description	<p>This alarm indicates PF(Pm) Control Fail which can be caused by:</p> <ul style="list-style-type: none"> > PF/Q Request Source (page 243) = Analog External Value and Breaker state (page 473) = ParalOper <p><i>Note: Function is evaluated as PF/Q Request Source (page 243) = Setpoint</i></p> <ul style="list-style-type: none"> > curve is not available in configuration - evaluated during controller initialization only <p><i>Note: Function is evaluated as PF/Q Control PTM Mode (page 244) = PF Control</i></p> <ul style="list-style-type: none"> > curve has changed resolution <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601).</p>

🔍 back to List of alarms level 1

Wrn PF/Q IMP/EXP Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn PF/Q IMP/EXP Fail
Alarm evaluated	Always
Related applications	MCB, MGCB
Alarm ID	1054
Description	<p>This alarm is active when PF/Q Regulation Type (page 245) = Import/Export PF/Q Control and #System PF Control PTM (page 244) = Var Shar but Mains Measurement P or Q is unavailable.</p> <p>When this alarm is active, PF/Q is controlled as if PF/Q Regulation Type (page 245) = Base PF/Q Control and #System PF Control PTM (page 244) = Base PF.</p> <p>Alarm is caused by:</p> <ul style="list-style-type: none"> > Mains Measurement P (page 250) = None > Mains Measurement P (page 250) = Analog Input and <ul style="list-style-type: none"> >> LAI MAINS MEASUREMENT P (PAGE 597) is not configured >> Value from LAI Mains Measurement P (page 250) has Invalid flag (page 434) > Mains Measurement Q (page 251) = None > Mains Measurement Q (page 251) = Analog Input and <ul style="list-style-type: none"> >> LAI MAINS MEASUREMENT Q (PAGE 597) is not configured >> Value from LAI Mains Measurement Q (page 251) has Invalid flag (page 434)

	This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)
--	--

⬅ 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	MCB, MGCB
Description	Alarm is active when the controller has turned on Production 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 Q(P) Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Q(P) Fail
Alarm evaluated	Only when PF/Q Control PTM Mode (page 244) = Q(P) and at least one Gen-set is excited
Related applications	MCB, MGCB
Alarm ID	1051
Description	<p>This alarm indicates Q(P) Control Fail which can be caused by:</p> <ul style="list-style-type: none"> ➤ PF/Q Request Source (page 243) = Analog External Value and Breaker state (page 473) = ParalOper <p><i>Note: Function is evaluated as PF/Q Request Source (page 243) = Setpoint</i></p> <ul style="list-style-type: none"> ➤ Q(P) (PAGE 599) curve is not available in configuration - evaluated during controller initialization only. <p><i>Note: Function is evaluated as PF/Q Control PTM Mode (page 244) = PF Control</i></p> <ul style="list-style-type: none"> ➤ Q(P) (PAGE 599) curve has changed resolution <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601).</p>

⬅ back to List of alarms level 1

Wrn Synchronization Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Reverse Synchro Fail
Alarm evaluated	Only if LBO REVERSE SYNCHRONIZATION (PAGE 590) is closed
Related applications	MCB, MGCB
Alarm ID	93
Description	This alarm is activated when Reverse Synchronization fails. Reverse Synchronization is activated when synchronization is done over MCB breaker.

	This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).
--	---

⬅ back to List of alarms level 1

Wrn RTC Battery Flat

Alarm Type	Warning (page 186)
Alarmlist message	Wrn RTC Battery Flat
Alarm evaluated	Only during power-on of the controller
Related applications	MCB, MGCB
Alarm ID	42
Description	This alarm indicates that the controller detected a flat RTC Battery during power-on. The RTC battery is considered to be flat if its voltage drops below 2.8 V. To remove this alarm follow the Backup battery replacement (page 56) .

⬅ back to List of alarms level 1

Wrn SHAIN 1

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHAIN 1
Alarm evaluated	Only if SHAIN 1 is configured
Related applications	MCB, MGCB
Alarm ID	36
Description	This alarm is activated when shared analog inputs are not received from SHAIN module 1.

⬅ back to List of alarms level 1

Wrn SHAIN 2

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHAIN 2
Alarm evaluated	Only if SHAIN 2 is configured
Related applications	MCB, MGCB
Alarm ID	233
Description	This alarm is activated when shared analog inputs are not received from SHAIN module 2.

⬅ back to List of alarms level 1

Wrn SHAIN Collision

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHAIN Collision
Alarm evaluated	Only if SHIN 1 or SHAIN 2 module is configured
Related applications	MCB, MGCB
Alarm ID	38
Description	This alarm is activated when controller receives shared analog inputs of any SHAIN module from more than just one controller.

This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)

◀ back to List of alarms level 1

Wrn SHBIN 1

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN 1
Alarm evaluated	Only if SHBIN 1 is configured
Related applications	MCB, MGCB
Alarm ID	32
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 1.

◀ back to List of alarms level 1

Wrn SHBIN 2

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN 2
Alarm evaluated	Only if SHBIN 2 is configured
Related applications	MCB, MGCB
Alarm ID	33
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 2.

◀ back to List of alarms level 1

Wrn SHBIN 3

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN 3
Alarm evaluated	Only if SHBIN 3 is configured
Related applications	MCB, MGCB
Alarm ID	34
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 3.

◀ back to List of alarms level 1

Wrn SHBIN 4

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN 4
Alarm evaluated	Only if SHBIN 4 is configured
Related applications	MCB, MGCB
Alarm ID	35
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 4.

◀ back to List of alarms level 1

Wrn SHBIN 5

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN 5
Alarm evaluated	Only if SHBIN 5 is configured
Related applications	MCB, MGCB
Alarm ID	216
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 5.

◀ back to List of alarms level 1

Wrn SHBIN 6

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN 6
Alarm evaluated	Only if SHBIN 6 is configured
Related applications	MCB, MGCB
Alarm ID	217
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 6.

◀ back to List of alarms level 1

Wrn SHBIN Collision

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SHBIN Collision
Alarm evaluated	Only if at least one of SHBIN 1 to SHBIN 6 modules is configured
Related applications	MCB, MGCB
Alarm ID	37
Description	This alarm is activated when controller receives shared binary inputs of any SHBIN module from more than just one controller. This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)

◀ back to List of alarms level 1

Wrn SNMP TRAP 1 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SNMP TRAP 1 Fail
Alarm evaluated	Only when SNMP Agent (page 383) = Enabled and SNMP Traps IP Address 1 (page 423) is set.
Related applications	MCB, MGCB
Alarm ID	823
Description	This alarm is activated if sending of SNMP trap to IP address set by SNMP Traps IP Address 1 (page 423) failed.

◀ back to List of alarms level 1

Wrn SNMP TRAP 2 Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn SNMP TRAP 2 Fail
Alarm evaluated	Only when SNMP Agent (page 383) = Enabled and SNMP Traps IP Address 2 (page 423) is set.
Related applications	MCB, MGCB
Alarm ID	824
Description	This alarm is activated if sending of SNMP trap to IP address set by SNMP Traps IP Address 2 (page 423) failed.

⬆ back to List of alarms level 1

Wrn Soft Transfer Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Soft Transfer Fail
Alarm evaluated	During transition of load
Related applications	MCB, MGCB
Alarm ID	852
Description	This alarm is activated when loading/unloading was not finished in time Load Ramp (page 343) +10%. This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601)

⬆ back to List of alarms level 1

Wrn Synchronization Fail

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Synchronization Fail
Alarm evaluated	During synchronization
Related applications	MGCB
Alarm ID	94
Description	This alarm is activated if the synchronization fails, e.g. Synchronization Timeout (page 348) elapses. This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603) .

⬆ back to List of alarms level 2

Wrn Total Running PQS Value Overflow

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Total Running PQS Value Overflow
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	1077
Description	This alarm is activated in case the sum of all Controllers' apparent power is above range of value Total Running Samax (page 463) .

	Changing of the power format should be considered if this alarm appears.
--	--

⬅ back to List of alarms level 1

Wrn Unsupported PMS Mode

Alarm Type	Warning (page 186)
Alarmlist message	Wrn Unsupported PMS Mode
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	1044
Description	This alarm is active if setpoint #Power Management Mode (page 315) = N/A Mode.

⬅ back to List of alarms level 1

Wrong PLC Configuration

Alarm Type	Warning (page 186)
Alarmlist message	Wrong PLC Configuration
Alarm evaluated	Always
Related applications	MCB, MGCB
Alarm ID	41
Description	This alarm is activated when the PLC - Programmable Logic Controller (page 152) configuration is invalid. Once the alarm is active the whole PLC does not work. This alarm will be active until the PLC configuration is not fixed and the archive is written to the controller.

⬅ back to List of alarms level 1

Alarm List Indication

ALI Bus Ph L1 Inverted

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Bus Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	928
Description	This alarm is activated when Bus Phase L1 is inverted.

⬅ back to List of alarms level 1

ALI Bus Ph L2 Inverted

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Bus Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	929
Description	This alarm is activated when Bus Phase L2 is inverted.

⬅ back to List of alarms level 1

ALI Bus Ph L3 Inverted

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Bus Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	930
Description	This alarm is activated when Bus Phase L3 is inverted.

⬅ back to List of alarms level 1

ALI Bus Ph Rotation Opposite

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Bus Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	847
Description	This alarm is activated when controller detects wrong phase rotation, e.g. Phase Rotation (page 266) is set to Clockwise and actual rotation is Counterclockwise, on the Bus side.

⬅ back to List of alarms level 1

ALI Mains Ph L1 Inverted

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Mains Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	925
Description	This alarm is activated when Mains Phase L1 is inverted.

⬅ back to List of alarms level 1

ALI Mains Ph L2 Inverted

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Mains Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	926
Description	This alarm is activated when Mains Phase L2 is inverted.

⬅ back to List of alarms level 1

ALI Mains Ph L3 Inverted

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Mains Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	927
Description	This alarm is activated when Mains Phase L3 is inverted.

⬅ back to List of alarms level 1

ALI Mains Ph Rotation Opposite

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Mains Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	158
Description	<p>This alarm is activated when controller detects wrong phase rotation, e.g. Phase Rotation (page 266) is set to Clockwise and actual rotation is Counterclockwise, on the Mains side.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).</p>

⬅ back to List of alarms level 1

ALI Manual Restore

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Manual Restore
Alarm evaluated	Only if Controller mode (page 267) = AUTO and Return From Island (page 288) = Manual
Related applications	MCB, MGCB
Alarm ID	783
Description	<p>This alarm is activated after MAINS HEALTHY (PAGE 579) is closed and Mains Return Delay (page 287) elapses and Gen-sets are loaded.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).</p>

⬅ back to List of alarms level 1

ALI Wrong Power Format

Alarm Type	Alarm List Indication (page 186)
Alarmlist message	ALI Wrong Power Format
Alarm evaluated	All the time
Related applications	MCB, MGCB
Alarm ID	149
Description	This alarm is activated when there is inconsistency of Power Formats And Units (page 164) on any controller which is connected via CAN2 (page 17) or Communication peripherals (page 17) .

⬅ back to List of alarms level 1

History Record Only

Hst Bus Overvoltage L1-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >V L1-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	98
Description	This alarm is activated by Bus <>V Protection (page 299) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Overvoltage L2-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >V L2-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	99
Description	This alarm is activated by Bus <>V Protection (page 299) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Overvoltage L3-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >V L3-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	100
Description	This alarm is activated by Bus <>V Protection (page 299) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

 back to List of alarms level 1

Hst Bus Overvoltage L1-L2

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >V L1-L2
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	107
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

 back to List of alarms level 1

Hst Bus Overvoltage L2-L3

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >V L2-L3
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	108
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

 back to List of alarms level 1

Hst Bus Overvoltage L3-L1

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >V L3-L1
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	109
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

 back to List of alarms level 1

Hst Bus Undervoltage L1-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <V L1-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	95
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

 back to List of alarms level 1

Hst Bus Undervoltage L2-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <V L2-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	96
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L3-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <V L3-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	97
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L1-L2

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <V L1-L2
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	104
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L2-L3

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <V L2-L3
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	105
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L3-L1

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <V L3-L1
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	106
Description	This alarm is activated by Bus <>V Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Overfrequency

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus >f
Alarm evaluated	Only if Bus <>f Protection (page 302) != Disabled
Related applications	MCB, MGCB
Alarm ID	121
Description	This alarm is activated by Bus <>f Protection (page 302). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Underfrequency

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus <f
Alarm evaluated	Only if Bus <>f Protection (page 302) != Disabled
Related applications	MCB, MGCB
Alarm ID	120
Description	This alarm is activated by Bus <>f Protection (page 302). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Voltage Unbalance Ph-N

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus V Unbalance Ph-N
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	589
Description	This alarm is activated by Bus Voltage Unbalance Protection (page 299). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst Bus Voltage Unbalance Ph-Ph

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Bus V Unbalance Ph-Ph
Alarm evaluated	Only if Bus <>V Protection (page 299) != Disabled
Related applications	MCB, MGCB
Alarm ID	588
Description	This alarm is activated by Bus Voltage Unbalance Protection (page 299) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Hst ROCOF

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst ROCOF 1
Alarm evaluated	Only if ROCOF Protection (page 306) = Enabled or (ROCOF Protection (page 306) = Parallel Only and MCB FEEDBACK (PAGE 547) is active)
Related applications	MCB, MGCB
Alarm ID	851
Description	This alarm is activated by ROCOF Protection (page 306) . <i>Note: There are 4 ROCOF Protections which can be enabled.</i> > ROCOF Protection (page 306)

⬅ back to List of alarms level 1

Hst Vector Shift

Alarm Type	History Record Only (page 186)
Alarmlist message	Hst Vector Shift
Alarm evaluated	Only if Vector Shift Protection (page 305) = Enabled or (Vector Shift Protection (page 305) = Parallel Only and MCB FEEDBACK (PAGE 547) is closed)
Related applications	MCB, MGCB
Alarm ID	850
Description	This alarm is activated when Vector shift (page 137) is detected.

⬅ back to List of alarms level 1

MP Mains Overload

Alarm Type	Hst
Alarmlist message	MP Mains Overload
Alarm evaluated	While Gen-set is excited
Related applications	MCB, MGCB
Alarm ID	23
Description	This alarm is activated by overload on Mains.

⬅ back to List of alarms level 2

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.

List of alarms level 2

Mains Protection	678
MP Mains Overvoltage L1-N	678
MP Mains Overvoltage L2-N	678
MP Mains Overvoltage L3-N	679
MP Mains Overvoltage L1-L2	679
MP Mains Overvoltage L2-L3	680
MP Mains Overvoltage L3-L1	680
MP Mains Undervoltage L1-N	681
MP Mains Undervoltage L2-N	681
MP Mains Undervoltage L3-N	682
MP Mains Undervoltage L1-L2	682
MP Mains Undervoltage L2-L3	683
MP Mains Undervoltage L3-L1	684
MP Mains Voltage Unbalance Ph-Ph	684
MP Mains Voltage Unbalance Ph-N	685
MP Mains Overfrequency	686
MP Mains Underfrequency	686
Mains Protection + FltRes	687
MPR Current Unbalance	687
Hst IDMT Overload	687
MPR IDMT Mains >A	687
MPR Short Circuit	687
Sd Battery Flat	688
System Stop	688
Stp Request Under MinPowerPTM	688

 **back to Alarms**

Mains Protection

MP Mains Overvoltage L1-N

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
Mains Protection (page 186)	
Alarmlist message	MP Mains >V L1-N
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
Only if Mains <>V Protection (page 296) != Disabled	
Related applications	MCB, MGCB
Alarm ID	125
Description	This alarm is activated by Mains <>V Protection (page 296).
	This alarm is activated when Mains Voltage L1-N (page 445) rises over preset value.
	Application Mode (page 472)
SPTM	
MINT	
This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).	

⬆ back to List of alarms level 1

MP Mains Overvoltage L2-N

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
Mains Protection (page 186)	
Alarmlist message	MP Mains >V L2-N
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
Only if Mains <>V Protection (page 296) != Disabled	
Related applications	MCB, MGCB
Alarm ID	126
Description	This alarm is activated by Mains <>V Protection (page 296).
	This alarm is activated when Mains Voltage L2-N (page 445) rises above preset value.

	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).

⬅ back to List of alarms level 1

MP Mains Overvoltage L3-N

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
	Mains Protection (page 186)
Alarmlist message	MP Mains >V L3-N
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
	Only if Mains <>V Protection (page 296) != Disabled
Related applications	MCB, MGCB
Alarm ID	127
Description	This alarm is activated by Mains <>V Protection (page 296).
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).

⬅ back to List of alarms level 1

MP Mains Overvoltage L1-L2

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
	Mains Protection (page 186)
Alarmlist message	MP Mains >V L1-L2
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
	Only if Mains <>V Protection (page 296) != Disabled
Related applications	MCB, MGCB
Alarm ID	131
Description	This alarm is activated by Mains <>V Protection (page 296).
	This alarm is activated when Mains Voltage L1-L2 (page 445) rises over

	<p>preset value.</p> <table><tr><td>Application Mode (page 472)</td></tr><tr><td>SPTM</td></tr><tr><td>MINT</td></tr></table> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).</p>	Application Mode (page 472)	SPTM	MINT
Application Mode (page 472)				
SPTM				
MINT				

⬆ back to List of alarms level 1

MP Mains Overvoltage L2-L3

Alarm Type	Application Mode (page 472)	
	SPTM	
	MINT	
	Mains Protection (page 186)	
Alarmlist message	MP Mains >V L2-L3	
Alarm evaluated	Application Mode (page 472)	
	SPTM	
	MINT	
	Only if Mains <>V Protection (page 296) != Disabled	
Related applications	MCB, MGCB	
Alarm ID	132	
Description	This alarm is activated by Mains <>V Protection (page 296).	
	This alarm is activated when Mains Voltage L2-L3 (page 445) rises over preset value.	
	Application Mode (page 472)	
	SPTM	
	MINT	
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).	

⬆ back to List of alarms level 1

MP Mains Overvoltage L3-L1

Alarm Type	Application Mode (page 472)	
	SPTM	
	MINT	
	Mains Protection (page 186)	
Alarmlist message	MP Mains >V L3-L1	
Alarm evaluated	Application Mode (page 472)	
	SPTM	
	MINT	
	Only if Mains <>V Protection (page 296) != Disabled	
Related applications	MCB, MGCB	

Alarm ID	133
Description	This alarm is activated by Mains <>V Protection (page 296) .
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602) .

⬆ back to List of alarms level 1

MP Mains Undervoltage L1-N

Alarm Type	Application Mode (page 472)	
	SPTM	
	MINT	
	Mains Protection (page 186)	
Alarmlist message	MP Mains <V L1-N	
Alarm evaluated	Application Mode (page 472)	
	SPTM	
	MINT	
	Only if Mains <>V Protection (page 296) != Disabled	
Related applications	MCB, MGCB	
Alarm ID	122	
Description	This alarm is activated by Mains <>V Protection (page 296).	
	This alarm is activated when Mains Voltage L1-N (page 445) drops below preset value.	
	Application Mode (page 472)	
	SPTM	
	MINT	
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).	

⬆ back to List of alarms level 1

MP Mains Undervoltage L2-N

Alarm Type	Application Mode (page 472)	
	SPTM	
	MINT	
	Mains Protection (page 186)	
Alarmlist message	MP Mains <V L2-N	
Alarm evaluated	Application Mode (page 472)	
	SPTM	
	MINT	
	Only if Mains <>V Protection (page 296) != Disabled	

Related applications	MCB, MGCB
Alarm ID	123
Description	This alarm is activated by Mains <>V Protection (page 296) .
	This alarm is activated when Mains Voltage L2-N (page 445) drops below preset value.
	<div>Application Mode (page 472)</div>
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602) .

⬅ back to List of alarms level 1

MP Mains Undervoltage L3-N

Alarm Type	
	Application Mode (page 472)
	SPTM
	MINT
	Mains Protection (page 186)
Alarmlist message	MP Mains <V L3-N
Alarm evaluated	
	Application Mode (page 472)
	SPTM
	MINT
	Only if Mains <>V Protection (page 296) != Disabled
Related applications	MCB, MGCB
Alarm ID	124
Description	This alarm is activated by Mains <>V Protection (page 296).
	This alarm is activated when Mains Voltage L3-N (page 445) drops below preset value.
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).

⬅ back to List of alarms level 1

MP Mains Undervoltage L1-L2

Alarm Type	Application Mode (page 472)	
	SPTM	
	MINT	
	Mains Protection (page 186)	
Alarmlist message	MP Mains <V L1-L2	

Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
	Only if Mains <>V Protection (page 296) != Disabled
Related applications	MCB, MGCB
Alarm ID	128
Description	This alarm is activated by Mains <>V Protection (page 296) .
	This alarm is activated when Mains Voltage L1-L2 (page 445) drops below preset value.
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).

⬆ back to List of alarms level 1

MP Mains Undervoltage L2-L3

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
	Mains Protection (page 186)
Alarmlist message	MP Mains <V L2-L3
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
	Only if Mains <>V Protection (page 296) != Disabled
Related applications	MCB, MGCB
Alarm ID	129
Description	This alarm is activated by Mains <>V Protection (page 296) .
	This alarm is activated when Mains Voltage L2-L3 (page 445) drops below preset value.
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602).

⬆ back to List of alarms level 1

MP Mains Undervoltage L3-L1

Alarm Type	Application Mode (page 472)	
	SPTM	
	MINT	
	Mains Protection (page 186)	
Alarmlist message	MP Mains <V L3-L1	
Alarm evaluated	Application Mode (page 472)	
	SPTM	
	MINT	
	Only if Mains <>V Protection (page 296) != Disabled	
Related applications	MCB, MGCB	
Alarm ID	130	
Description	This alarm is activated by Mains <>V Protection (page 296) .	
	This alarm is activated when Mains Voltage L3-L1 (page 446) drops below preset value.	
	Application Mode (page 472)	
	SPTM	
	MINT	
	This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602) .	

⬅ back to List of alarms level 1

MP Mains Voltage Unbalance Ph-Ph

Alarm Type	Application Mode (page 472)	Alarm Type
	SPTM	Mains Protection (page 186)
	MINT	History Record Only (page 186)
	Mains Protection (page 186)	
Alarmlist message	MPMains V Unbalance Ph-Ph	
Alarm evaluated	Application Mode (page 472)	Evaluated
	SPTM	Only if Mains Voltage Unbalance Protection (page 298) != Disabled
	MINT	All the time
	Only if Mains Voltage Unbalance Protection (page 298) != Disabled	
Related applications	MCB, MGCB	
Alarm ID	592	
Description	<p>This alarm is activated by Mains Voltage Unbalance Protection (page 298)</p> <p>This alarm is activated when relative difference between Mains Voltage L1-L2 (page 445), Mains Voltage L2-L3 (page 445) or Mains Voltage L3-L1 (page 446) rises over preset value.</p>	

	Application Mode (page 472)	Behavior
	SPTM	Alarm is activated by Mains Voltage Unbalance Protection (page 298)
	MINT	Protection is always active. Alarm is activated when relative difference between bus voltages rises over Bus V Unbalance (page 308) for period longer than Bus V Unbalance Delay (page 308) .
This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602) .		

🔍 back to List of alarms level 1

MP Mains Voltage Unbalance Ph-N

Alarm Type	Application Mode (page 472)	Alarm Type
	SPTM	Mains Protection (page 186)
	MINT	History Record Only (page 186)
Mains Protection (page 186)		
Alarmlist message	MP Mains V Unbalance Ph-N	
Alarm evaluated	Application Mode (page 472)	Evaluated
	SPTM	Only if Mains Voltage Unbalance Protection (page 298) != Disabled
	MINT	All the time
Only if Mains Voltage Unbalance Protection (page 298) != Disabled		
Related applications	MCB, MGCB	
Alarm ID	593	
Description	This alarm is activated by Mains Voltage Unbalance Protection (page 298) This alarm is activated when relative difference between Mains Voltage L1-N (page 445) , Mains Voltage L2-N (page 445) or Mains Voltage L3-N (page 445) rises over preset value.	
	Application Mode (page 472)	Behavior
	SPTM	Alarm is activated by Mains Voltage Unbalance Protection (page 298)
	MINT	Protection is always active. Alarm is activated when relative difference between bus voltages rises over Bus V Unbalance (page 308) for period longer than Bus V Unbalance Delay (page 308) .
This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 602) .		

🔍 back to List of alarms level 1

MP Mains Overfrequency

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
	Mains Protection (page 186)
Alarmlist message	MP Mains >f
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
	Only if Bus <>f Protection (page 302) != Disabled
Related applications	MCB, MGCB
Alarm ID	135
Description	This alarm is activated by Bus <>f Protection (page 302).
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

MP Mains Underfrequency

Alarm Type	Application Mode (page 472)
	SPTM
	MINT
	Mains Protection (page 186)
Alarmlist message	MP Mains <f
Alarm evaluated	Application Mode (page 472)
	SPTM
	MINT
	Only if Bus <>f Protection (page 302) != Disabled
Related applications	MCB, MGCB
Alarm ID	134
Description	This alarm is activated by Bus <>f Protection (page 302).
	Application Mode (page 472)
	SPTM
	MINT
	This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

⬅ back to List of alarms level 1

Mains Protection + FltRes

MPR Current Unbalance

Alarm Type	Mains Protection + FltRes (page 186)
Alarmlist message	MPR Current Unbalance
Alarm evaluated	Only if Current Unbalance Protection (page 295) != Disabled
Related applications	MCB, MGCB
Alarm ID	1064
Description	This alarm is activated by Current Unbalance Protection (page 295) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

🔍 back to List of alarms level 2

Hst IDMT Overload

Alarm Type	Protection types (page 186)Mains Protection + FltRes (page 186)
Alarmlist message	Hst IDMT Overload
Alarm evaluated	Only if Overload Protection (page 292) != Disabled
Related applications	MCB, MGCB
Alarm ID	147
Description	This alarm is activated by Overload Protection (page 292) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

🔍 back to List of alarms level 2

MPR IDMT Mains >A

Alarm Type	Mains Protection + FltRes (page 186)
Alarmlist message	MPR IDMT Mains >A
Alarm evaluated	Only if IDMT Mains Overcurrent Protection (page 293) != Disabled
Related applications	MCB, MGCB
Alarm ID	1063
Description	This alarm is activated by IDMT Mains Overcurrent Protection (page 293) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603).

🔍 back to List of alarms level 2

MPR Short Circuit

Alarm Type	Mains Protection + FltRes (page 186)
Alarmlist message	MPR Short Circuit

Alarm evaluated	Only if Short Circuit Protection (page 296) != Disabled
Related applications	MCB, MGCB
Alarm ID	1066
Description	This alarm is activated by Short Circuit Protection (page 296) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 603) .

⬅ back to List of alarms level 2

Sd Battery Flat

Alarm Type	Sd
Alarmlist message	Sd Battery Flat
Alarm evaluated	During cranking
Related applications	MCB, MGCB
Alarm ID	52
Description	This alarm will be issued if the controller was reset during cranking of the Controller. 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. This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 601) .

⬅ back to List of alarms level 2

System Stop

Stp Request Under MinPowerPTM

Alarm Type	System Stop (page 186)
Alarmlist message	Stp Request under MinPowerPTM
Alarm evaluated	Only if Minimal Power PTM Protection (page 303) != Disabled
Related applications	MCB, MGCB
Alarm ID	1511
Description	This alarm is activated if controller detects that the System goes below Minimal Power PTM (page 277) , Minimal Power PTM Protection Del (page 278) elapsed and Minimal Power PTM Protection (page 303) is not Disabled.

⬅ back to List of alarms level 2

8.3 Modules

8.3.1 CAN modules

Supported combinations of modules 689

Module's protections	690
Theory of binary inputs and outputs	690
Extension modules	694

Supported combinations of modules

The maximal number of CAN modules is limited by the number of the controller's generic modules. Once the physical module is configured, it allocates necessary generic modules. So, it is possible to configure as many CAN modules as many generic modules are available. The maximum number of CAN modules is also limited by the number of addresses (indexes) that can be configured for each type of the generic module. CAN modules and generic modules share indexes.

Example: If you configure Intel IO8/8 module which is using 1x BI, BO, and AO generic module with index (address) 1, any other module using same generic modules will not be able to be configured with index (address) 1 (IGS-PTM, Intel AIO9/1).

Each generic module has 8 "terminals" (inputs/outputs) and the IntelMains 510 has the following amount of the generic modules:

- > AI generic: 10
- > AO generic: 8
- > BI generic: 16
- > BO generic: 12

In the table below, you can see how many generic modules are necessary for each CAN module and how many indexes are available for each type of CAN module in the IntelMains 510.

CAN Module	Max number of indexes	AI generic	AO generic	BI generic	BO generic
Intel AIN8	10	1	0	0	0
Intel IO 8/8	12	0	1	1	1
Intel IO 16/0	8	0	1	2	0
IGL-RA15	4	0	0	0	2
IGS-PTM	4	1	1	1	1
Intel AIO9/1	5	2	1	0	0
Intel AIN8TC	10	1	0	0	0
I-AOUT8	4	0	1	0	0
IS-BIN16/8	7	0	0	2	1

Note: When configuring modules do not forget to let first 4 indexes free for modules which can't use high addresses such as IGL-RA15, IGS-PTM, AIO9/1, I-AOUT8.

Note: Module Intel IO8/8 has available AOUT only if it is configured with index number below 9 and Intel AIO9/1 has available AOUT only if it is configured with index number below 5.

Note: Module Intel IO8/8 with older FW than 1.3.1.2 has available AOUT only if it is configured with index number below 5.

Module's protections

Each configured CAN module can have its own protection and protection state. For setup: connect the controller via IntelliConfig → Control → Controller Configuration → Modules → Module Settings.

➤ Protection Upon Module Failure

- » None - No alarm will be activated if module fails. It is not possible to use the User Protection State.
- » Warning - Wrn alarm is activated if module fails.

Note: The name and color of the alarm is automatically generated according to the options **Protection Upon Module Failure, Module Name, and Module Index**. The module name is automatically generated or renamed by the user.

- **Protection State** - If you check the check box the new User Protection State will be displayed in the User Protection States group in the Values after the configuration is imported to the CU.

Note: The name of the User Protection State is automatically generated according to the options **Protection Upon Module Failure, Module Name, and Module Index**. The module name is automatically generated or renamed by the user.

Example: Wrn Intel AIN8 10 = Warning upon module failure of the Intel AIN8 module with index 10.

Theory of binary inputs and outputs

Binary inputs	690
Binary outputs	692

Type of the binary inputs/outputs of some configured modules using BINs or BOUTs can be changed via Intelli Config. For setup: connect the controller via IntelliConfig → Control → Controller Configuration → Modules → Module Settings → **Binary Inputs Type / Binary Outputs Type**.

See the following chapters for more details.

Binary inputs

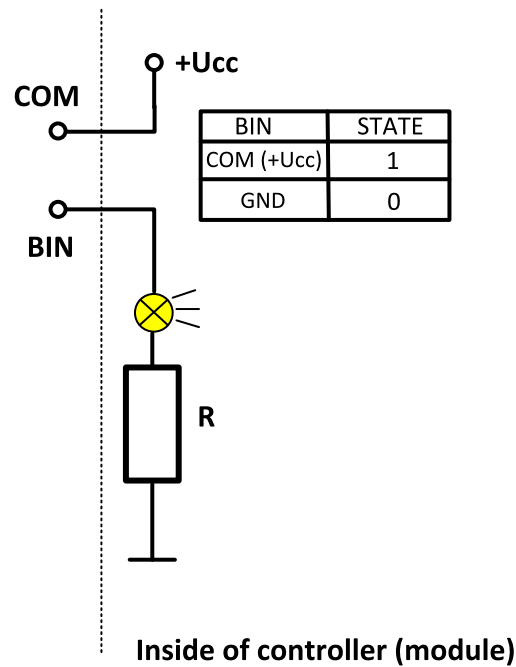
Pull Down

The pull-down logic is used when it is required to ensure that the logical value of inputs settles at the expected logical level whenever external devices are turned off, or they are at a high impedance state. It ensures that input is at a defined low logic level when the connection with external devices is lost. In the controller (module), the pull-down resistor is used to connect the input to the -BAT (0 V), so the log 0 (open state) is represented by 0 V. This connection is used as prevention against fluctuations and an undefined state at the input.

- The principle of internal connection is shown in the picture below.
- The bulb represents internal state of binary input.

- > In case the “COM” (+Ucc) is not connected to the input terminal “BIN” then the internal state is logical 0.
- > In case the “COM” (+Ucc) is connected to the input terminal “BIN” then the internal state is logical 1.

Binary input : Pull Down



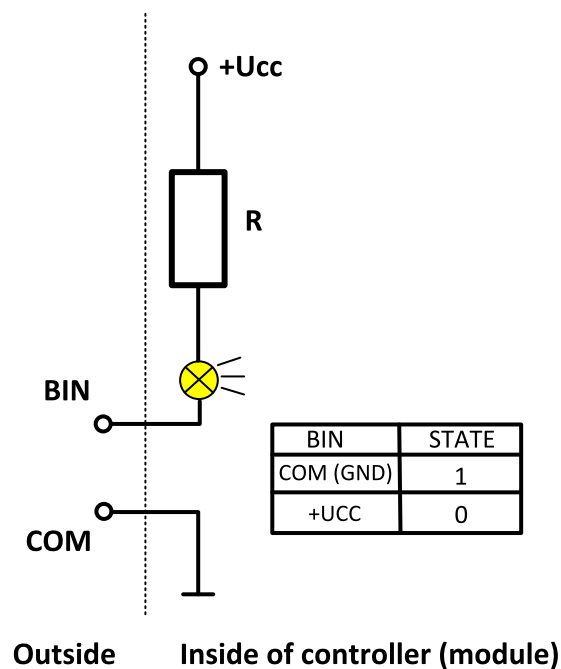
Note: There is not any COM terminal on the controller, the wire is directly connected to the input terminal "BIN", so if input signal is log 1 the +Ucc is directly connected to the "BIN".

Pull Up

The pull-up logic is used when it is required to establish an additional loop over the critical components while making sure that the voltage is well-defined even when the switch is open. It ensures that input and wiring is at a defined high logical level in the absence of an input signal. In the controller (module), the pull-up resistor is used to connect the input to the +BAT (+Ucc), so the log 0 (open state) is represented by +Ucc. This connection is used as prevention against fluctuations and an undefined state at the input.

- > The principle of internal connection is shown in the picture below.
- > The bulb represents internal state of binary input.
- > In case the input terminal “BIN” (+Ucc) is not connected to the “COM” (GND) then the internal state is logical 0.
- > In case the input terminal “BIN” (+Ucc) is connected to the “COM” (GND) then the internal state is logical 1.

Binary input : Pull Up



Note: There is not any COM terminal on the controller, the wire is directly connected to the input terminal "BIN", so if input signal is log 1 the GND is directly connected to the "BIN".

🔍 back to Theory of binary inputs and outputs

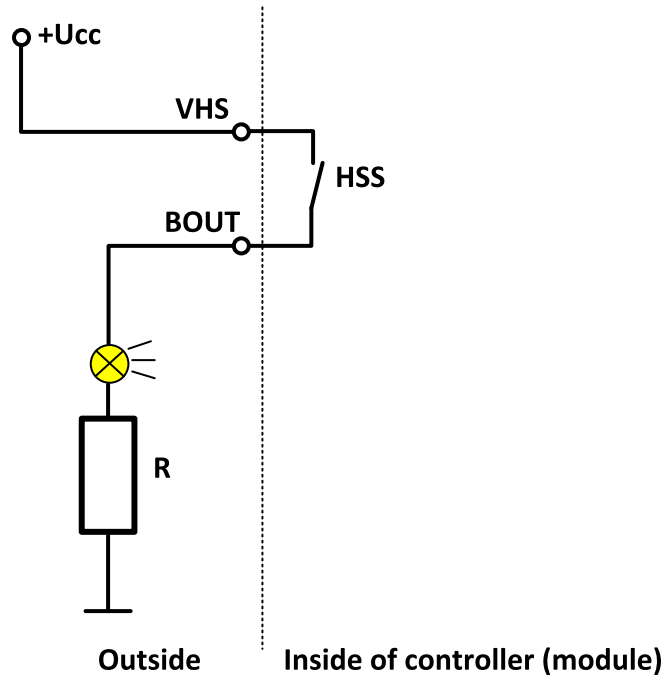
Binary outputs

High side switch - HSS

The high side logic is used when load is permanently connected to the ground (GND) and when it is required to ensure that the logical value of outputs settles at the expected logical level whenever the controller (module) is turned off, or at a high impedance state. It ensures that external devices will not be randomly activated when the connection is lost.

- The principle of internal connection is shown in the picture below.
- The bulb represents internal state of binary output.
- By activating of binary output terminal (BOUT), the switch is closed, which causes connection of the load to the VHS (Voltage High side) and +Ucc, so the external state of the load is logical 1.

Binary output: High side switch HSS



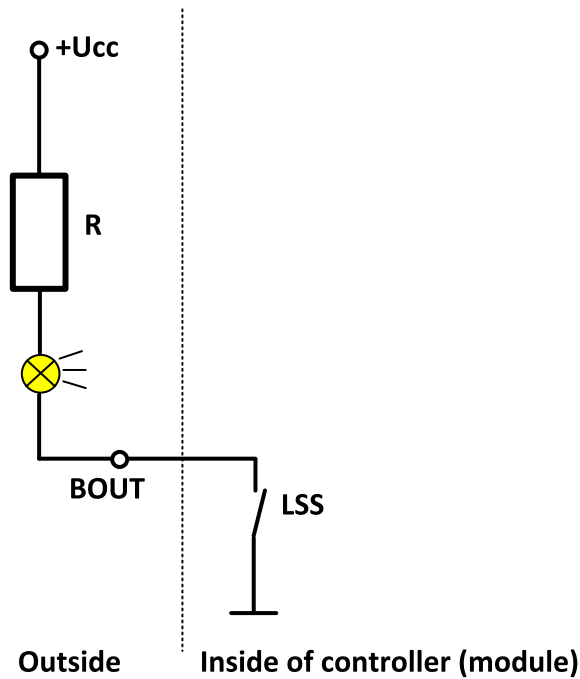
Low side switch - LSS

The low side logic is used when load is permanently connected to the voltage (+Ucc). In case module will be turned off or the connection will be lost the external devices will be activated. It can be used as inverse logic for the detection of the lost connection.

- The principle of internal connection is shown in the picture below.
- The bulb represents internal state of binary output.
- By activating of binary output terminal (BOUT), the switch is closed, which causes connection of the load to the ground (GND), so the external state of the load is logical 1.

Note: Because of safety reasons, the Low side switch is not supported in the InteliMains 510 controller. In case you need BOUT to BIN logical communication between controllers using Pull Up BIN logic, you must use an external module with LSS BOUT logic or any converter which converts the HSS controller's BOUT to LSS. The solution above is not recommended! Try to reconsider your options and use the Pull Down BIN logic.

Binary output: Low side switch LSS



🔍 back to Theory of binary inputs and outputs

Extension modules

Inteli AIN8	694
Inteli IO8/8	701
IGL-RA15	709
IGS-PTM	714
Inteli AIO9/1	721
Inteli AIN8TC	727
I-AOUT8	731
IS-BIN16/8	736

Inteli AIN8

Inteli AIN8 module is extension module equipped with analog inputs and Impulse/RPM input. The module is connected to controller by **CAN1 (page 17)** bus. It is possible to connect up to 10 Inteli AIN8 external units to one controller.

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 7.60 Intel AIN8

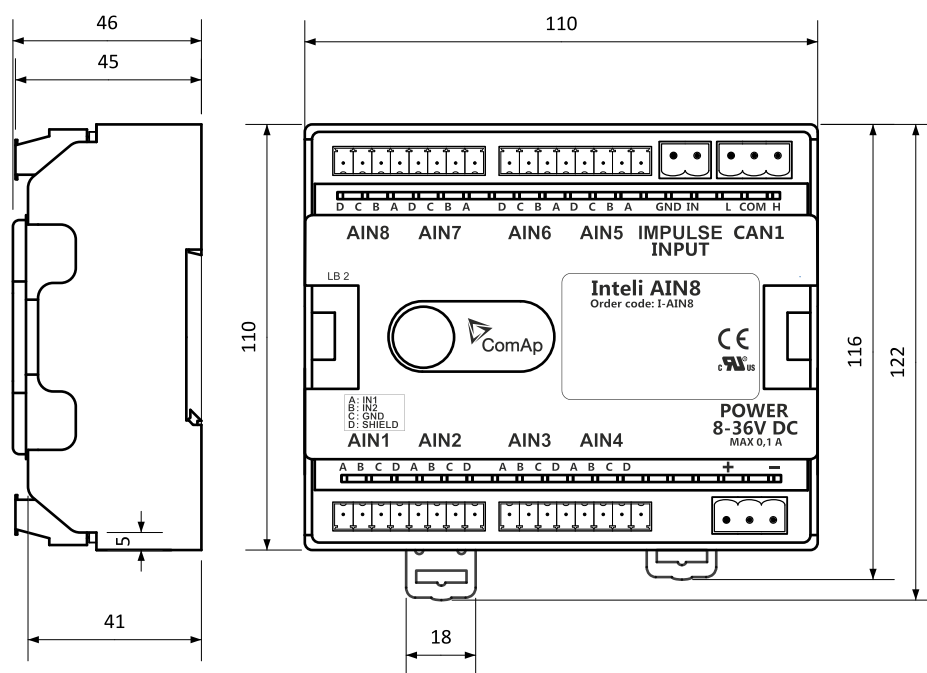
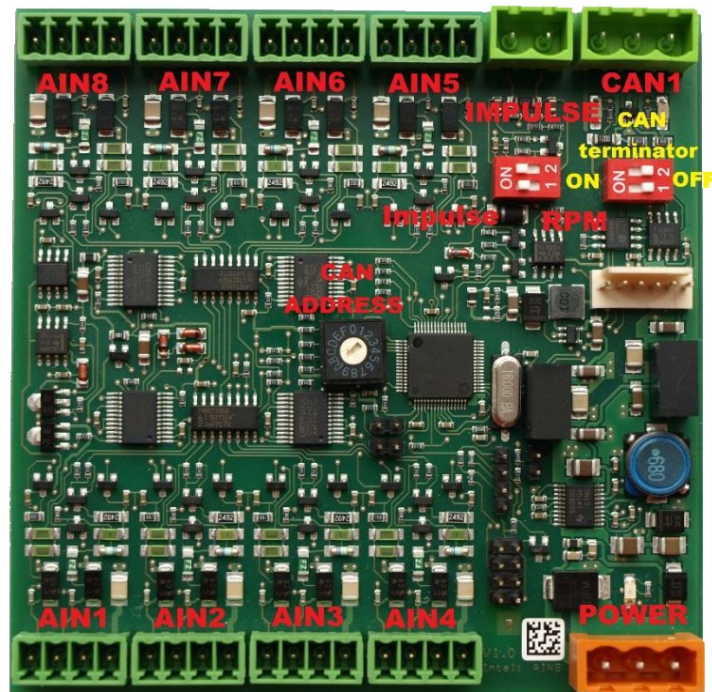


Image 7.61 Intel AIN8 dimensions

Note: All dimensions are in mm.

Terminals



Analog input	8 analog Inputs
CAN1	CAN1 (page 17) line
Power	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" - switch both switches)

IMPORTANT: Impulse input is not supported by the controller.

Analog inputs

- 8 channels
- can be configured as:
 - resistor three wire input
 - current input
 - voltage input

All inputs can be configured to any logical function or protection.

Supported sensors

Sensors				
PT100 [°C] (fix)	PT100 [°F] (fix)	+1V	4-20mA passive	0-250 ohm
PT1000 [°C] (fix)	PT1000 [°F] (fix)	0-2.4V	4-20mA active	0-2400 ohm
NI100 [°C] (fix)	NI100 [°F] (fix)	0-5V	0-20mA passive	0-10k ohm
NI1000 [°C] (fix)	NI1000 [°F] (fix)	0-10V	+20mA active	

Note: It is also possible to use User Curves as sensor.

CAN address

DIP switch determinates CAN address for analog inputs.



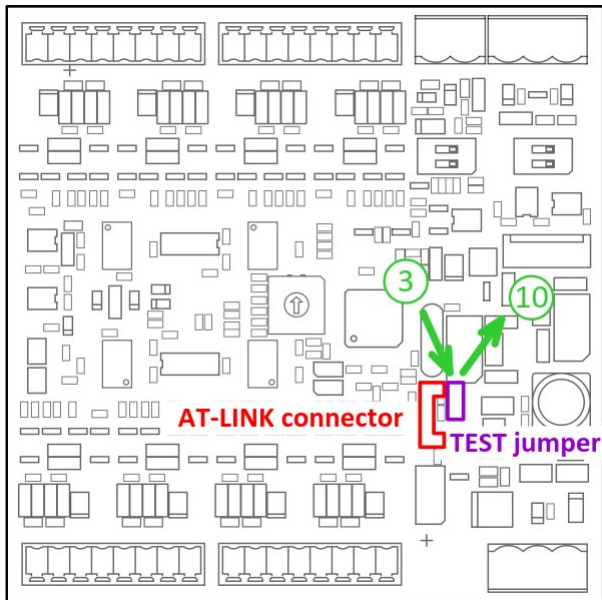
Note: In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins

4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli AIN8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
 - > You have proper connection with the unit
 - > COM port selection is correct
 - > Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

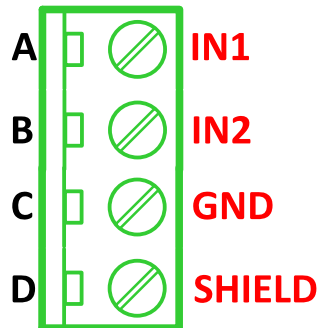
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli AIN8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

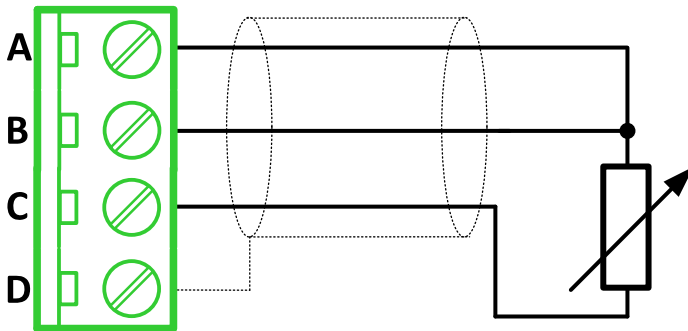
Wiring

The following diagrams show the correct connection of sensors.

Terminator

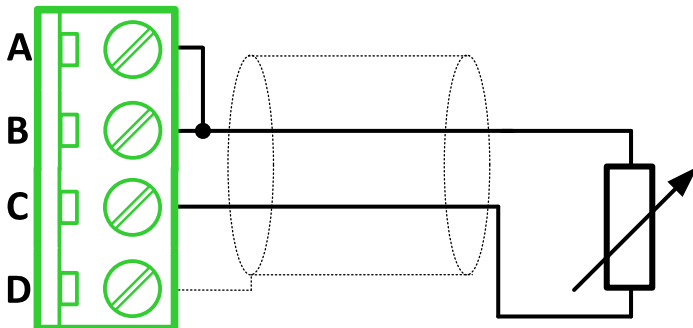


Resistance sensor - 3 wires



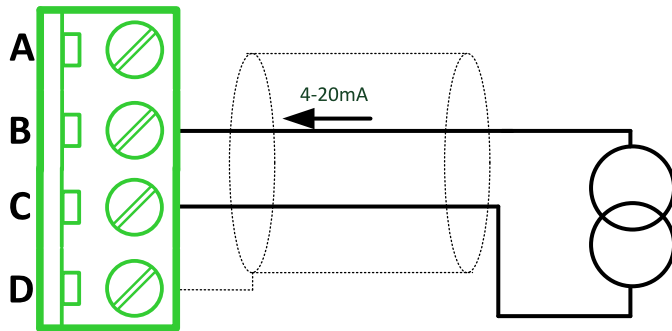
Note: Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω , 0 – 10 k Ω

Resistance sensor - 2 wires



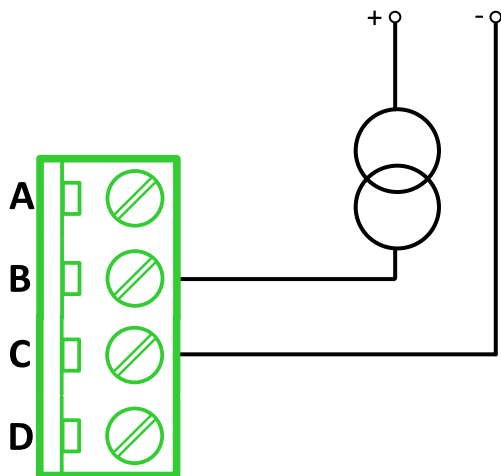
Note: Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω , 0 – 10 k Ω

Current sensor - active



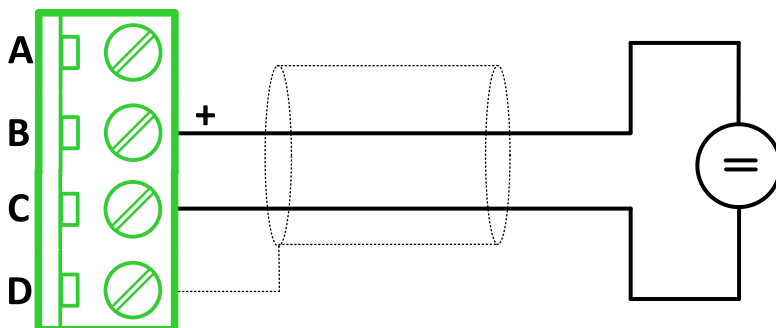
Note: Ranges: $\pm 20\text{ mA}$, $4 - 20\text{ mA}$

Current sensor - passive



Note: Ranges: $0 - 20\text{ mA}$, $4 - 20\text{ mA}$

Voltage sensor



Note: Ranges: $\pm 1\text{ V}$, $0 - 2,5\text{ V}$, $0 - 5\text{ V}$, $0 - 10\text{ V}$

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1 (page 17)
Protection	IP20
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Dimensions (WxHxD)	110x110x46 mm (4,3"x4,3"x1,8")
Weight	221,5 grams

Analog inputs

Number of channels	8
Voltage	Range 0-10 V Accuracy: $\pm 0,25$ % of actual value + ± 25 mV
Current	Range: ± 20 mA Accuracy: $\pm 0,25$ % of actual value + ± 50 μ A
Resistive	Range: 0- 10 k Ω Accuracy: $\pm 0,5$ % of actual value + ± 2 Ω

 [back to Extension modules](#)

Inteli IO8/8

Inteli IO8/8 module is an extension module equipped with binary inputs, binary outputs and analog outputs. The module is connected to controller by **CAN1 (page 17)** bus.

Inteli IO8/8 is the name of the module, but it is possible to configure the module (by internal switch) to two configurations:

- Inteli IO8/8 - 8 binary inputs, 8 binary outputs and 2 analog outputs
- Inteli IO16/0 - 16 binary inputs, 0 binary outputs and 2 analog outputs

It is possible to connect up to 12 Inteli IO8/8 or 8 Inteli IO 16/0 external units to one controller.

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 7.62 Intel I/O8/8

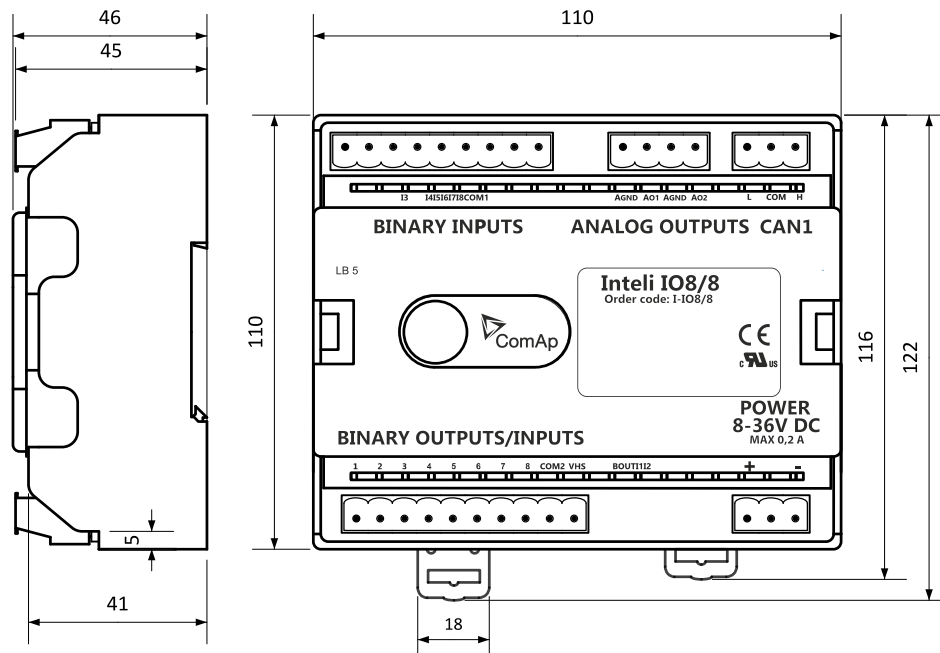
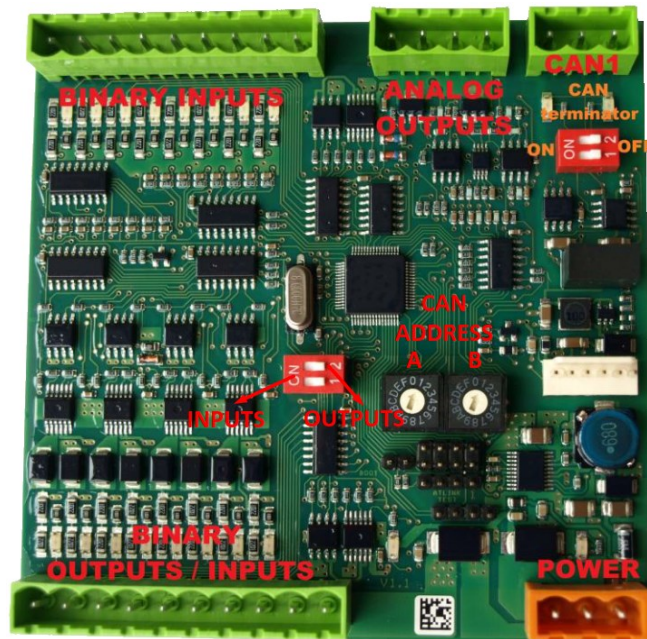


Image 7.63 Intel I/O8/8 dimensions

Note: All dimensions are in mm.

Terminals



Binary inputs	8 binary inputs
Binary outputs	8 binary outputs (8 binary inputs)
Analog outputs	2 analog outputs
CAN1	CAN1 (page 17) line
Power	Power supply
Binary inputs LEDs	8 LEDs for binary input indication
Binary outputs LEDs	8 LEDs for binary output indication
CAN LED	Indication transmitted or received data
Status	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" - switch both switches)

Inputs and outputs

Binary inputs

- 8 channels
- can be configured as:
 - » pull up
 - » pull down

All 8 inputs are configured to one type together.

All inputs can be configured to any logical function or protection.

Binary outputs

- 8 channels
- can be configured as:
 - High side switch
 - Low side switch

Always all 8 inputs are configured to one type (HSS/LSS) together. All 8 outputs can be modified to inputs by switch on the PCB (Intel IO8/8 to Intel IO16/0).

Analog outputs

- 2 channels
- can be configured as:
 - voltage 0-10V
 - current 0-20mA
 - PWM (level 5V, with adjustable frequency from 200Hz to 2400Hz, with step 1Hz)

All inputs/outputs can be configured to any logical function or protection.

Output state check

Output state check function evaluates in real time the state of binary outputs and adjusted (required) state. In case of failure (different state of required state and real state) history record and alarm are issued (type of the alarm is set by “Protection upon module failure” - (No protection / Warning)).

This function is designed for short-circuit or other failure, which causes change of set state of binary output.

CAN address

In Intel IO8/8 mode CAN address for binary inputs is determined by DIP switch A, CAN address for binary output and analog outputs is determined by DIP switch B.

In Intel IO16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.

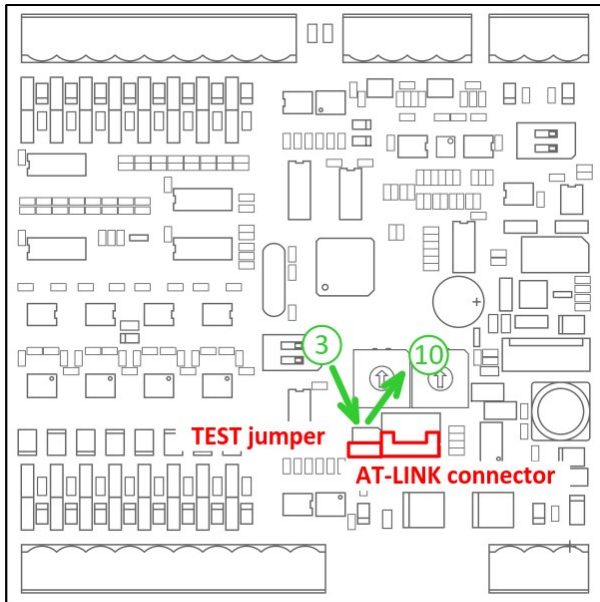


Note: In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins
4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Intel IO8/8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
 - > You have proper connection with the unit
 - > COM port selection is correct
 - > Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

LED indication

Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

Binary output

Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set. When this LED is shining, then module is configured as 8 binary inputs and 8 binary outputs. When this LED is dark, then the module is configured as 16 binary inputs.

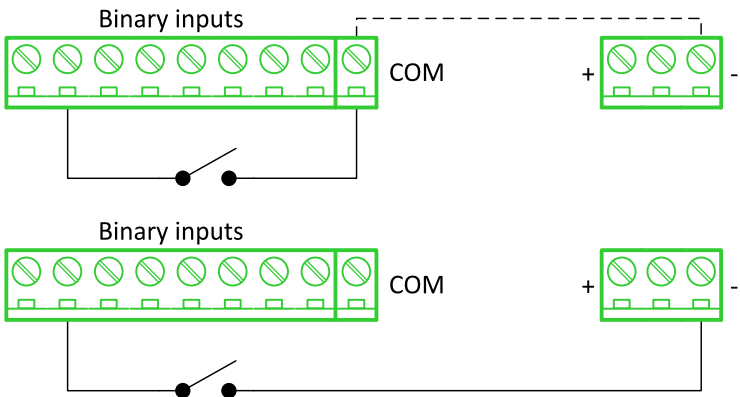
LED at power connector - status LED

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli IO8/8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

Wiring

The following diagrams show the correct connection of inputs and outputs.

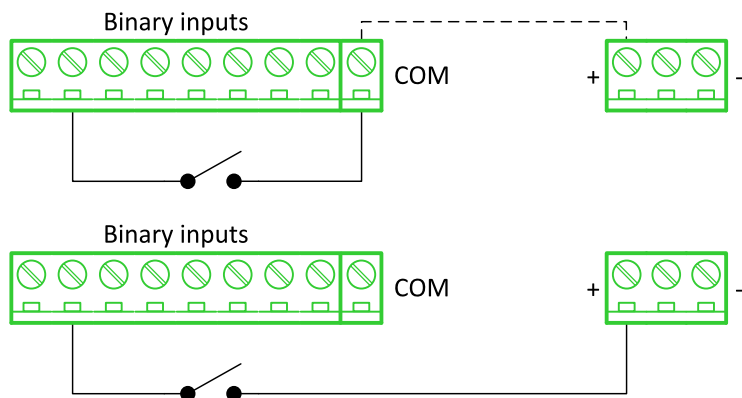
Binary inputs - pull up



There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the GND (-) - dashed line).

On lower picture is case of wiring between BIN2 and GND (-). Both ways are correct.

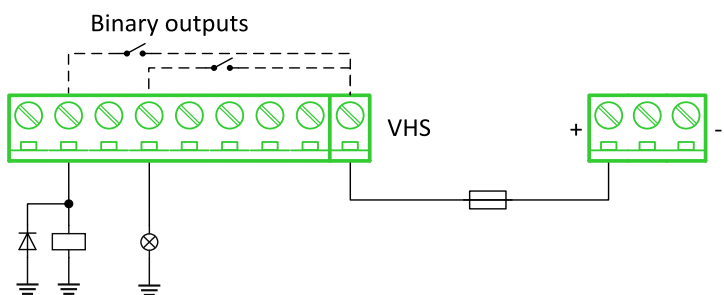
Binary inputs - pull down



There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the Ucc (+) - dashed line).

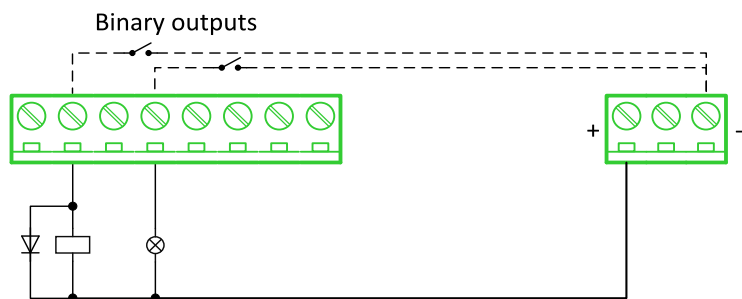
On lower picture is case of wiring between BIN2 and Ucc (+). Both ways are correct.

Binary outputs - high side



When high side setting of outputs is chosen - binary output must be connected to the minus potential directly Terminal VHS (voltage High side) has to be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

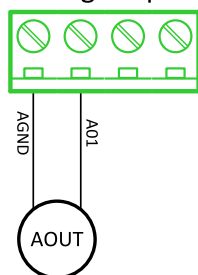
Binary outputs - low side



When low side setting of outputs is chosen - binary output must be connected to the plus potential of power supply directly. Minus potential is connected internally - dashed line.

Analog outputs

Analog outputs



Note: Limit of analog ground (AGND) is 100mA.

IMPORTANT: Terminator for analog output has special analog ground (AGND), which must not be connected to the GND.

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1 (page 17)
Protection	IP20
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Dimensions (WxHxD)	110x110x46 mm (4,3"x4,3"x1,8")
Weight	240 grams

Analog outputs

Number of channels	2
Voltage	Range 0-10 V Accuracy: $\pm 20 \text{ mV} + \pm 0,5 \%$ of actual value I _{max} 5 mA
Current	Range: 0-20 mA Accuracy: $\pm 100 \mu\text{A} + \pm 0,5 \%$ of actual value R _{max} 500 Ω
PWM	Level 5 V Frequency - adjustable 200÷2400 Hz I _{max} 20 mA

Binary inputs

Number of channels	8 for Intel® IO8/8, 16 for Intel® IO16/0
Input resistance	4400 Ω
Input range	0 to 36 V DC
Switching voltage level for open contact indication	0 to 2 V DC
Max voltage level for close contact indication	6 to 36 V DC

Binary outputs

Number of channels	8 for Intel® IO8/8, 0 for Intel® IO16/0
Max current	500 mA
Max switching voltage	36 V DC

⬅ back to Extension modules

IGL-RA15

Remote annunciator (IGL-RA15) is designed as an extension signaling unit. The module is connected to controller by **CAN1 (page 17)** bus. It is possible to connect up to 4 IGL-RA15 external units to one controller.

The unit is equipped with a fully configurable tri-color (red, orange, green) LED for intuitive operation together with high functionality.

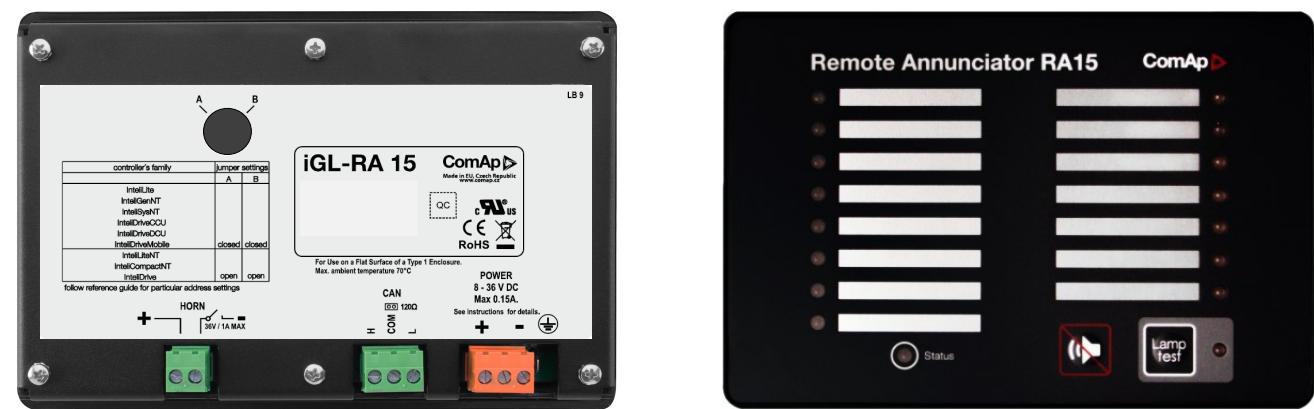


Image 7.64 IGL-RA15

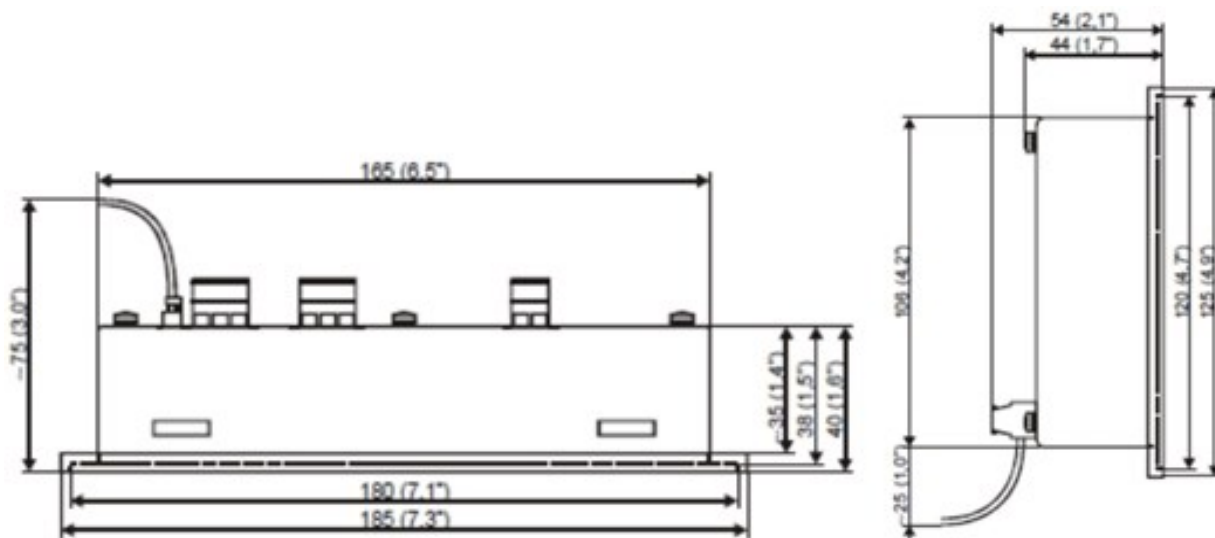


Image 7.65 IGL-RA15 dimensions

Terminals

Horn	Horn
CAN	CAN1 (page 17) line
Power	Power supply

CAN address

Address	Jumper A	Jumper B
1	OPEN	OPEN
5+6	CLOSED	OPEN
Customer defined	CLOSED	CLOSED

SW changing of **CAN1 (page 17)** address is enabled only when both jumpers are closed. Any one of these addresses (1+2 or 3+4 or 5+6 or 7+8) can be set by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test sixteen times
- Set the address up by pressing Horn reset.
 - » The number of red luminous LEDs means the **CAN1 (page 17)** addresses (two for addresses 1+2, four for addresses 3+4, six for addresses 5+6 and eight for addresses 7+8)
- Press Lamp test

LED indication

Each LED color is adjusted independently of controller output settings. If controller output 1 is set as “Common Shutdown” it doesn’t mean red LED1 color for iGL-RA15. The LEDs color can be adjusted by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Horn reset to change the LED1 color (green, yellow, red)
- Press Lamp test to switch to the next LED color adjusting
- Continue to adjust all LEDs color
- After LED15 color adjusting press three times Lamp test

Note: If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.

Status LED

The signals LEDs are handled like binary outputs. It means all what can be configured to binary outputs can be also configured to the LEDs of IGL-RA15.

LED status	Description
Lights	Configured logical output is active on the controller
Dark green LED	Configured logical output is not active on the controller
Dark yellow or red LED	Configured logical output is not active on the controller and horn reset was pressed.
Yellow or red LED blinks	Configured logical output is not active on the controller and horn reset was still not pressed.

Power LED

LED status	Description
Blinking green	The unit is OK and the communication to the master controller is OK.
Blinking red	The unit is OK, but the communication to the master controller is not running.
Blinking yellow	EEPROM check not passed OK after power on
Yellow	Horn timeout or controller address adjustment

Horn setting

The horn output is activated if any of red or yellow LED is on. Output is on until pressing Horn reset or horn timeout counts down. The timeout can be set by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test fifteen times
- Set the horn timeout by pressing Horn reset.
 - The number of green luminous LEDs means timeout in 10 s (none for disabling horn output, 1 for 10s timeout, 2 for 10s timeout, 15 for disabling horn timeout).

» Press Lamp test two times

Note: If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.

The horn is activated if:

- Some of red or yellow LED lights up or
- At the end of the extended lamp test. See chapter **Lamp and horn test (page 712)**

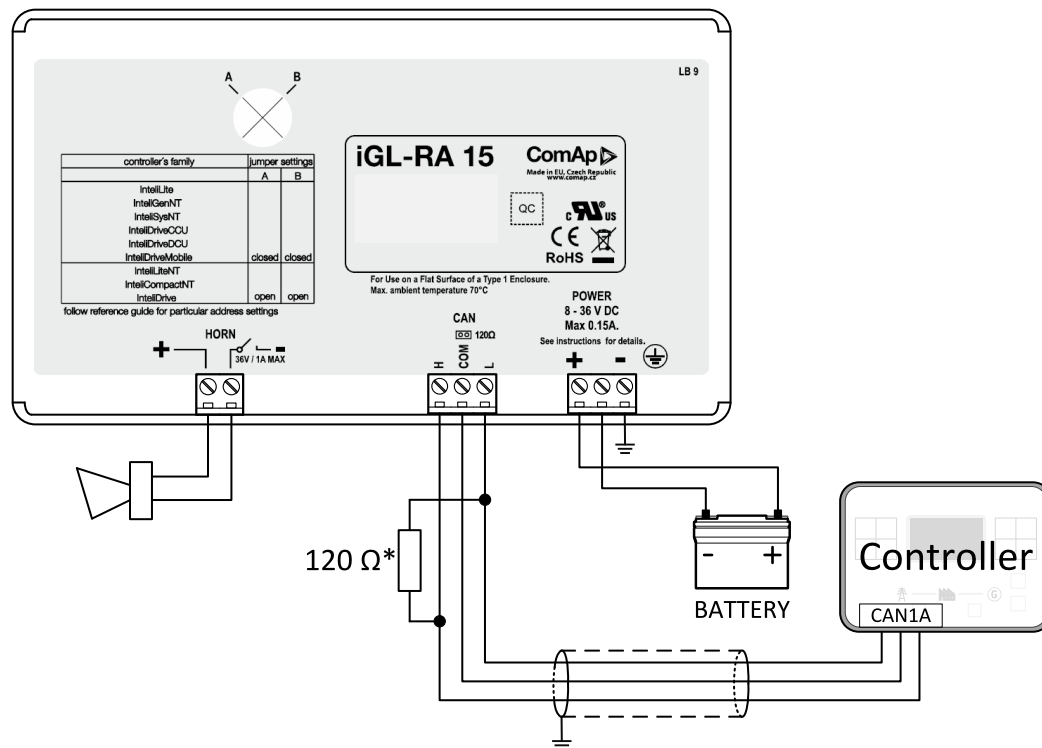
The horn can be silenced:

- By pressing horn reset button or
- It silences automatically after adjusted time

Lamp and horn test

Pressing and holding lamp test button for less than 2 s execute the basic lamp test. All LEDs light up with the configured colour. If the button is hold longer than 2 s, an extended test is started. Every LED is tested step-by-step in green colour and then in red colour. The horn is activated at the end of the test. After that the unit returns to normal operation. The horn can be silenced with horn reset.

Wiring



* use terminator resistor only when IGL-RA 15 is the last unit on the CAN1A bus.

Note: The shielding of the CAN bus cable has to be grounded at one point only!

Note: See the section *Technical data* (page 713) for recommended CAN bus cable type

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	0.35-0.1A (+1Amax horn output) depends on supply voltage
Protection	IP65
Interface to controller	CAN1 (page 17)
Humidity	85%
Storage temperature	- 30 °C to + 80 °C
Operating temperature	- 20 °C to + 70 °C
Dimensions (WxHxD)	180x120x55 mm
Weight	950 g

Horn output

Maximum current	1.0 A
Maximum switching voltage	36 V DC

CAN bus interface

Galvanic separated	
Maximal CAN bus length	200 m
Speed	250 kbps
Nominal impedance	120 Ω
Cable type	twisted pair (shielded)
Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length	
Nominal Velocity of Propagation	min. 75 % (max. 4,4 ns/m)
Wire crosscut	min.0,25 mm ²
Maximal attenuation (at 1 MHz)	2 dB/100m

Recommended Industrial Automation & Process Control Cables

BELDEN (www.belden.com)	<ul style="list-style-type: none">> 3082A DeviceBus for Allen-Bradley DeviceNet> 3083A DeviceBus for Allen-Bradley DeviceNet> 3086A DeviceBus for Honeywell SDS> 3087A DeviceBus for Honeywell SDS> 3084A DeviceBus for Allen-Bradley DeviceNet> 3085A DeviceBus for Allen-Bradley DeviceNet> 3105A Paired EIA Industrial RS485 cable
LAPP CABLE (www.lappcable.com)	<ul style="list-style-type: none">> Unitronic BUS DeviceNet Trunk Cable> Unitronic BUS DeviceNet Drop Cable> Unitronic BUS CAN> Unitronic-FD BUS P CAN UL/CSA

IMPORTANT: This module is not compatible with different than 250 kbps communication speed. If the ECU module with 125 kbps communication speed is connected the whole system will automatically switch to the 125 kbps, and IGL-RA15 module will stop communicating.

🔍 back to Extension modules

IGS-PTM

IGS-PTM module is extension module equipped with binary inputs, binary outputs, analog inputs and analog output. The module is connected to controller by **CAN1 (page 17)** bus. It is possible to connect up to 4 IGS-PTM external units to one controller.



Image 7.66 IGS-PTM

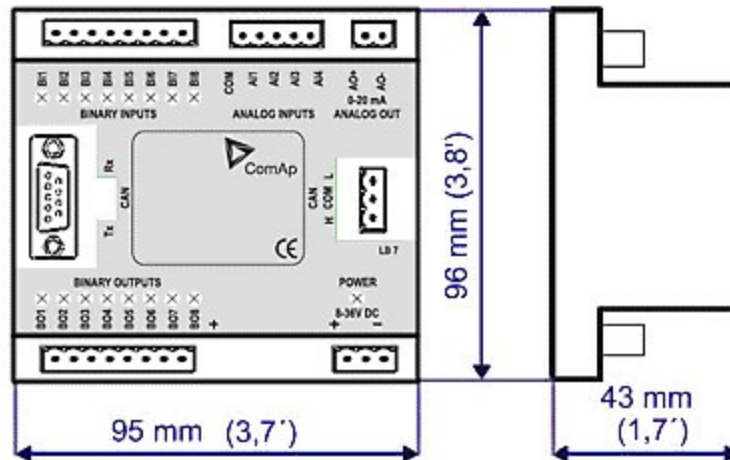
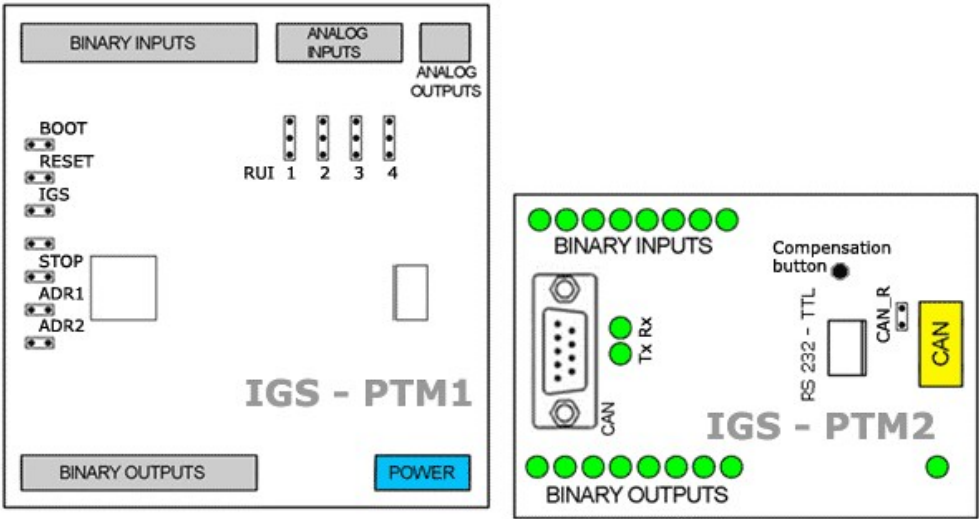


Image 7.67 IGS-PTM dimensions

Terminals



Binary inputs	8 binary inputs
Analog inputs	4 analog inputs
Analog outputs	1 analog output
Binary outputs	8 binary outputs
CAN	CAN1 (page 17) line
RS232-TTL	Interface for programming
Power	Power supply

Analog inputs

Analog inputs can be configured for:

- > Resistance measurement
- > Current measurement
- > Voltage measurement

The type of analog inputs is configured via jumpers RUI located on lower PCB.

RUI	Analog input configuration
1 - 2	Resistance measuring
2 - 3	Current measuring
no jumper	Voltage measuring

Supported sensors

Sensors	
PT100 [°C] (fix)	User curves
NI100 [°C] (fix)	0-100 mV
PT100 [°F] (fix)	0-2400 ohm
NI100 [°F] (fix)	±20 mA

CAN address

Controller type selection

The type of controller to be used with IGS-PTM must be selected via jumper labeled IGS accessible at the lower PCB.

IGS jumper	Controller type
OPEN	IL-NT, IC-NT
CLOSE	IG-NT, IS-NT, IntelliLite

Address configuration

If IntelliLite controller type is selected (by IGS jumper), address of IGS-PTM could be modified via jumpers labeled ADR1 and ADR2.

ADR1	ADR2	ADR offset	BIN module	BOUT module	AIN module
Open	Open	0 (default)	1	1	1
Close	Open	1	2	2	2
Open	Close	2	3	3	3
Close	Close	3	4	4	4

Programing firmware

Firmware upgrade is via AT-link (TTL). For programming is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming is used FlashProg PC tool.

LED indication

Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

Binary output

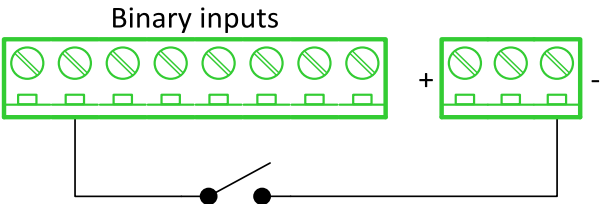
Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set.

LED at power connector - status LED

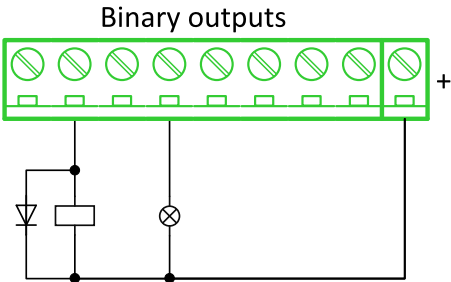
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

Wiring

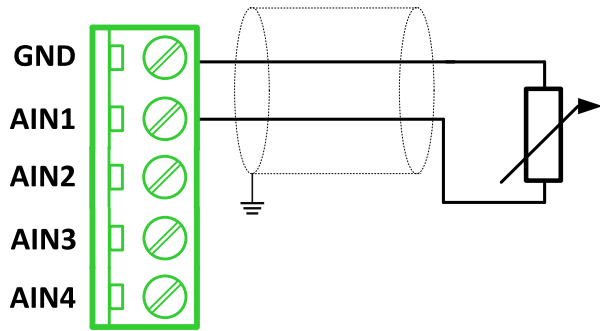
Binary inputs



Binary outputs



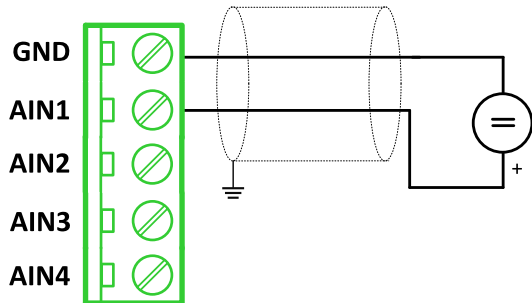
Resistance sensor



Note: Range: 0- 2400 Ω

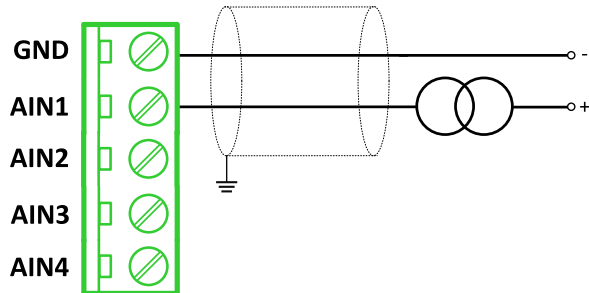
IMPORTANT: Physical analog input range is 0-250 Ω . In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.

Voltage sensor



Note: Range 0-100 mV

Current sensor - passive

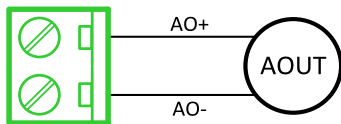


Note: Range: \pm 0-20 mA

IMPORTANT: Physical analog input range is 0-20mA. In sensor configuration in PC tool it is necessary to chose +- 20mA active sensor HW type to ensure proper function of analog input.

Analog outputs

Analog output



Note: Range: 0 to 20 mA \pm 0,33 mA

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	100 mA at 24V \div 500 mA
Interface to controller	CAN1 (page 17)
Protection	IP20
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Dimensions (WxHxD)	95×96×43 mm (3.7'×3.8'×1.7')

Analog inputs

Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1,5 % \pm 1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % \pm 0,5 ohm out of measured value
Resistive	Range: 0- 250 Ω Accuracy: 1 % \pm 2 ohm out of measured value

Analog outputs

Number of channels	1
Current	Range: 0 to 20 mA \pm 0,33 mA Resolution 10 bit

Binary inputs

Number of channels	8
Input resistance	4700 Ω
Input range	0 to 36 V DC
Switching voltage level for open contact indication	0 to 2 V DC
Max voltage level for close contact indication	8 to 36 V DC

Binary outputs

Number of channels	8
Max current	500 mA
Max switching voltage	36 V DC
Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1,5 % \pm 1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % \pm 0,5 ohm out of measured value
Resistive	Range: 0- 250 Ω Accuracy: 1 % \pm 2 ohm out of measured value

 [back to Extension modules](#)

Intel AIO9/1

Intel AIO9/1 module is an extension module equipped with analog inputs and outputs – designed for DC measurement. The module is connected to controller by **CAN1 (page 17)** bus. It is possible to connect up to 5 Intel AIO9/1 external units to one controller.

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.



Image 7.68 Intel AIO9/1

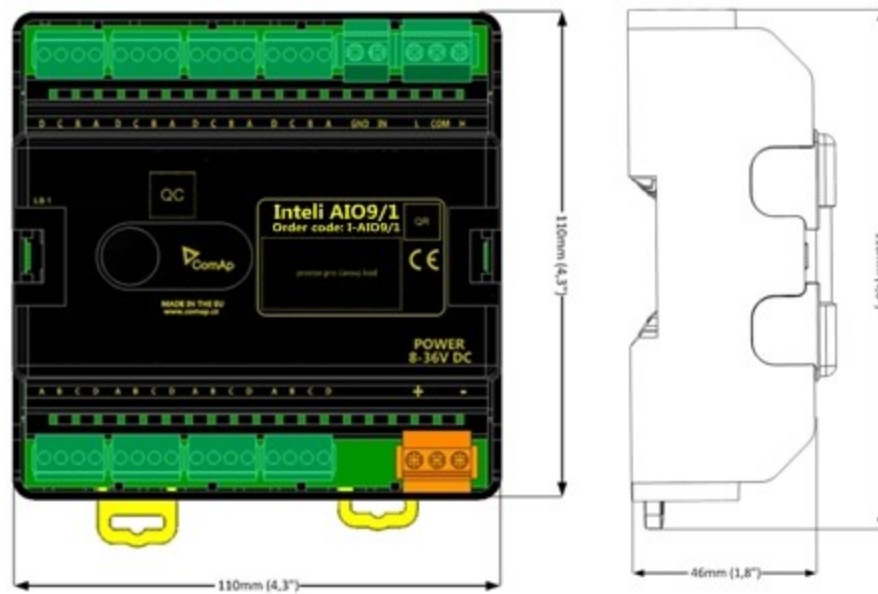
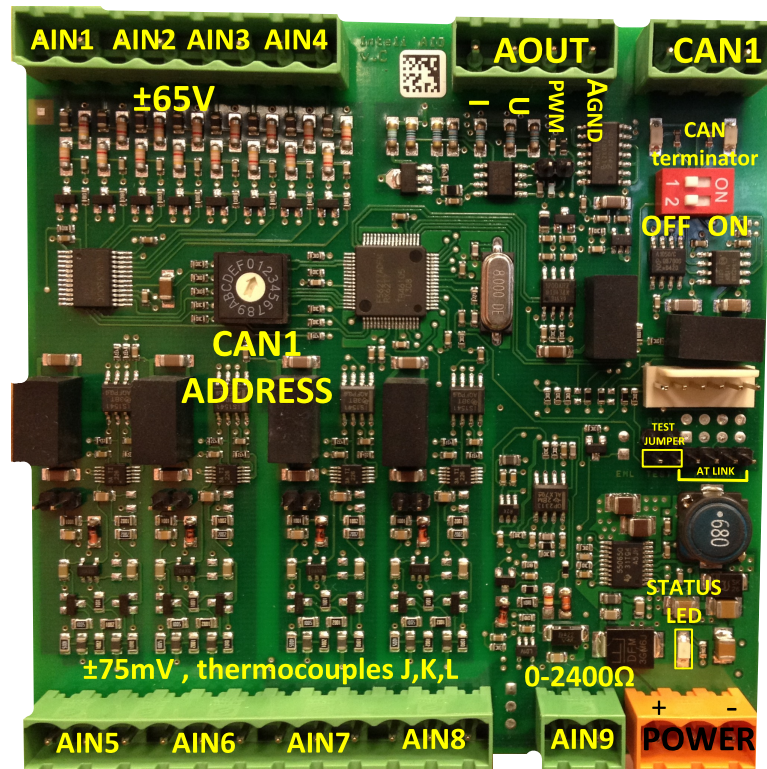


Image 7.69 Intel AIO9/1 dimensions

Terminals



ANALOG INPUT	9 channels
ANALOG OUTPUTS	1 channel
CAN	CAN1 line
POWER	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON")
TEST jumper	Upgrade of SW
AT-LINK	Connector for AT-LINK (Upgrade of SW)

Analog inputs

- 4 channels AIN1 – AIN4 can be configured as:
 - » Sensor $\pm 65V$ (determined for measurement of battery voltage)
- 4 channels AIN5 – AIN8 can be configured as:
 - » Thermocouples – type J,K or L (in $^{\circ}C$ or $^{\circ}F$)
 - » Sensor $\pm 75mV$ DC – (for connecting current shunts)

- 1 channel AIN9 can be configured as:
 - » RTD (Pt1000, Ni1000)
 - » Common resistance 0-2400Ω

Analog outputs

- 1 channel AOUT1. Type of output:
 - » 0-10V DC
 - » 0-20mA
 - » PWM (5 V, freq 2.4 Hz ÷ 2.4 kHz)
- Analog output has 4-pins connector – GND and one pin for each type of output.

All analog inputs can be configured to any logical function or protection.

Supported sensors

Sensors		
User curves	±65 V DC (fix linear)	Thermocpl (nc) K [°C] (fix)
PT1000 [°C] (fix)	±75 mV (fix linear)	Thermocpl (nc) L [°C] (fix)
NI1000 [°C] (fix)	Thermocpl J [°C] (fix)	Thermocpl (nc) J [°F] (fix)
PT1000 [°F] (fix)	Thermocpl K [°C] (fix)	Thermocpl (nc) K [°F] (fix)
NI1000 [°F] (fix)	Thermocpl L [°C] (fix)	Thermocpl (nc) L [°F] (fix)
0-2400 Ω (fix linear)	Thermocpl (nc) J [°C] (fix)	

Address and DIP switch setting

Address configuration

DIP switch determinates CAN address for analog inputs and outputs.

Programming Firmware

Firmware upgrade is available via AT-link (TTL). For programming it is necessary to close jumper TEST and switch OFF and ON the power supply.

For programming use FlashProg PC tool version 4.4 or higher.

LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)

Technical data

General data

Dimension (W × H × D)	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
Weight	248 grams
Interface to controller	CAN1 – galvanic separated from power supply and measurement,

Analog inputs (not electric separated)

9 channels		
AIN1-AIN4 – Voltage inputs	Range	0-65 V ± 0.25 % of actual value + ± 120 mV Measurement is not galvanic separated from power supply, but IN- is not interconnected with GND – there is floating measurement.
	Accuracy of measurement	± 0,1 % of actual value + ± 100 µV (± 3 °C)
AIN5-AIN8 – Voltage inputs	Range	± 75 mV (nominal) (measurement up to ±80 mV)
	Accuracy of measurement	± 0.1 % of actual value + ± 75 µV Galvanic separated from power supply
AIN9 resistance input	Range	0- 2400 Ω
	Accuracy of measurement	± 0.5 % of actual value + ± 4 Ω Pt1000, Ni1000 ± 2,5 °C It is not galvanic separated from power supply.

Analog output

I 0-20mA /500Rmax. ± 1 % of actual value + ± 200 uA
U 0-10V ± 0.5 % of actual value + ± 50 mV
PWM – 5 V, 200 Hz-2.4kHz 15 mA max.
Galvanic separated from power supply

Galvanic separation	CAN bus is galvanic separated from the measurement and power supply
---------------------	---

Power supply	8 to 36 V DC
Protection	IP20
Current consumption	150 mA at 24 V + 400 mA at 8 V
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 80 °C

The product is fully supported in firmware IGS-NT 3.1.1 or higher.

For information about support of this module in IGS-NT fw branches and ID-DCU – please read New Feature Lists.

🔍 back to Extension modules

Inteli AIN8TC

Inteli AIN8TC module is extension module equipped with 8 analog inputs dedicated for thermocouple sensors only. The module is connected to controller by **CAN1** (page 17) bus. It is possible to connect up to 10 Inteli AIO9/1 external units to one controller.

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 7.70 Intel AIN8TC

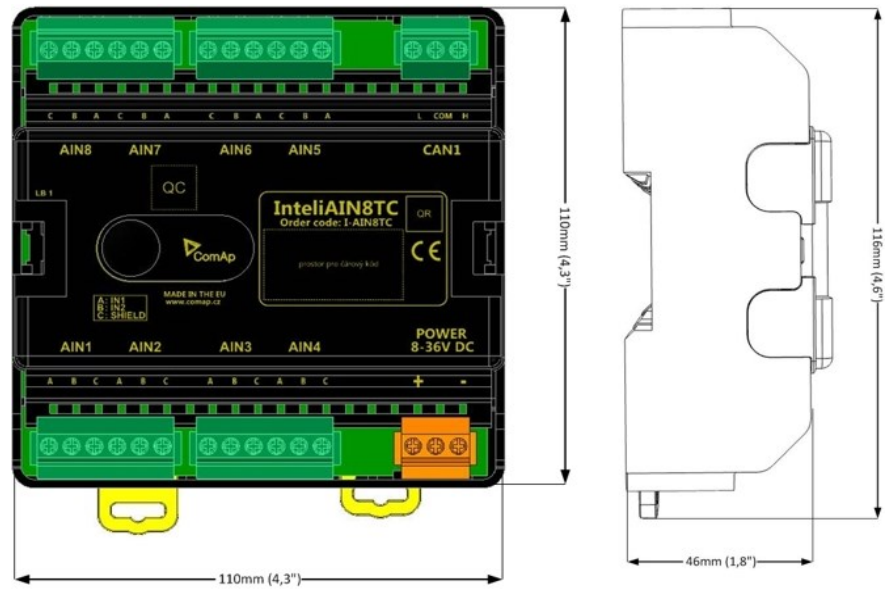
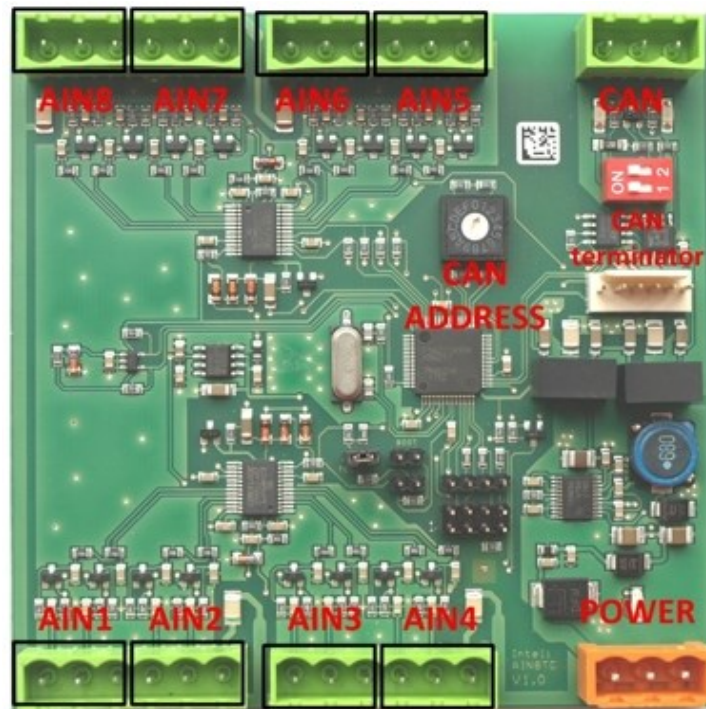


Image 7.71 IntelI AIN8TC dimensions

Terminals



Analog input	8 analog Inputs
CAN	CAN1 (page 17) line
Power	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" - switch both switches)

Analog inputs

- 8 channels
- Can be configured as thermocouple sensors only

All inputs can be configured to any logical function or protection

Supported sensors

Sensors	
Thermocpl J [°C] (fix)	Thermocpl (nc) J [°C] (fix)
Thermocpl K [°C] (fix)	Thermocpl (nc) K [°C] (fix)
Thermocpl L [°C] (fix)	Thermocpl (nc) L [°C] (fix)
Thermocpl J [°F] (fix)	Thermocpl (nc) J [°F] (fix)
Thermocpl K [°F] (fix)	Thermocpl (nc) K [°F] (fix)
Thermocpl L [°F] (fix)	Thermocpl (nc) L [°F] (fix)

Note: "nc" means "not cold junction compensation (by external sensor). In this case is used internal temperature sensor on the PCB

CAN address

DIP switch determinates CAN address for analog inputs.



Note: In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

Programming firmware

Firmware is upgraded via AT-link (TTL). For programming it is necessary to close jumper TEST.

For programming FlashProg PC tool version 4.2 or higher must be used.

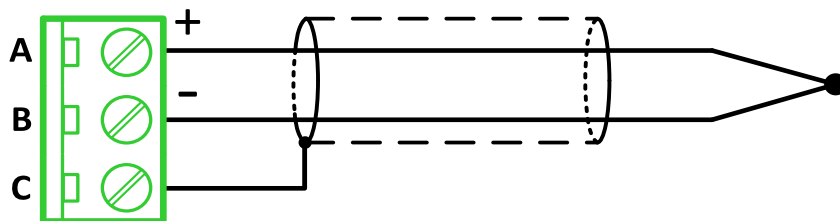
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)
Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Intel AIN8TC and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller)

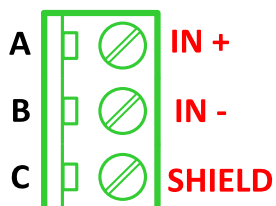
Wiring

The following diagrams show the correct connection of sensors.

Thermocouple



Terminator



Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1 (page 17)
Protection	IP20
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Dimensions (WxHxD)	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
Weight	237.5 grams

Analog inputs

Number of channels	8, no galvanic separated
Voltage	Range: ± 100 mV Accuracy: ± 0.1 % of actual value + ± 100 µV (± 3 °C)

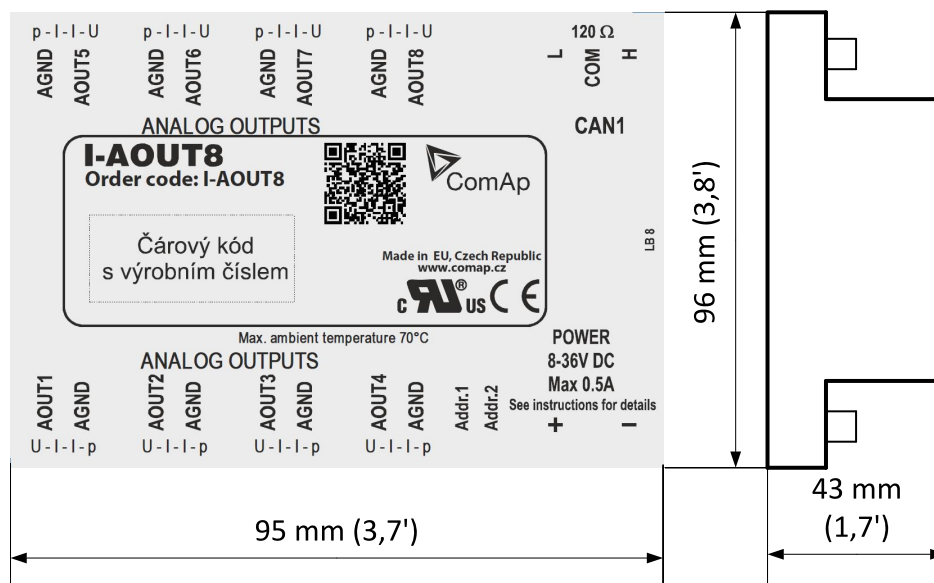
 [back to Extension modules](#)

I-AOUT8

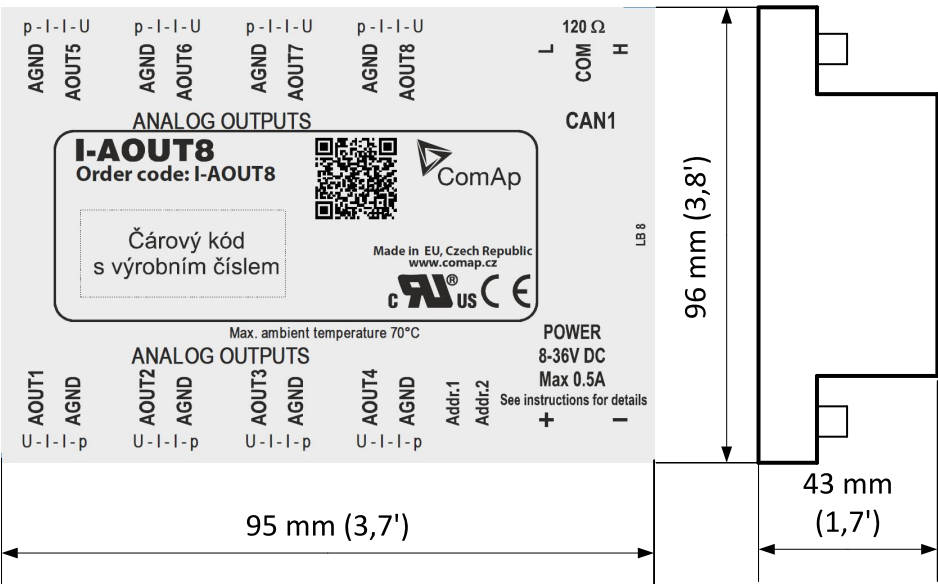
I-AOUT8 is an extension unit with 8 analog outputs. Each analog output can be switched to

- 0 to 20 mA DC
- 0 to 10 V DC
- PWM (Pulse With Modulation on 1,2 kHz)

The module is connected to controller by **CAN1 (page 17)** bus. It is possible to connect up to 4 I-AOUT8 external units to one controller. The corresponding module Address 1 to 4 (default 1) must be set on module (by Adr.1 and Adr.2 jumpers) and in controller configuration. CAN1 terminating 120 ohm resistor jumper is connected as default. AGND terminals are on the same potential.

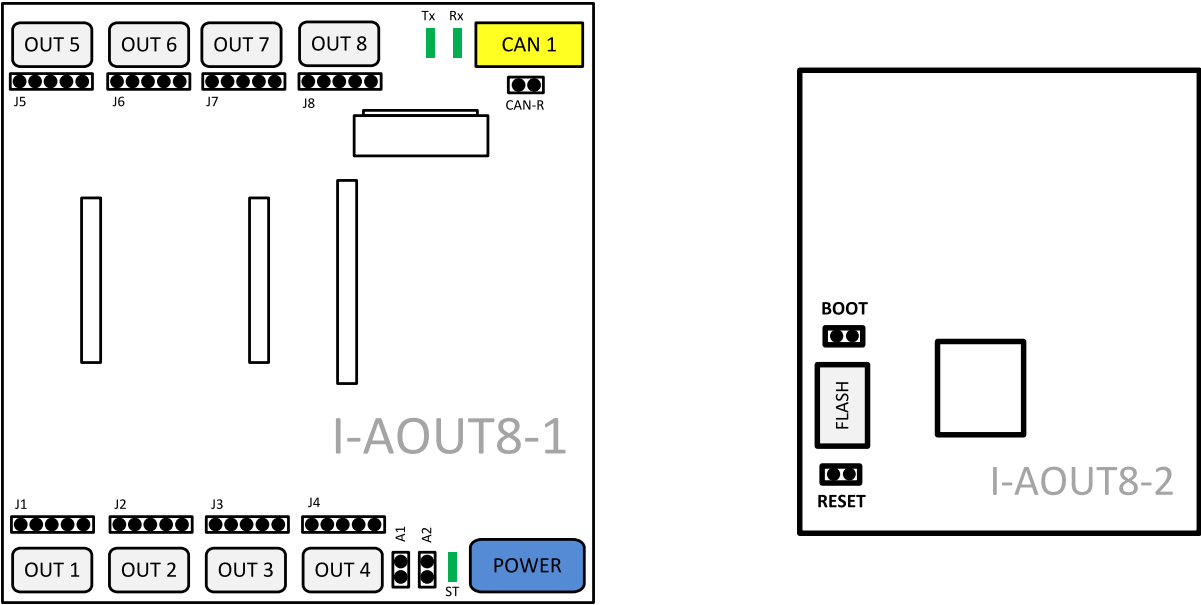


Dimensions



Unit is 35 mm DIN rail mounted.

Connectors



POWER	Power supply
CAN 1	CAN1 line
OUT1 - OUT8	Analog output
FLASH	AT-link
J1 – J8	Output mode
A1, A2	CAN 1 address
CAN-R	Terminating resistor
BOOT	Programming
RESET	Programming / reset
Tx, Rx	CAN 1 data
ST	Power/module state

Address and jumpers setting

CAN Address


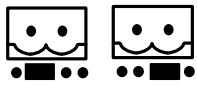
The module CAN address is set by jumpers A1 and A2. Set module CAN address correspondingly to configuration according table below.

CAN Address	A1	A2
1	Open	Open
2	Close	Open
3	Open	Close
4	Close	Close

Table 7.2 Setting CAN address

Output mode

Follow the p – I – U symbols on the module sticker. There are two equivalent positions for current output.

AOUT	Symbol	Function
	p	PWM Pulse-Width-Modulation
	I	0 to 20 mA DC

	U	0 to 10 V DC
---	---	--------------

Table 7.3 Setting output mode

Programming firmware

Firmware upgrade is via AT-link (TTL). For programming it is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming is used FlashProg PC tool.

CAN1 termination

I-AOUT8 has own CAN terminating resistor (120 ohm). Close jumper CAN-R to connect terminating resistor to CAN bus, open jumper CAN-R disconnecting terminating resistor.

Wiring

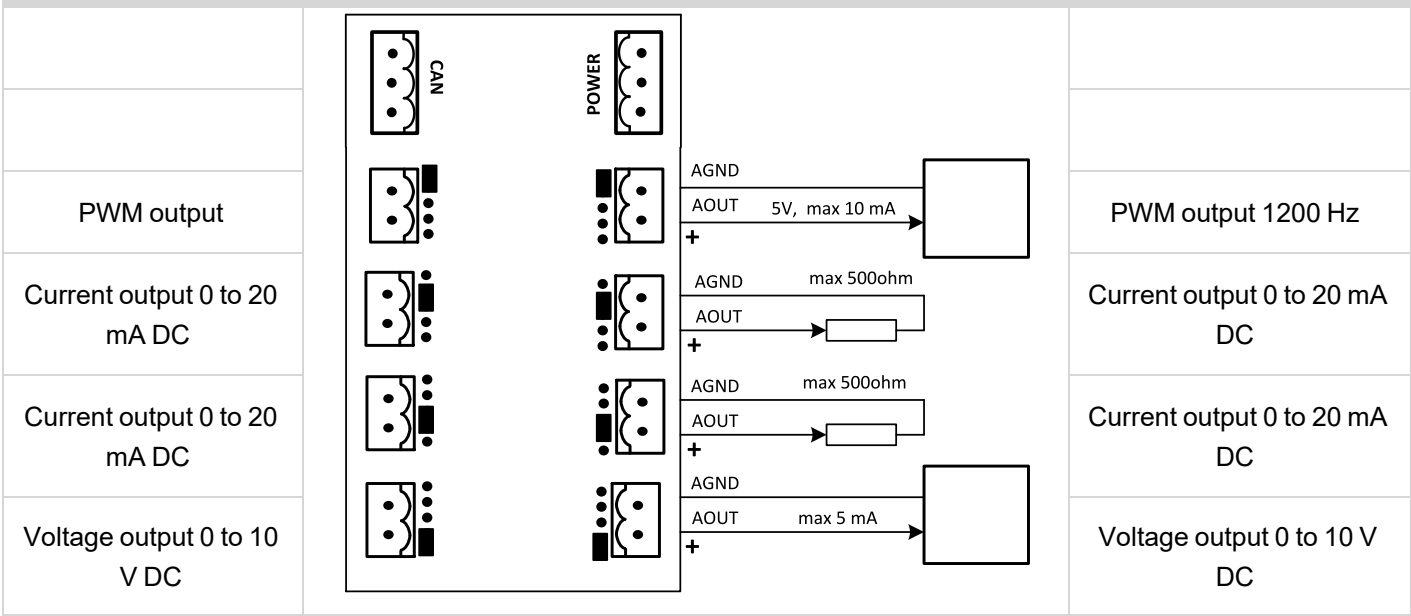


Image 7.72 Possible output modes

Technical data

Dimension (W × H × D)	95 × 96 × 43 mm (3.7' × 3.8' × 1.7')
Interface to controller	CAN
Output	8 analog, no galvanic separation

Type of analog output
0 to 10V DC $\pm 1\%$, max 5 mA DC
0 to 20 mA DC $\pm 1\%$, max 500 Ω
PWM 1200 Hz, 5V DC level, max 10 mA DC

Power supply	8 to 36 V DC
Analog output refreshment	320 ms
Current consumption	max 300 mA (100 mA at 24 V)
RS232 interface	TTL, firmware upgrade via AT-link.
Storage temperature	-40 °C to +80 °C
Operating temperature	- 30 °C to + 70 °C
Heat radiation	2.5 W

 [back to Extension modules](#)

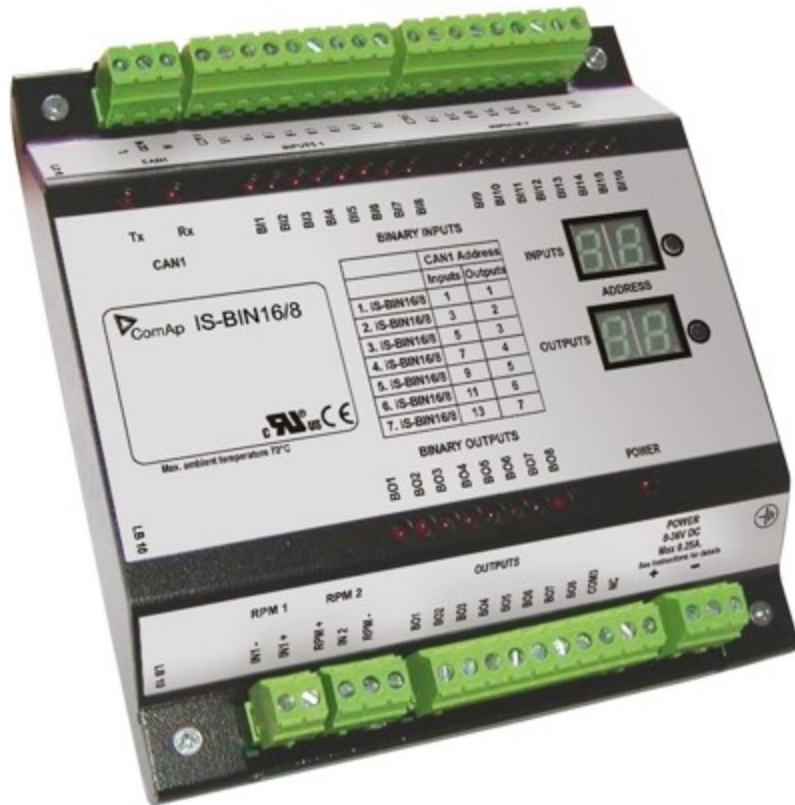
IS-BIN16/8

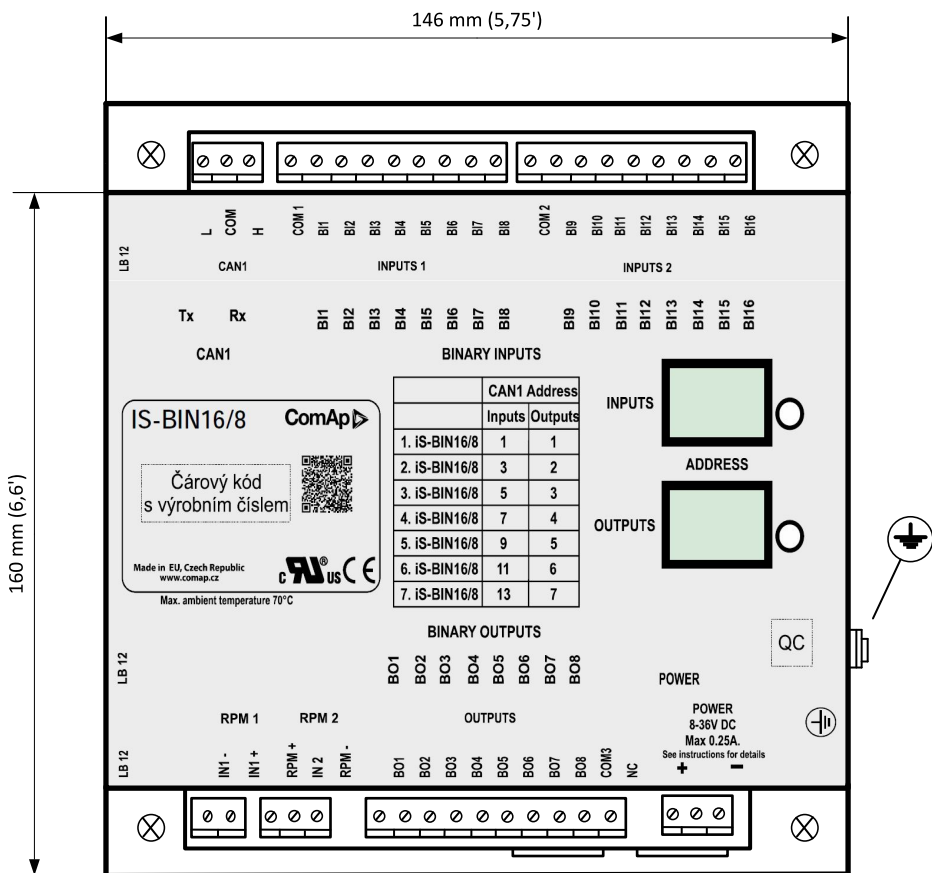
IS-BIN16/8 is an extension module with 16 binary inputs (galvanic separated) and 8 binary output (galvanic separated), 2 pulse inputs (frequency measurement or pulse counting). All I/O can be configured to any logical function or protection. It is possible to connect up to 7 IS-BIN16/8 external units to one controller. External modules IS-BIN16/8 is connected to controller **CAN1 (page 17)** bus. To operate external modules:

- Connect all external modules to CAN1 bus line
- On each module adjust I/O CAN1 address in the range of 1 to 7 for IS-BIN16/8 output, 1,3,5,7,9,11,13 for IS-BIN18/8 inputs
- In case of use generic module in configuration you can set CAN address from 1 – 12
- In case of set 0 CAN address - inputs/ outputs are deactivated
- Input output address is displayed on the front panel LCD's
- Use PC configuration tool to configure controller according external modules setting

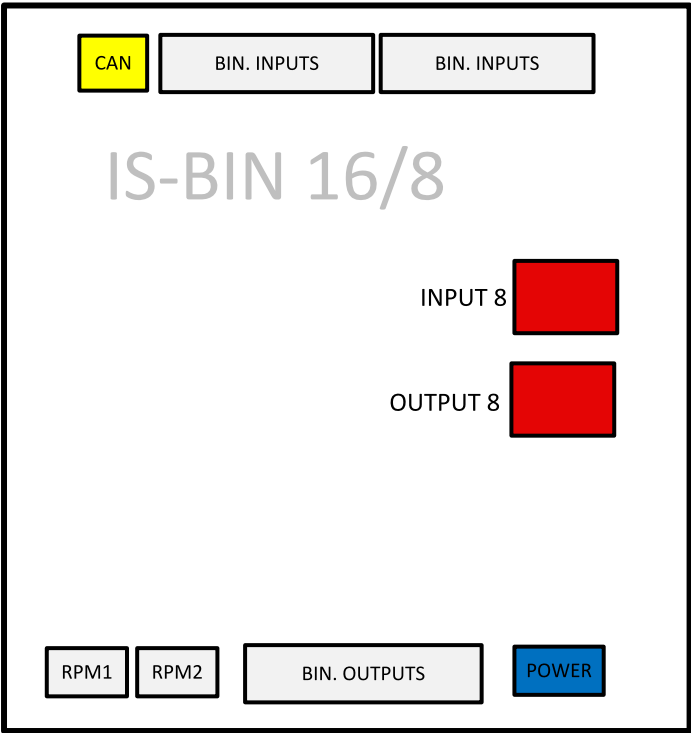
IS-BIN16/8 module has two separate CAN1 addresses for binary inputs Group 1, Group 2 and binary output Group (total three addresses). The CAN1 address for BI Group 1 and for BO Group 2 can be adjusted on the IS-BIN16/8. The address for BI Group 2 is set automatically to the address following BI Group 1.

Note: CAN address 0 disables corresponding CAN message (Group data are not send).





Terminals



CAN	CAN1 line
BINARY INPUTS	16 binary inputs
BINARY OUTPUT	8 binary output
RPM1, RPM2	2 frequency inputs
POWER	Power supply
INPUTS	LDD CAN address
OUTPUT	LDD CAN address

CAN Address

CAN 1 address is setting by following procedure:

- > Press Address buttons (for INPUTS address and OUTPUT address) during IS-BIN8 power supply on to switch to addressing mode.
- > Then repeatedly press or keep pressed address button to adjust required address according to CONTROLLER configuration.
- > After setting requested address, release the buttons and wait until the digits blink – it indicates write the changed address to EEPROM memory.

	CAN 1 Address	
	Inputs	Output
1. IS-BIN16/8	1	1
2. IS-BIN16/8	3	2
3. IS-BIN16/8	5	3
4. IS-BIN16/8	7	4
5. IS-BIN16/8	9	5
6. IS-BIN16/8	11	6
7. IS-BIN16/8	16	7

Table 7.4 Table of recommended CAN1 address setting

SW version check

Let suppose IS-AIN8 of SW version 1.4. Shortly press address button. Following sequence appears on the display: number “1”, one second pause, number “4”, two second pause, number “1”, one second pause, number “4”, two second pause and finally IS-AIN8 actual address.

Error message (e.g. SD BOUT2) appears on Controller screen when Binary input or output Address x is configured but corresponding unit is not recognized (no message is received from CAN bus). Check IS configuration and corresponding external IS-AIN, IS-BIN unit address setting.

LED indication

Tx			Rx		
Dark	Blink	Light	Dark	Blink	Light
Any data are transmitted on the CAN1 line	Data are transmitted on the CAN1 line		Any data are received on the CAN1 line	Data are received on the CAN1 line	

Table 7.5 Tx / Rx LED status

Wiring

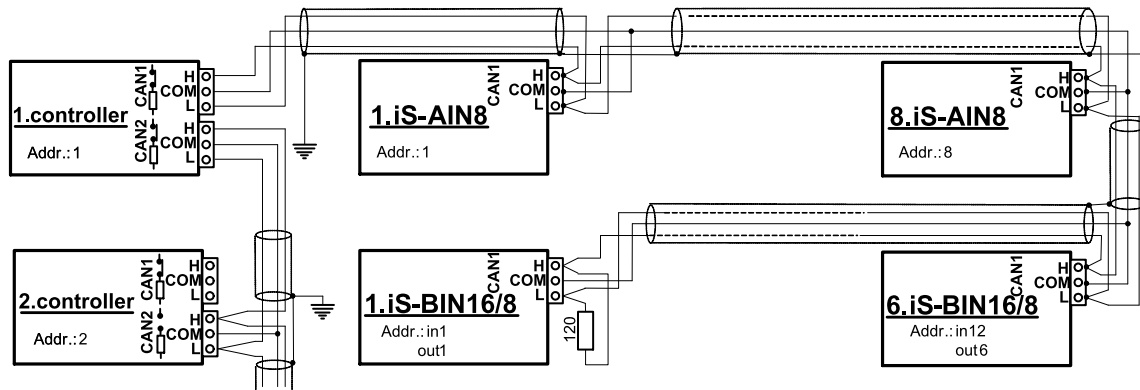


Image 7.73 CAN bus line has to be terminated by 120 ohm resistors on the both ends.

Note: CAN bus line has to be terminated by 120 ohm resistors on the both ends.

For longer distances is recommended to connect CAN COM terminals between all controllers and cable shielding to the **ground in one point!**

Recommended CAN bus data cables see in Chapter Technical data.

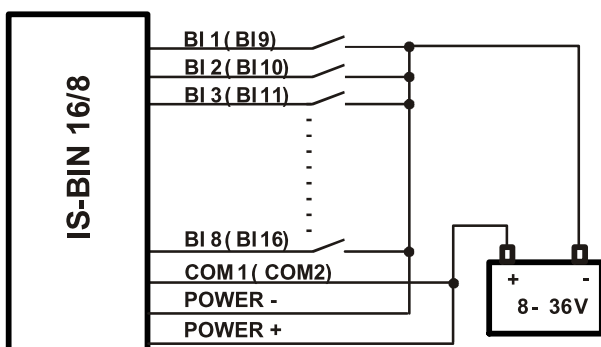
External units can be connected on the CAN bus line in any order, but line arrangement (no tails no star) is necessary- Recommended CAN bus data cables see in Chapter Technical data.

Binary inputs

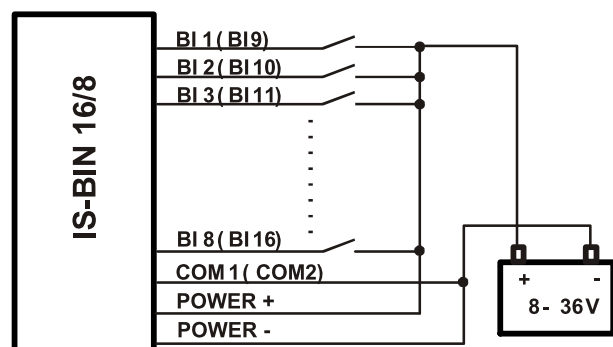
There are two groups of eight Binary inputs BI1 to BI8 and BI9 to BI16. Each group has a separate Common terminal COM1 and COM2. The Common terminal can be connected to positive or negative pole – see following drawing. Binary inputs are galvanically separated from IS-BIN16/8 power supply.

Note: See the *Theory of binary inputs and outputs* (page 690) (Pull Up, Pull Down, High side switch, Low side switch).

Binary inputs Common terminal is connected to **positive** supply terminal, Binary inputs contacts are closed to **negative** supply terminals.



Binary inputs common terminal is connected to **negative** supply terminal, Binary inputs contacts are closed to **positive** supply terminals.



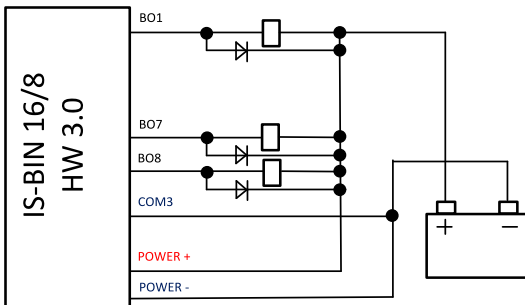
Input voltage range for opened contact is from 8 VDC to Power supply VDC. Input voltage range for closed contact is from 0 to 2 VDC. Voltage level is defined between Binary input and Binary input COM terminal and does not depend on “positive” or “negative” connection.

IMPORTANT: Impulse inputs are not supported by the controller.

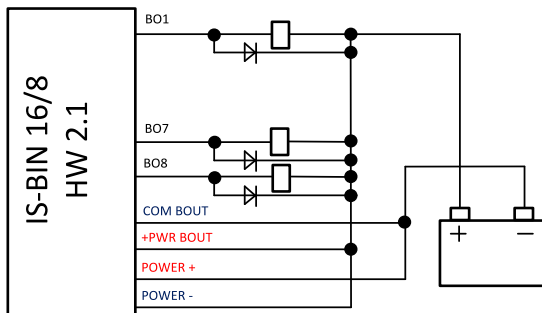
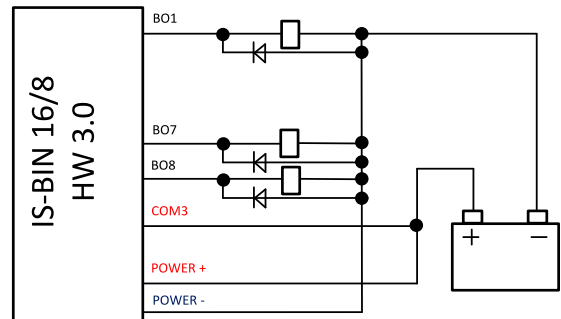
Binary output

The Common terminal can be connected to positive or negative pole (HW3.0 only) – see following drawing. Binary outputs are galvanic separated from IS-BIN16/8 power supply (have a look at technical data). The maximum load values are 0.5 A / 36V for one output.

Binary output common terminal is connected to **negative** supply terminal, Binary output contacts are closed to **positive** supply terminals.



Binary output common terminal is connected to **positive** supply terminal, Binary output contacts are closed to **negative** supply terminals.



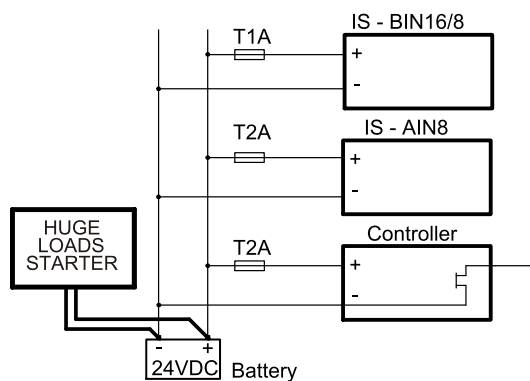
Power supply fusing

A (2) respectively (1) amp fuse should be connected in-line with the power to the controller and modules, these items should never be connected directly to the starting battery.

Take care for proper controller, extension units and relays power supply fusing. Fuse value and type depends on number of connected devices and wire length.

Controller or unit	Fuse
Controller	T1A or T2A
IS-AIN8	T2A
IS-BIN16/8	T1A

Table 7.6 Recommended fuse (not fast) types



For more extension units use separate fusing according to the table above.

Controller power supply should never be connected to starter terminals.

Technical data

Dimension (W × H × D)	146 × 160 × 46 mm (5.79' × 6.6' × 1.83')
Interface to controller	CAN1

Binary inputs (galvanic separated)

Voltage level is defined between binary input and binary input COM terminal

Number of inputs	8 + 8
Input resistance	3000 Ω
Input voltage range	0-36 VDC
Input voltage level for open contact	8 to Power supply VDC
Input voltage level for close contact	0 to 2 VDC

Frequency inputs* (for IS-CU only)

RPM1

Type of sensor	Magnetic pick-up
----------------	------------------

Minimum input voltage	2 Vpk-pk (from 4 Hz to 4 kHz)
Maximum input voltage	50 Veff
Maximum measured frequency	8 kHz (min. input voltage 6Vpk-pk), frequency mode
RPM2	
Type of sensor	Contact or Active sensor
Minimal pulse width	10 ms, integration mode
Maximum measured frequency	60 Hz, integration mode

Relays outputs (*galvanic separated*) only HW 3.0 (*non galvanic separated*) HW 2.1

Number of output	8
Maximum current	0.5A DC
Maximum switching voltage	36 VDC

Power supply	8 to 36 V DC
Protection front panel	IP20
Current consumption	250 mA** at 24 V
Humidity	95% without condensation
Storage temperature	-40 °C to +80 °C
Operating temperature	- 30 °C to + 70 °C
Heat radiation	2 W

Standard conformity	
Number of output	8
Low Voltage Directive	EN 61010-1:95 +A1:97
Electromagnetic Compatibility	EN 50081-1:94, EN 50081-2:96 EN 50082-1:99, EN 50082-2:97

*RPM1, RPM2 are available in IS-CU only

**During powering up current can be up to 1.5A

 [back to Extension modules](#)

Plug-in modules

IMPORTANT: 2nd generation of InteliMains 510 controllers does not support new modules and 3rd generation does not support all old modules.

The available communication plug-in modules are:

- CM-RS232-485 – communication module for connection via RS232 or RS485 line
- CM2-4G-GPS – communication module for connection via 4G
- CM3-Ethernet – communication module for internet connection via Ethernet

The available extension plug-in modules are:

- EM-BIO8-EFCP – extension module with 8 binary inputs/outputs and with earth fault current protection

Note: Controller has 2 plug-in module slots.

Supported combinations of plug-in modules

Module	CM-Ethernet	CM-4G-GPS	CM-RS232-485	EM-BIO8-EFCP
CM-Ethernet	✗	✓	✓	✓
CM-4G-GPS	✓	✗	✓	✓
CM-RS232-485	✓	✓	✗	✓
EM-BIO8-EFCP	✓	✓	✓	✓

CM-RS232-485

CM-RS232-485 is optional plug-in card to enable IntelliMains 510 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.

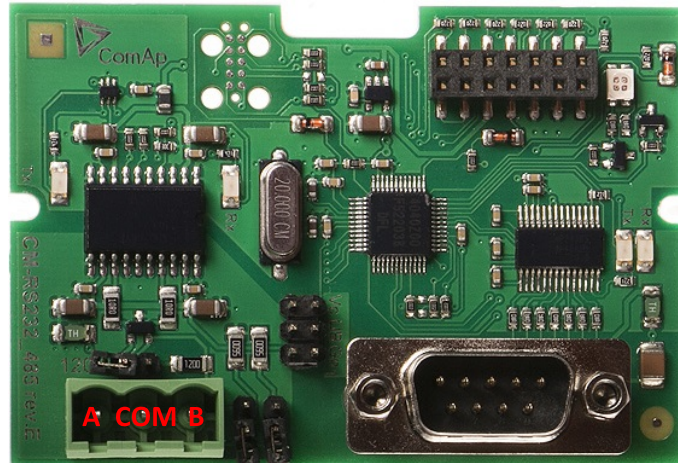


Image 7.74 CM-RS232-485 interface

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

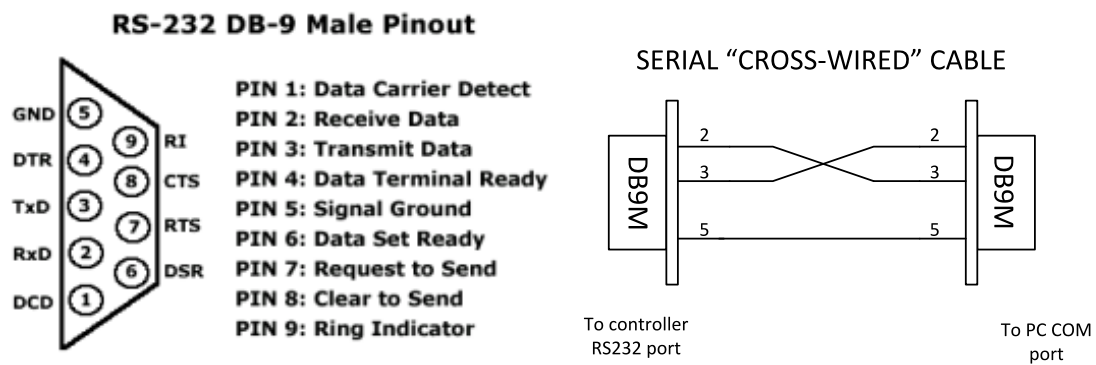


Image 7.75 Pinout of RS232 line

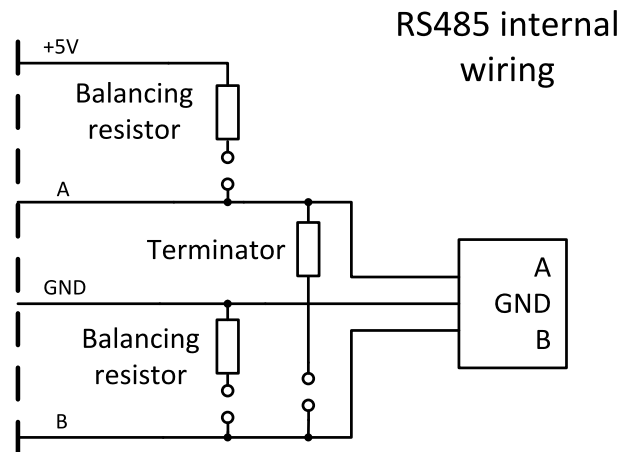


Image 7.76 Pinout of RS485 line

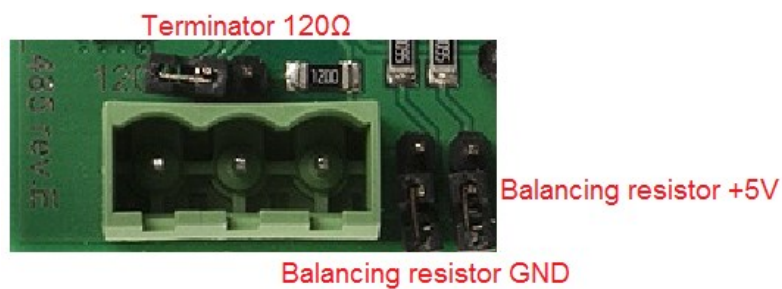


Image 7.77 Jumpers description

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

CM3-Ethernet

CM3-Ethernet is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. It provides an interface for connecting a PC through ethernet/internet network, for sending active e-mails and for integration of the controller into a building

management (MODBUS TCP and SNMP protocols).

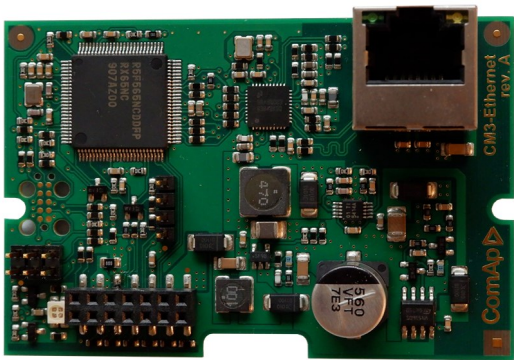


Image 7.78 CM3-Ethernet interface

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.

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 Ethernet.

All actual operational values like actual IP address etc. are available in controller values in a specific group as well.

Status LED

Blinking frequency	Color
1 Hz	Green – everything is OK Red – some of following errors occurred: <ul style="list-style-type: none">› 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 IntelliConfig
- › Plug the module into the controller and power the controller on.
- › Open a connection with controller via IntelliConfig
- › Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in IntelliConfig).
- › Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is 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.

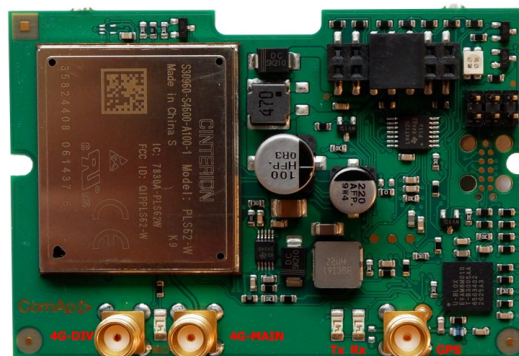


Image 7.79 CM2-4G-GPS module

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 antenna is CELLULAR only and has 1 cable ([OT1A4GXXMCX](#)), it is connected to the 4G-MAIN connector.
- If the antenna 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 antenna 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 antenna 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	<ul style="list-style-type: none">➤ 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)

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.
- Activate CM2-4G-GPS module.
- 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 IntelliConfig.
- Enter correct **Access Point Name** (this information is provided by Mobile Operator). Setpoint can be set on controller's front panel or by IntelliConfig.
- Switch the controller off and on.
- Wait for approx 2 – 4 minutes for first connection of the system to AirGate. AirGate will automatically generate the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

Modem Status

Code	Description
OK	Module successfully initialized and connected to the cellular network
E01	Unsuccessful restore to the factory settings
E02	Modem configuration error
E SIM	SIM not inserted or locked by PIN. <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ 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: <ul style="list-style-type: none"> ➤ Wrong number ➤ SIM doesn't support SMS
E18	Modem hardware configuration error
E conn lost	Loss of connection with cellular network
E19	Modem configuration error
Restart-config	Modem was restarted due to the change of controller setpoint
Restart-app	Modem was restarted due to the performed cellular connection check

AirGate Status

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable
Susp AGkeyEmpty	AirGate is not set in the controller

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