

InteliMains 510 BTB


Mains supervision controller

SW version 1.0.0

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1 Document information

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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 IntelIMains 510 BTB controllers family that shall be followed during installation and maintenance of the controllers.

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

This manual is dedicated for:

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

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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 540)** 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.
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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 	   
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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

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2.1 General description

InteliMains 510 BTB 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 and synchronizes two parts of bus bar and controls the bus tie circuit breaker (BTB).

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
- 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 BTB 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 29)** 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 540)**. 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".

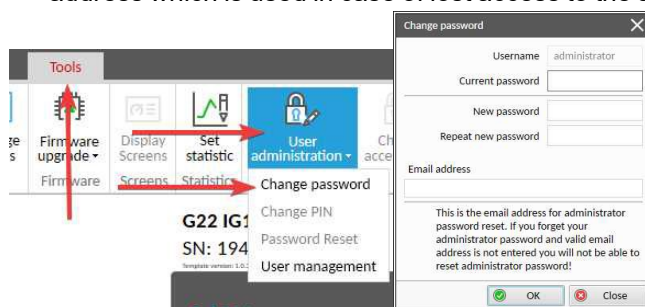
- Username = administrator
- Password = serial number of your controller

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 61)**.

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 BTB 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 223)**.

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.

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.

Setpoint used for setting the Power factor regulation **#System Power Factor (page 210)** with a 0.01 resolution.

Values for the Power factor are:

- **Mains Load Character (page 375)**
- **Mains Load Character L1 (page 376)**
- **Mains Load Character L2 (page 377)**
- **Mains Load Character L3 (page 377)**
- **Total Running Power Factor (page 393), Total Running Load Character (page 393)**

2.5 Communication peripherals

IntelliMains 510 BTB 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 581) .	CAN bus wiring (page 46)
CAN2	This terminal is used for CAN intercontroller communication.	
RS485	This terminal is used for Modbus-RTU, Modbus/TCP (page 185) communication.	RS485 wiring (page 47)
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 54)

You can see layout of the peripherals in the chapter **Terminal Diagram (page 29)**.

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

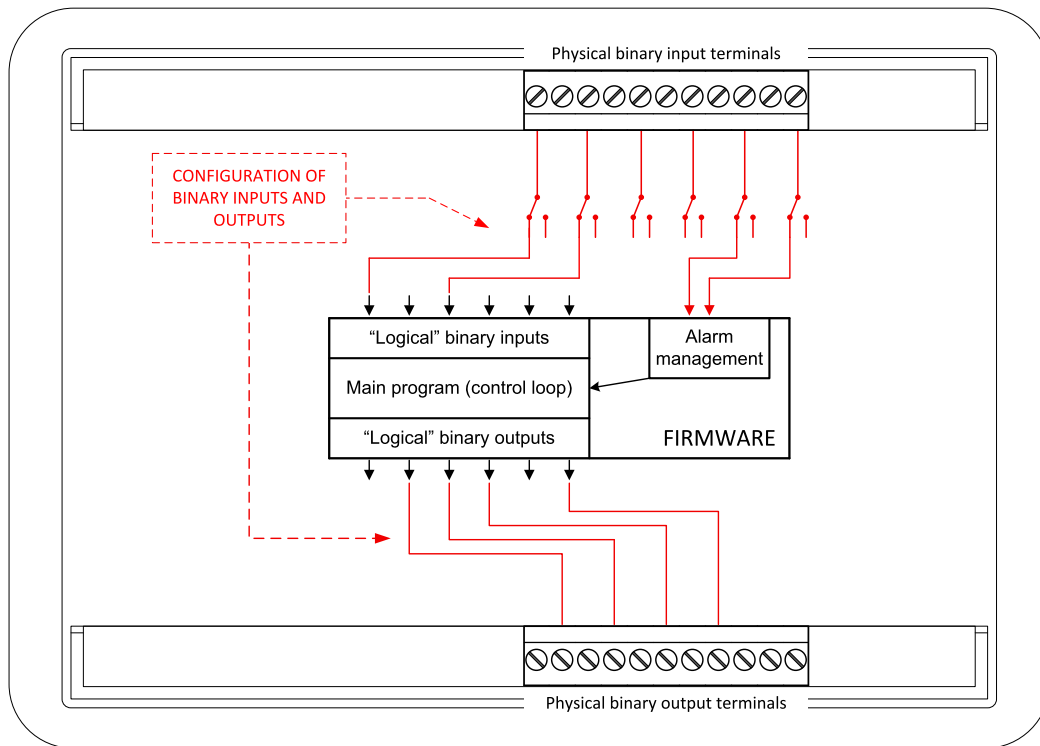


Image 2.1 Principle of inputs and outputs configuration

The controller is shipped with a **Default configuration (page 54)**, 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.

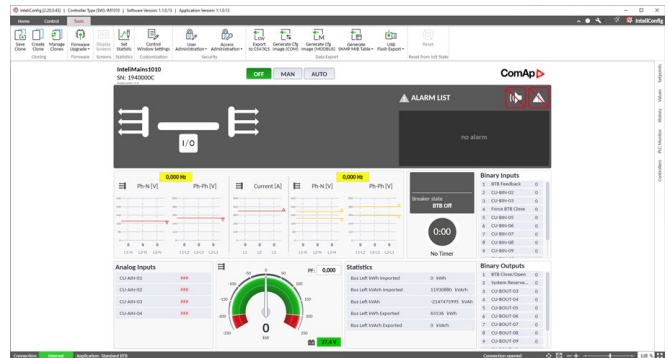
2.7 PC tools

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

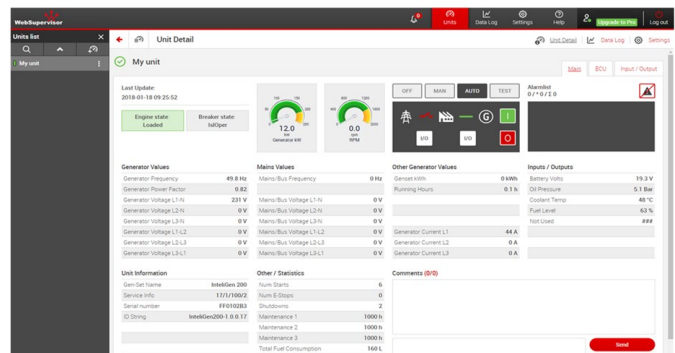


2.7.2 WebSupervisor

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:

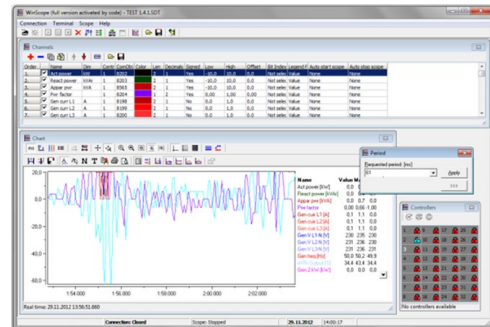
- Login: comaptest
- Password: ComAp123

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

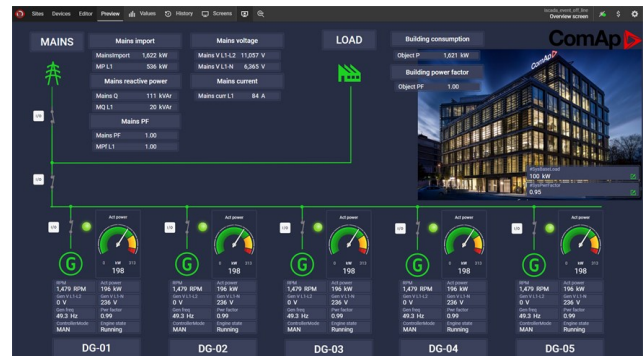


2.7.4 IntelISCADA

IntelISCADA is a Windows based software for monitoring of multiple controllers. See more in the [IntelISCADA 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

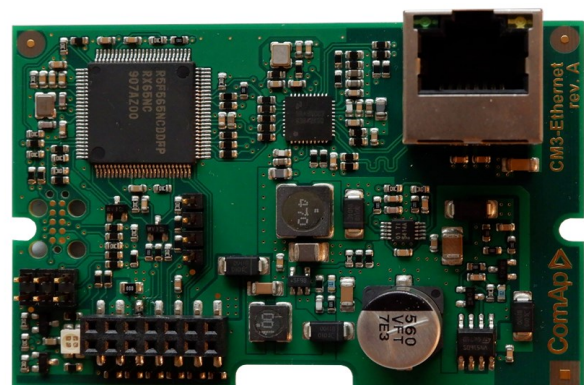


2.8 Plug-in modules

2.8.1 CM3-Ethernet

Internet/Ethernet module including web server.

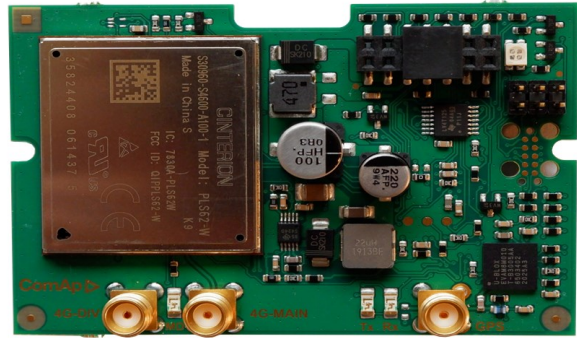
- 10/100 Mbit interface over RJ45 socket
- Remote control and monitoring of the controller via IntelliConfig, WebSupervisor
- Modbus TCP support
- Full SNMP support including traps (v1 & v2c)
- Active e-mail sending
- AirGate 2.0 technology support for easy connection – no need of public and static IP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



2.8.2 CM2-4G-GPS

GSM/4G module

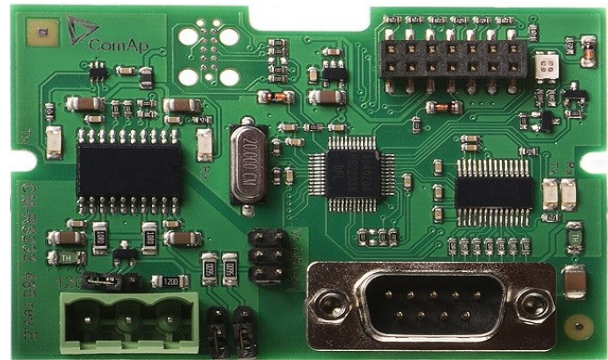
- GSM/4G Internet module and GPS locator
- Global 4G (LTE) module with 3G/2G backup
- Remote control and monitoring of the controller via IntelliConfig, WebSupervisor
- Active e-mail and SMS support
- AirGate 2 technology support for easy connection – no need of public and static IP address
- Tracking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



2.8.3 CM-RS232-485

Communication module with two communication ports.

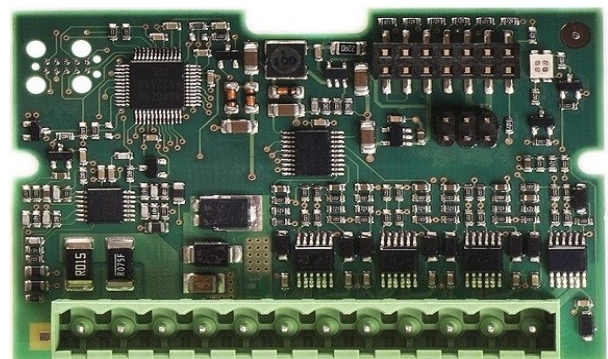
- RS232 and RS485 interface
- MODBUS
- Serial connection to IntelliConfig



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))

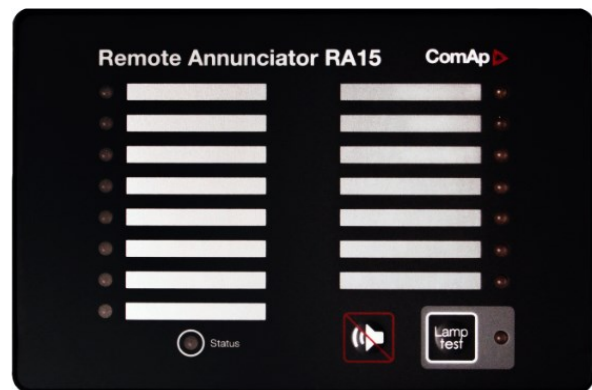
🔍 back to CAN Extension Modules



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 IntelI 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

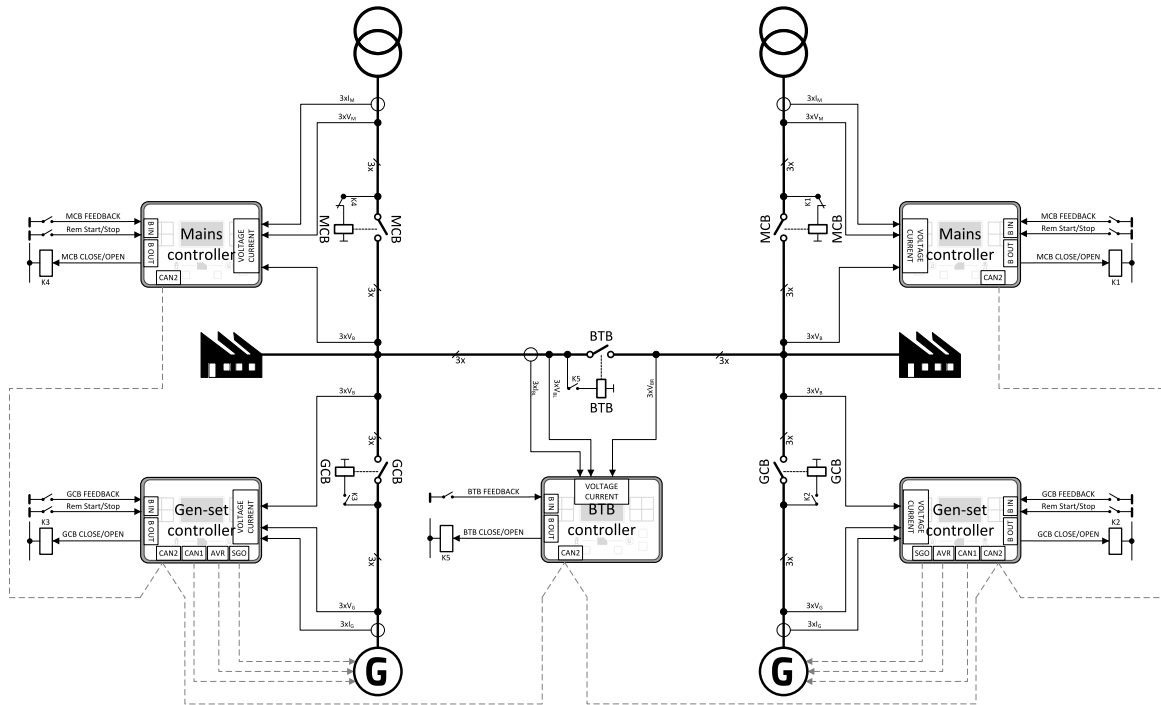
⬅ back to System overview

3 Applications overview

3.1 BTB 26

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3.1 BTB



IntelIMains 510 BTB directly controls only the BTB. Frequency and voltage on the left or right side of the bus is controlled via load sharing and var sharing outputs using **CAN2 (page 16)** and/or **Communication peripherals (page 15)** communication. The BTB cannot control the side with already connected Mains to it.

BTB closes automatically in **Controller Mode (page 400) = AUTO** if

- **MCB DISABLE (PAGE 463)** is NOT active and
- **MAINS HEALTHY (PAGE 481)** and **BUS HEALTHY (PAGE 481)** are both active while **Dead Bus Closing (page 218) = Disabled** or
- **MAINS HEALTHY (PAGE 481)** is active and **Dead Bus Closing (page 218) = Both** or **Left To Right** or
- **BUS HEALTHY (PAGE 481)** is active and **Dead Bus Closing (page 218) = Both** or **Right To Left**

🔍 back to Applications overview

4 Installation and wiring

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4.2 Controller installation	28
4.3 Terminal Diagram	29
4.4 Recommended wiring	31
4.5 Plug-in module installation	51
4.6 Maintenance	52

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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

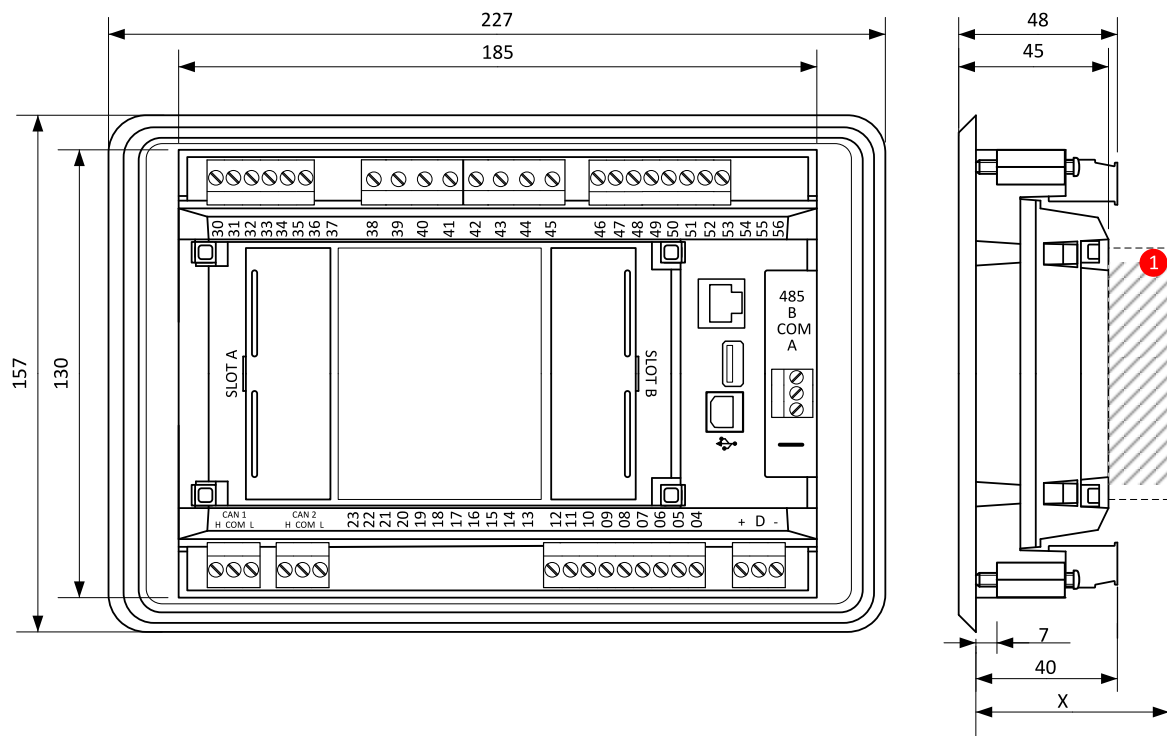


Image 4.1 Controller dimensions

1 Plug-in module

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

Note: Dimensions are in millimeters.

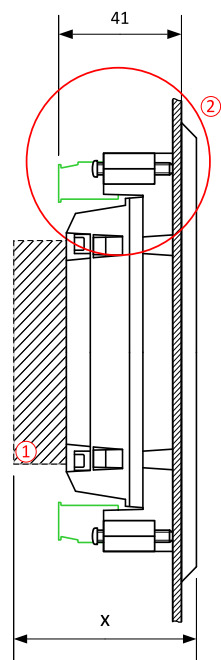
Note: The final depth of the controller depends on the selected plug-in module – it can vary between 47 mm and "x" mm. Mind also the size of connectors and cables (e.g. in case of RS232 connector, add about 60 mm more for standard RS232 connector and cable).

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.

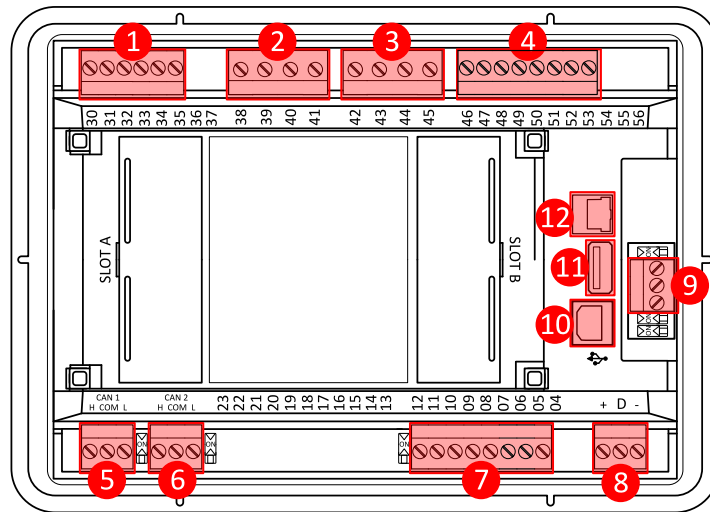
Panel door mounting



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

4.3 Terminal Diagram

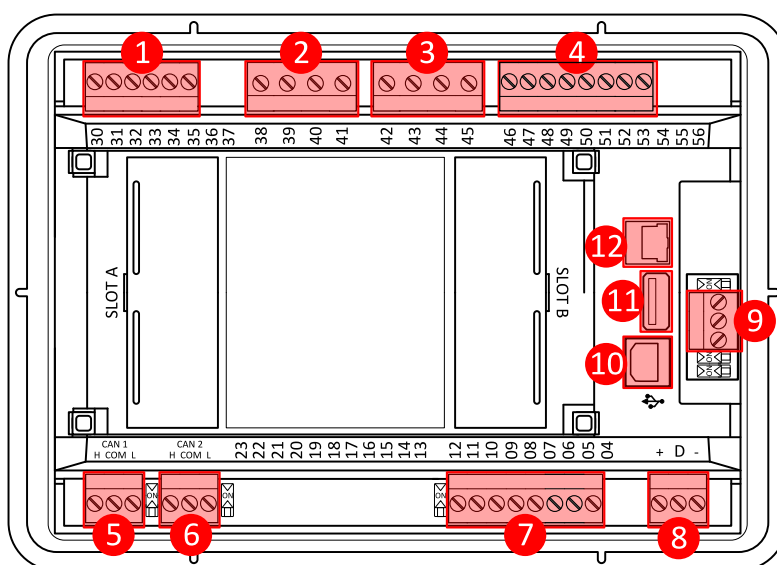
① CURRENT MEASUREMENT		② MAINS (BUS-L) VOLTAGE		③ BUS (BUS-R) VOLTAGE		④ BINARY INPUTS	
T30	COM	T38	N	T42	N	T46	BIN1
T31	L1	T39	L1	T43	L1	T47	BIN2
T32	L2	T40	L2	T44	L2	T48	BIN3
T33	L3	T41	L3	T45	L3	T49	BIN4
T34	COM					T50	BIN5
T35	L1					T51	BIN6
						T52	BIN7
						T53	BIN8



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

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4.4.10 Ethernet	50



1	Current inputs	30 - 35	Current measurement wiring (page 34)
2	Mains/Bus Voltage inputs	38 - 41	Voltage measurement wiring (page 38)
3	Mains/Bus Voltage inputs	42 - 45	Voltage measurement wiring (page 38)
4	Binary inputs	46-53	Binary Inputs (page 45)
5	CAN1	26 - 28	CAN bus and RS485 wiring (page 46)
6	CAN2	23 - 25	CAN bus and RS485 wiring (page 46)
7	Binary outputs	05 - 12	Binary Outputs (page 45)
8	Power supply	01 - 03	Power supply (page 33)
9	RS485	A, COM, B	CAN bus and RS485 wiring (page 46)

10	USB	USB B	USB (page 50)
11	USB HOST	USB A	USB HOST (page 50)
12	Ethernet	ETH	Ethernet (page 50)

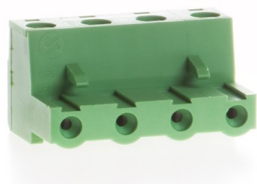
4.4.1 General

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.

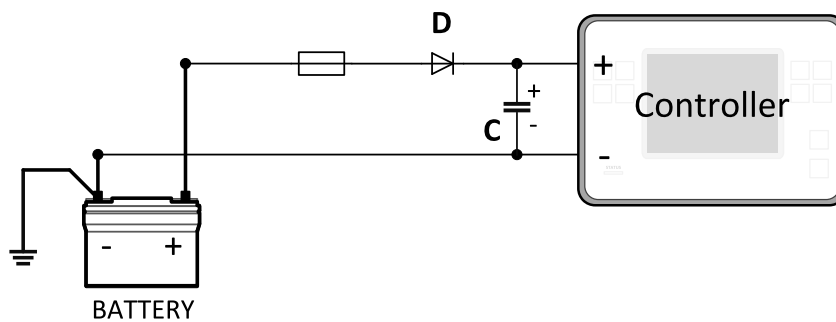


Image 4.2 Controllers power supply with external capacitor, separating diode and fusing

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.

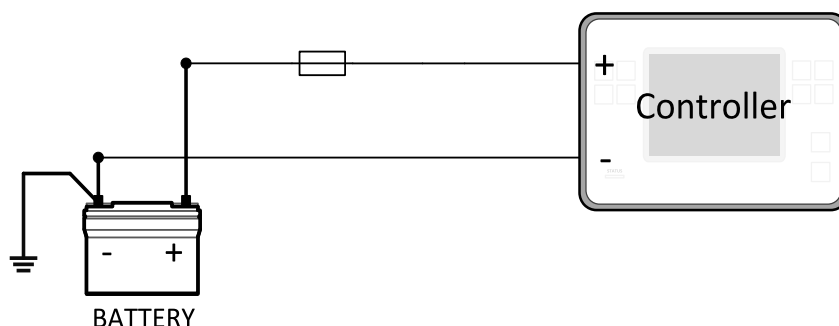


Image 4.3 Controllers power supply fusing

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 221), **MainsAC Shore Nominal Voltage Ph-N** (page 223), **Mains/Bus Nominal Voltage Ph-Ph**, **Mains Nominal Voltage Ph-Ph** (page 223), **Gen AC Bus Nominal Voltage Ph-N** (page 222), **Gen Nominal Voltage Ph-Ph** (page 222) and **Nominal Current** (page 220) 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 221) [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

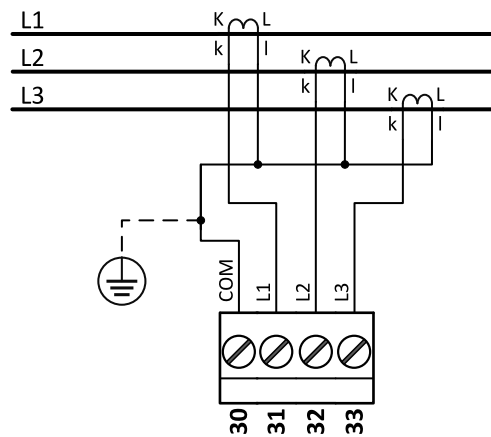


Image 4.4 3 phase application

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.

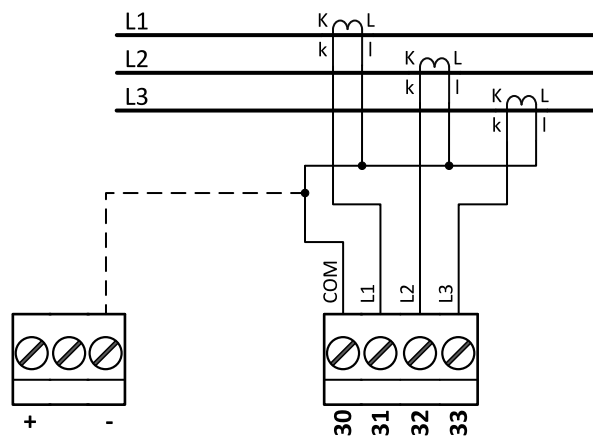


Image 4.5 3 phase application

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

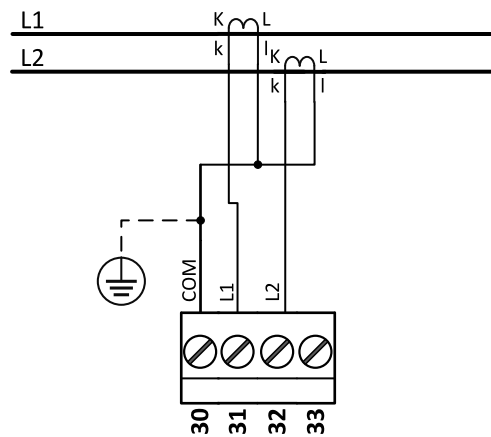


Image 4.6 SpIPhL1L2 application

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.

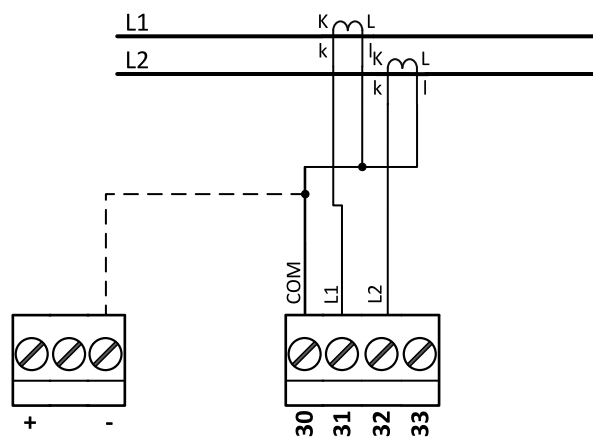


Image 4.7 SpIPhL1L2 application

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

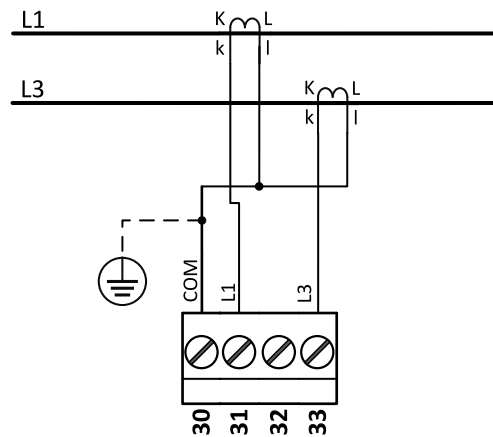


Image 4.8 SpIPhL1L3 application

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.

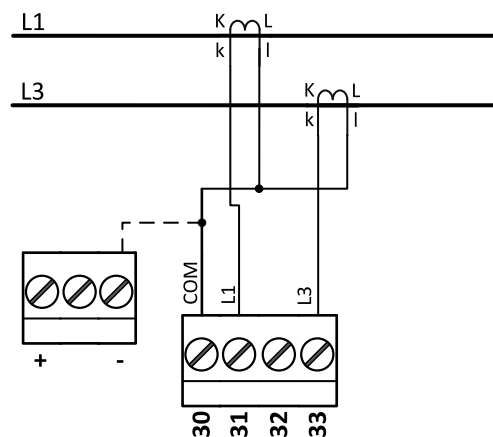


Image 4.9 SpIPhL1L3 application

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.

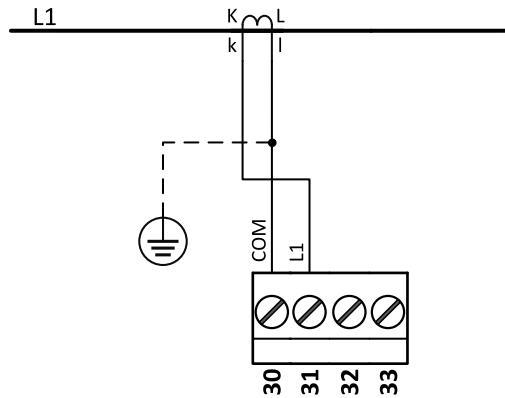


Image 4.10 Mono phase application

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.

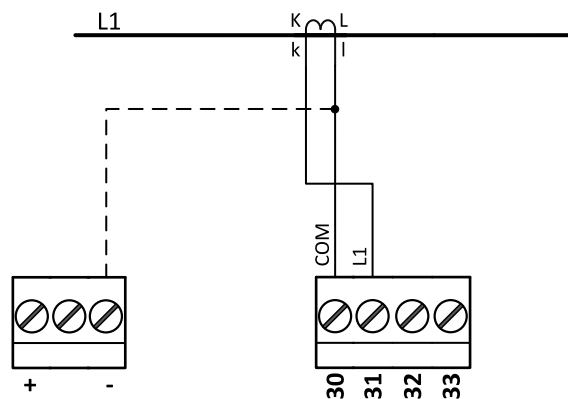


Image 4.11 Mono phase application

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 221) 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 221) = 3Ph4Wire

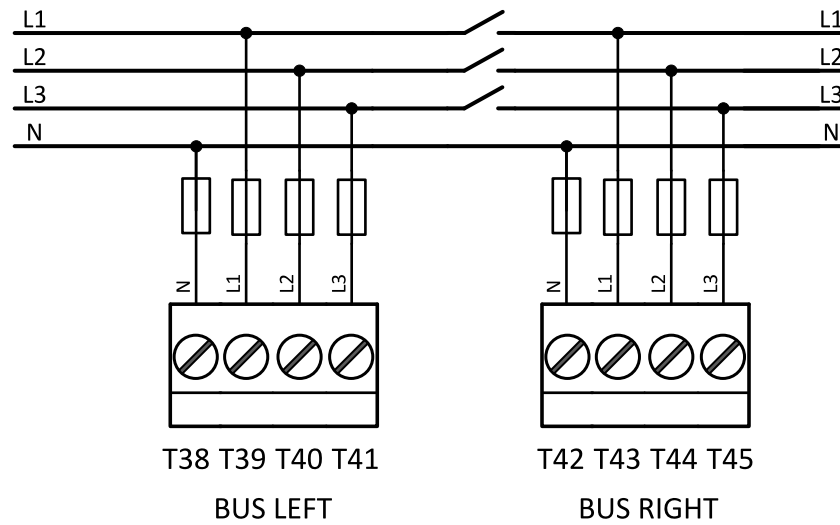


Image 4.12 Controller wiring for voltage measurement of 3 phase application with neutral

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

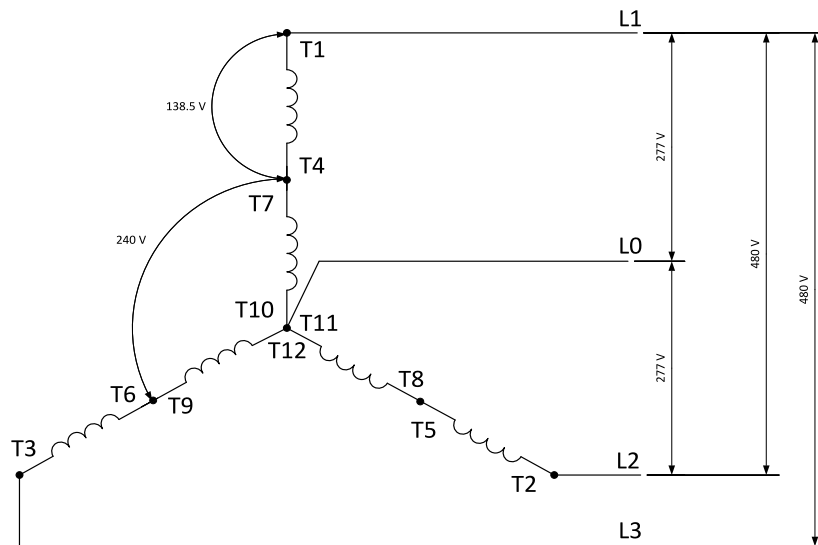


Image 4.13 Typical Mains wiring of 3 phase application with neutral

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 221) = High Leg D

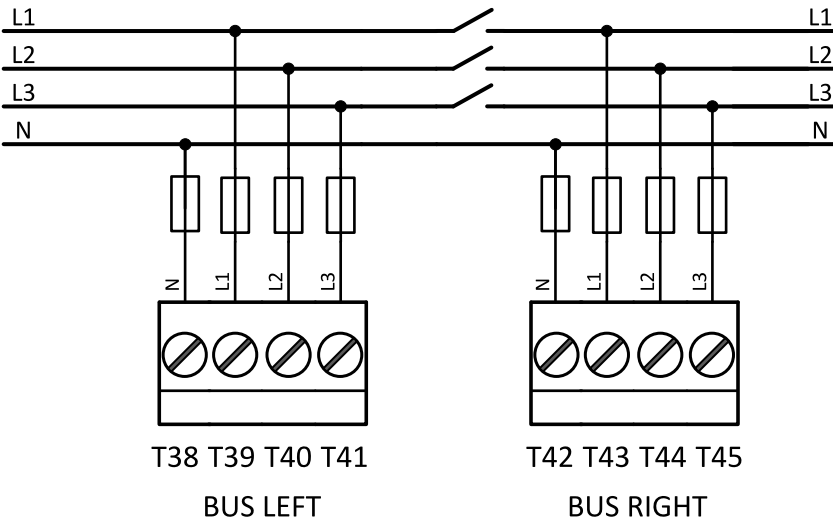


Image 4.14 Controller wiring for voltage measurement of High Leg Delta application

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

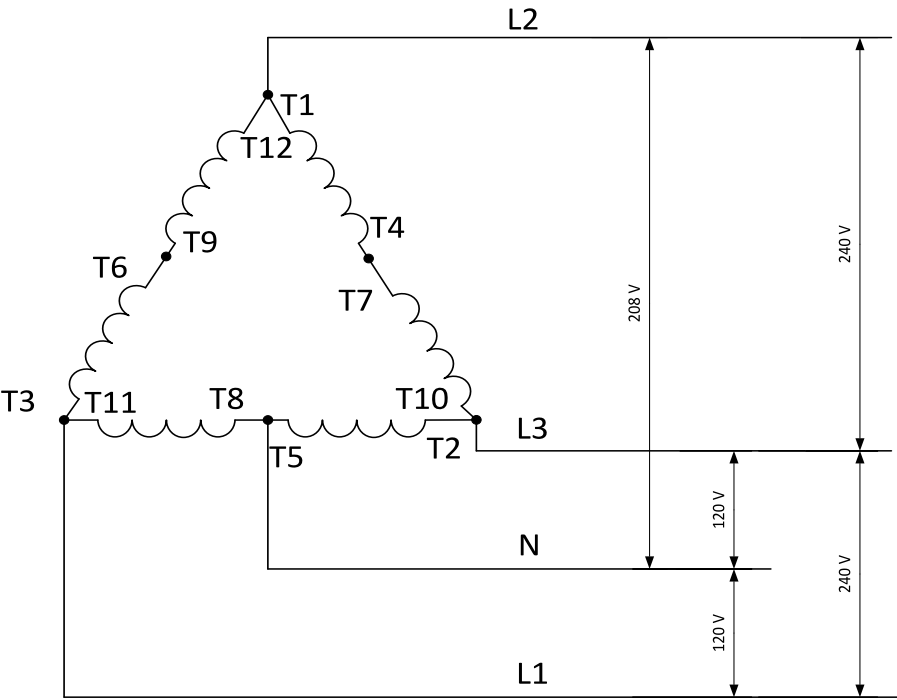


Table 4.1 Typical Mains wiring of High Leg Delta application

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 221) = 3Ph3Wire

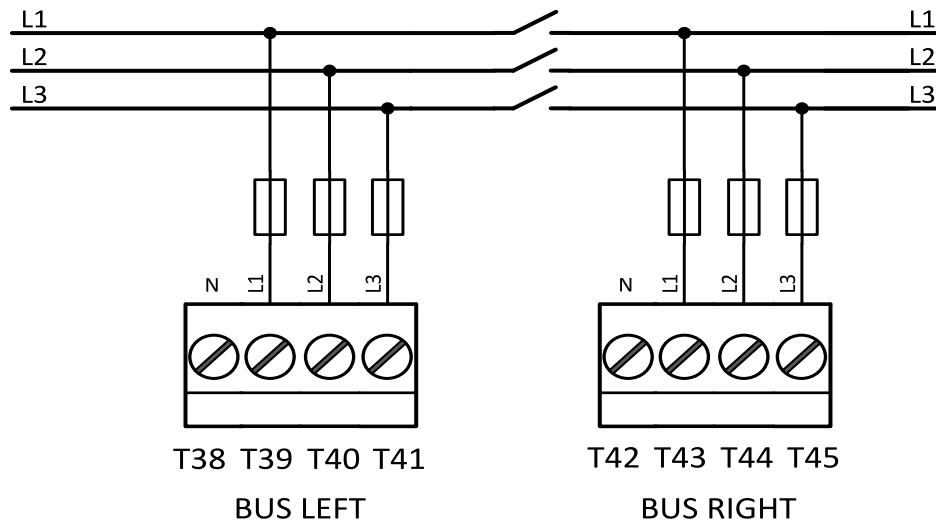


Image 4.15 3 Controller wiring for voltage measurement of 3 phase application without neutral

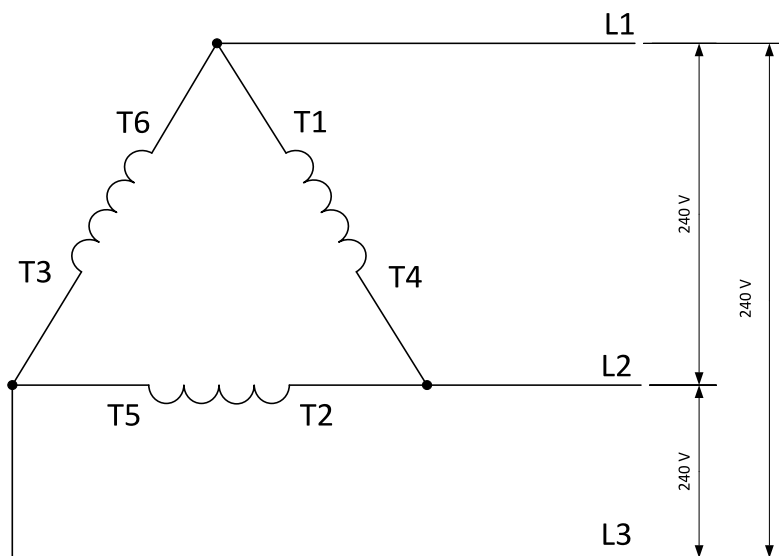


Image 4.16 Typical Mains wiring of 3 phase application without neutral

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: SplPhL1L3

Connection type (page 221) = SplPhL1L3

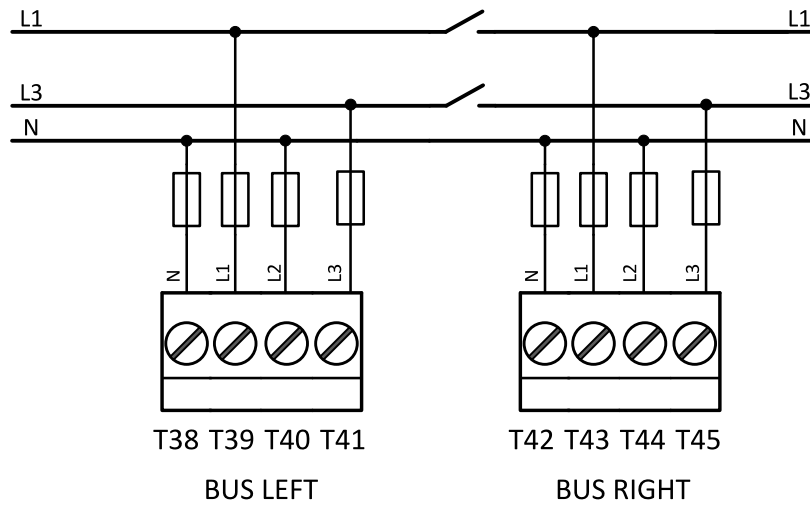


Image 4.17 Controller wiring for voltage measurement of SplPhL1L3 application

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

ConnectionType: SplPhL1L2

Connection type (page 221) = SplPhL1L2

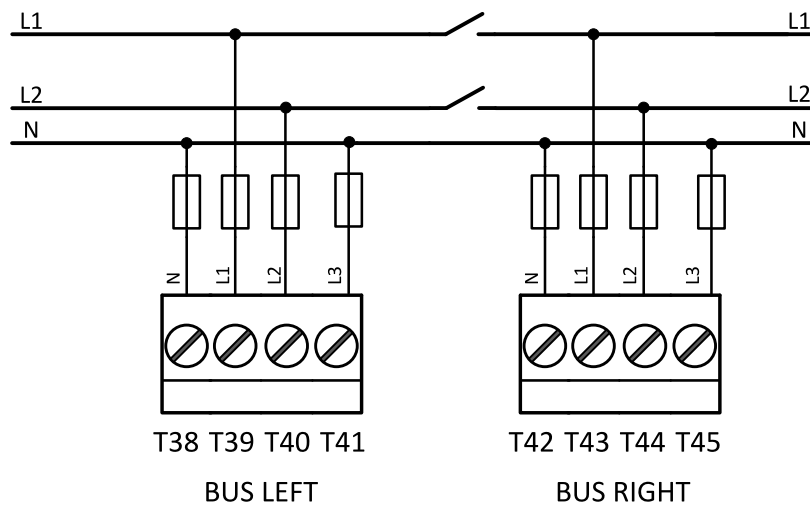
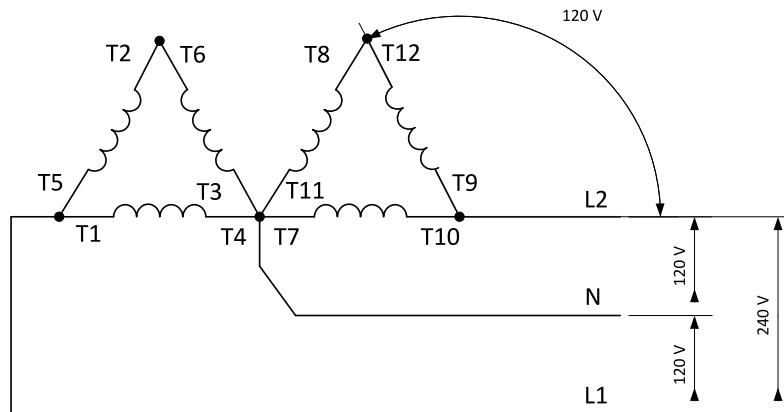


Image 4.18 Controller wiring for voltage measurement of SplPhL1L2 application

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

DOUBLE DELTA Connection



ZIG ZAG (DOG LEG) Connection

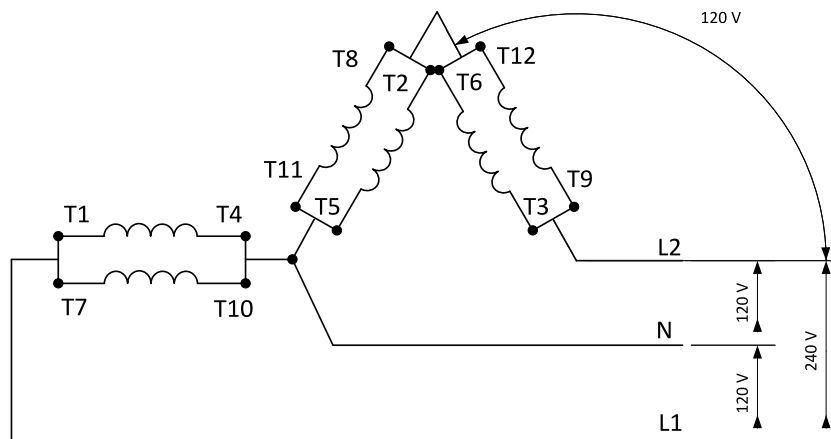


Image 4.19 Typical Mains wiring of SplitPhase application

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 221) = MonoPhase

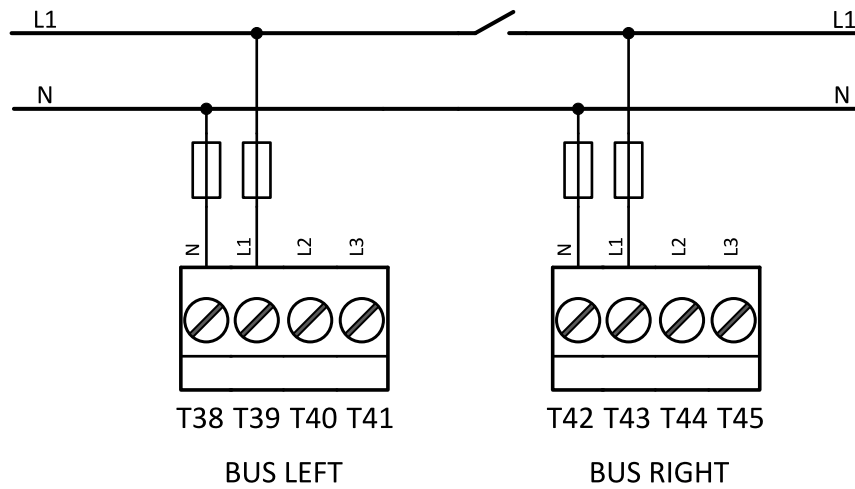


Image 4.20 Controller wiring for voltage measurement of MonoPhase application

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

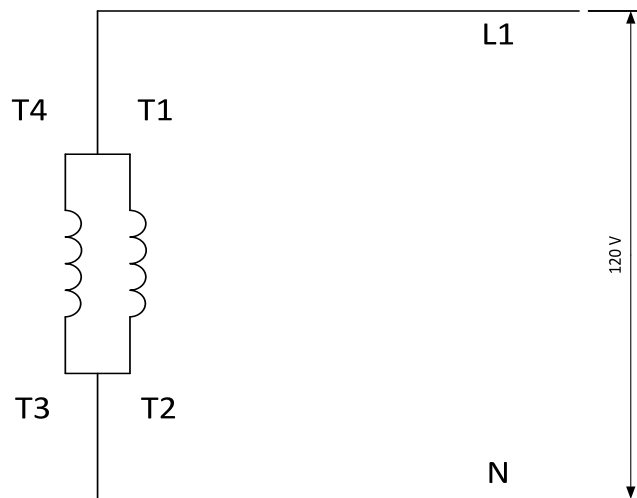


Image 4.21 Typical Mains wiring of MonoPhase application

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 BTB 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 583)** 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.

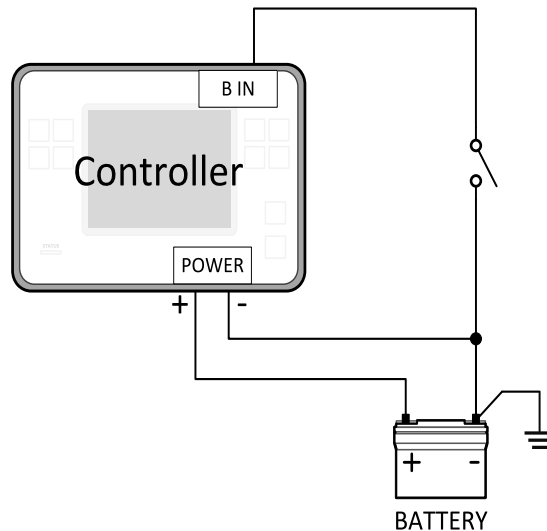


Image 4.22 Wiring binary inputs - Pull Up

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.).

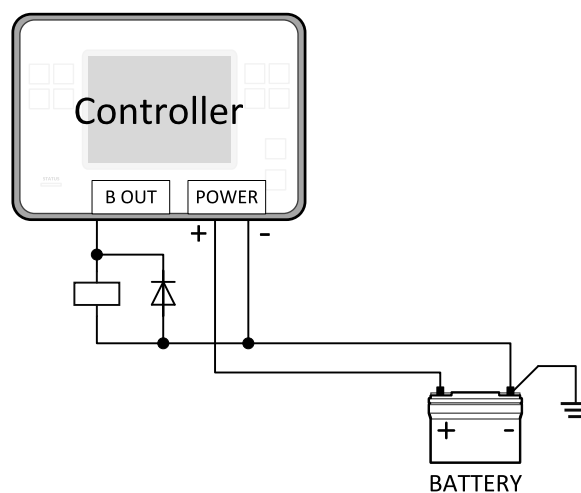


Image 4.23 Binary outputs wiring

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 16)** bus (extension modules, ECU) and **CAN2 (page 16)** (**Communication peripherals (page 15)**) 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.

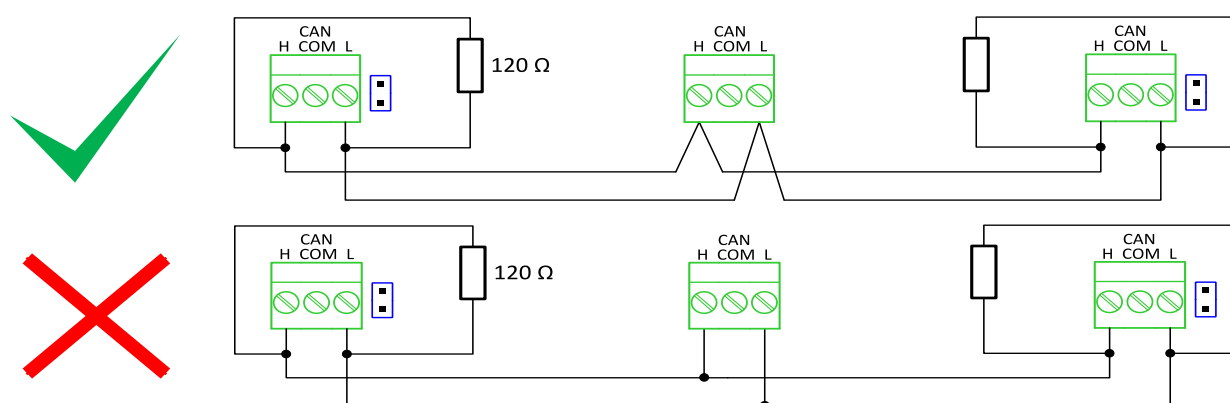


Image 4.24 CAN bus topology

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)

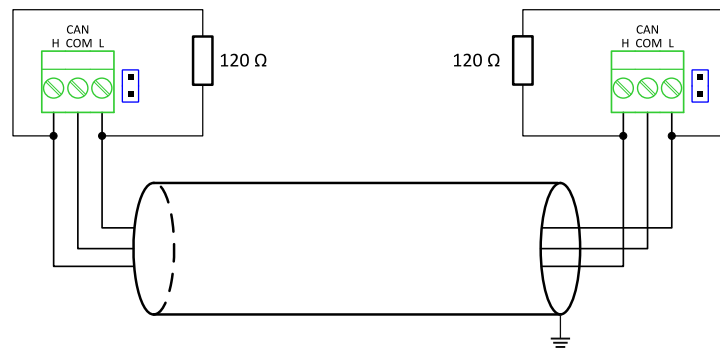


Image 4.25 CAN bus wiring for shorter distances

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.)

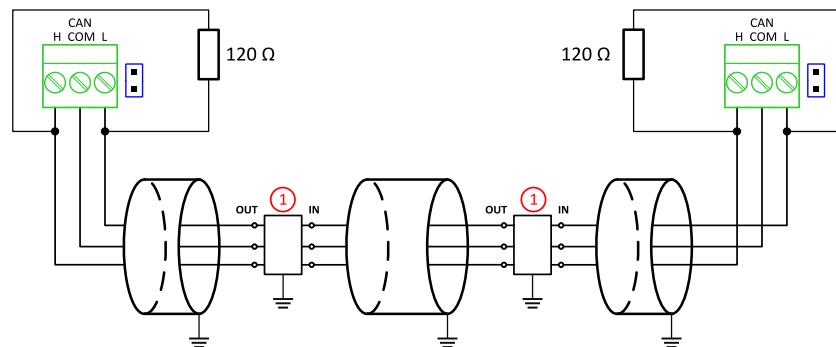


Image 4.26 CAN bus wiring for longer distances

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).

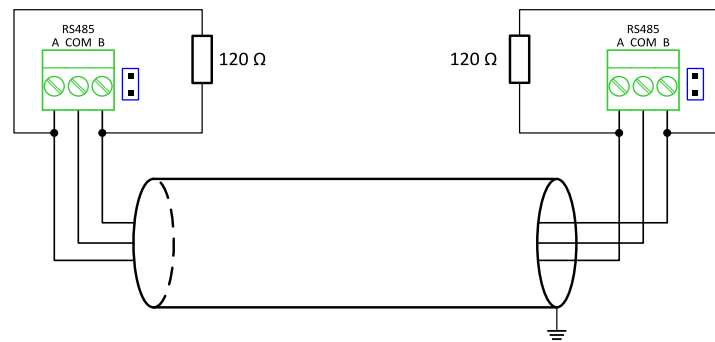


Image 4.27 RS485 wiring for shorter distances

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

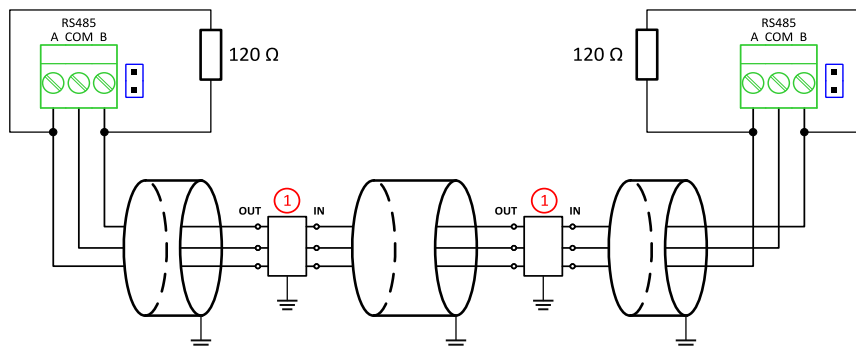


Image 4.28 RS485 wiring for longer distances

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.

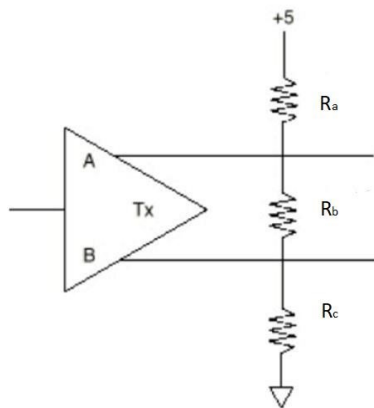


Image 4.29 Balancing resistors

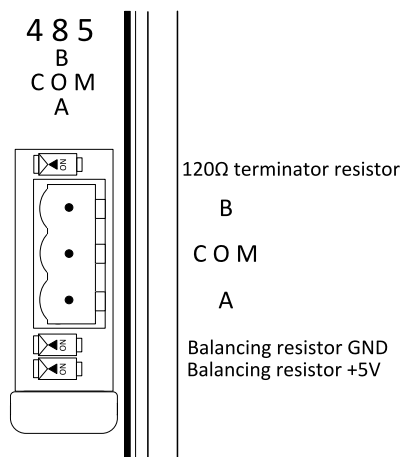


Image 4.30 RS485 on board

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 182)** for more information.

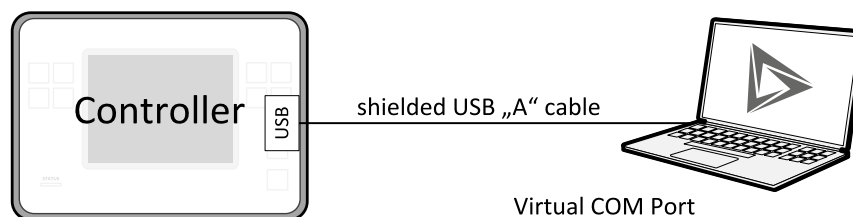


Image 4.31 USB connection

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 181)** for more information.

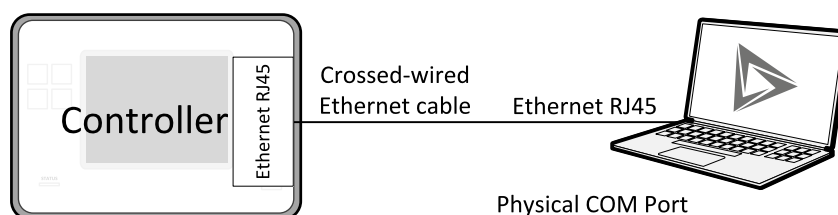
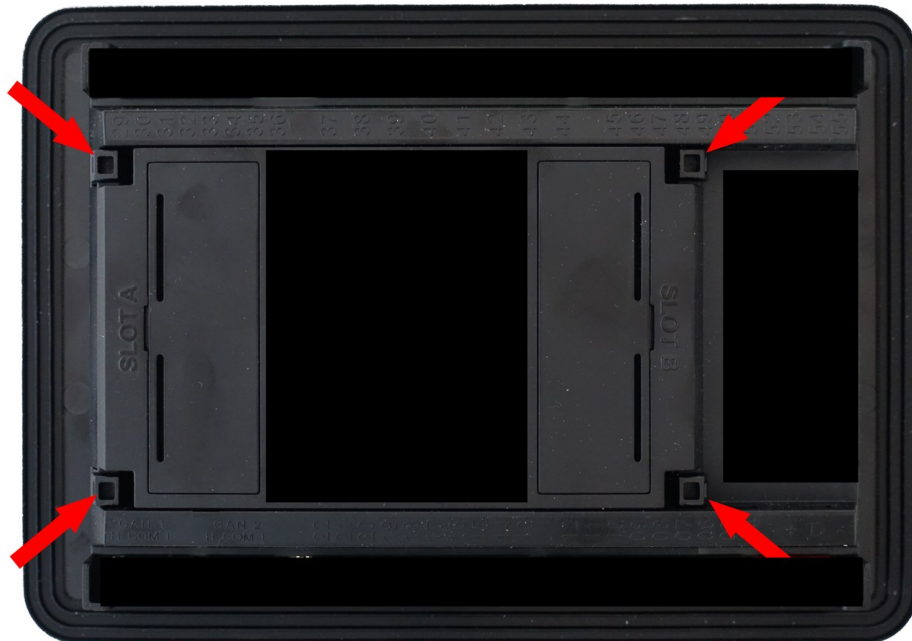


Image 4.32 Ethernet Connection

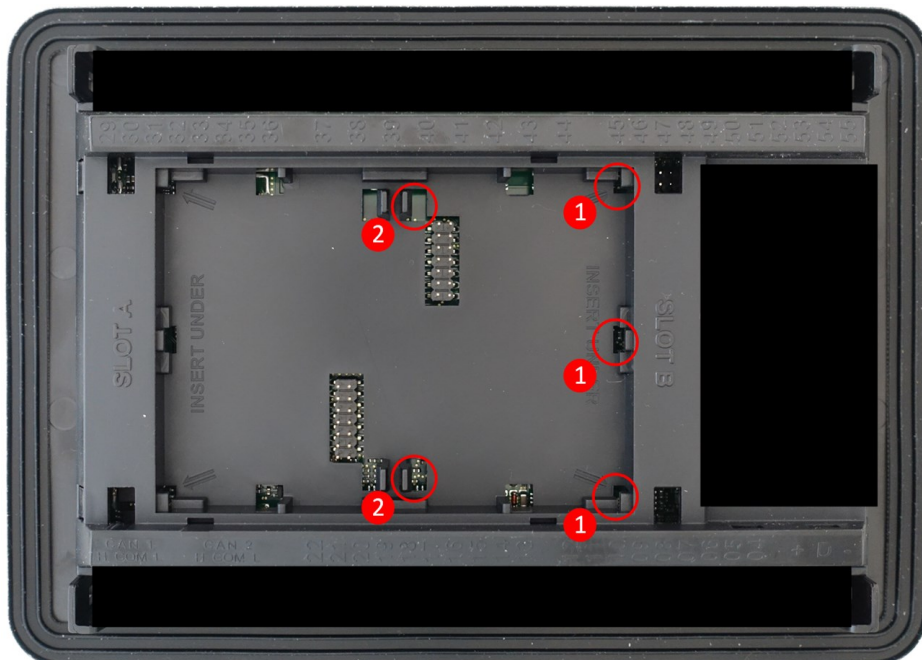
4.5 Plug-in module installation

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 562)** is present, replacement of backup battery is needed. Follow these instructions:

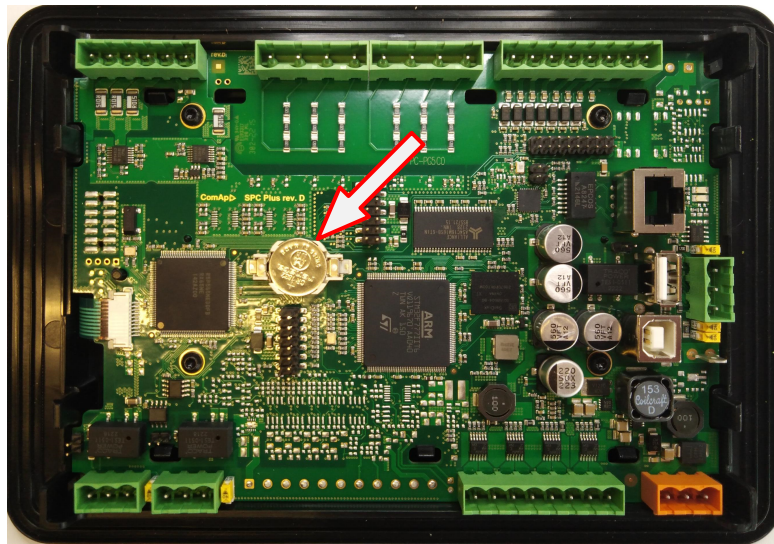
- Connect the controller to a PC and save an archive for backup purposes (not necessary but recommended).
- Disconnect all terminals from the controller and remove the controller from the switchboard.
- Release the rear cover using a flat screwdriver or another suitable tool.



- 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	54
5.2 Controller configuration and PC tools connection	54
5.3 Operator Guide	61
5.4 General Functions	95

[🔍 back to Table of contents](#)

5.1 Default configuration

5.1.1 BinaryBinary inputs

Number	Description	Configured function
BIN1	Bus tie breaker feedback	MCB FEEDBACK (PAGE 464)
BIN2	Access lock keyswitch	ACCESS LOCK (PAGE 463)
BIN3	Free slot	Not Used
BIN4	Manual closing of BTB	FORCE BTB CLOSE (PAGE 467)
BIN5	Access lock keyswitch	ACCESS LOCK (PAGE 463)
BIN6	Free slot	Not Used
BIN7	Free slot	Not Used
BIN8	Free slot	Not Used

5.1.2 Binary outputs

Number	Description	Configured function
BOUT1	Control of MCB	MCB CLOSE/OPEN (PAGE 482)
BOUT2	Status of a system reserve	SYSTEM RESERVE OK (PAGE 495)
BOUT3	Free slot	Not Used
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	55
5.2.2 Ethernet	56

[🔍 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 30)** Port. In this case standard USB A to B cable should be used - **USB (page 50)** connection.

Connection using IntelliConfig

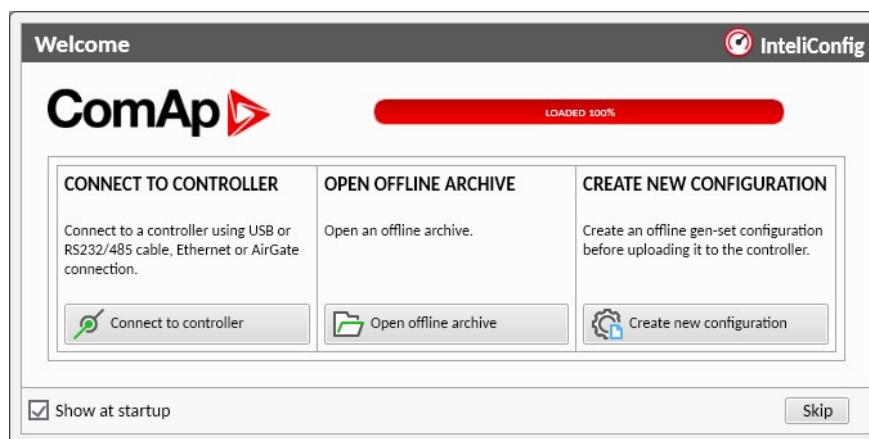


Image 5.1 First screen of IntelliConfig - select connect to controller



Image 5.2 Second screen of IntelliConfig - 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

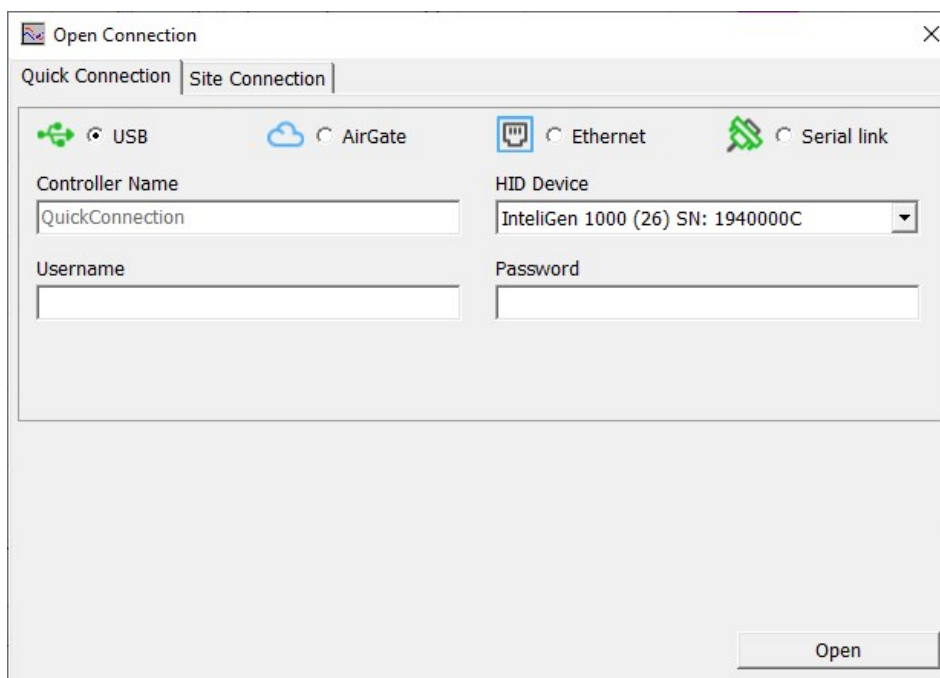


Image 5.3 WinScope screen - Select your controller from list of Detected controllers.

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 31)**, ports, if correct Ethernet Port Configuration settings are applied.

Note: See **Communication peripherals (page 15)** 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

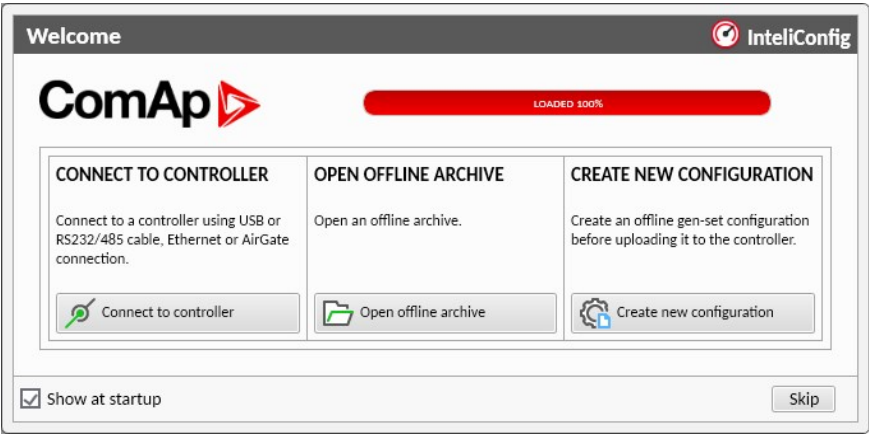


Image 5.4 First screen of IntelliConfig - select connect to controller

The screenshot shows the 'Online Connection' tab in the IntelConfig interface. 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 IntelConfig - 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 15) you need to fill Username and Password of actual user account.

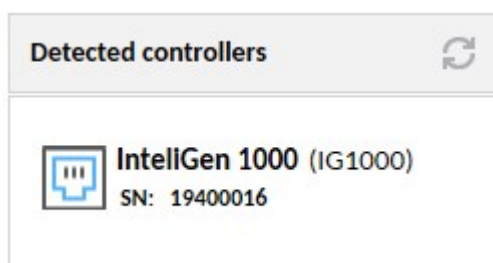


Image 5.6 Second option of connection via IntelConfig

You can also select controller from "Detected controllers" feature. If this controller is connected via **Communication peripherals (page 15)** you will be prompted to fill **Username** and **Password** of actual user account.

Connection using WinScope

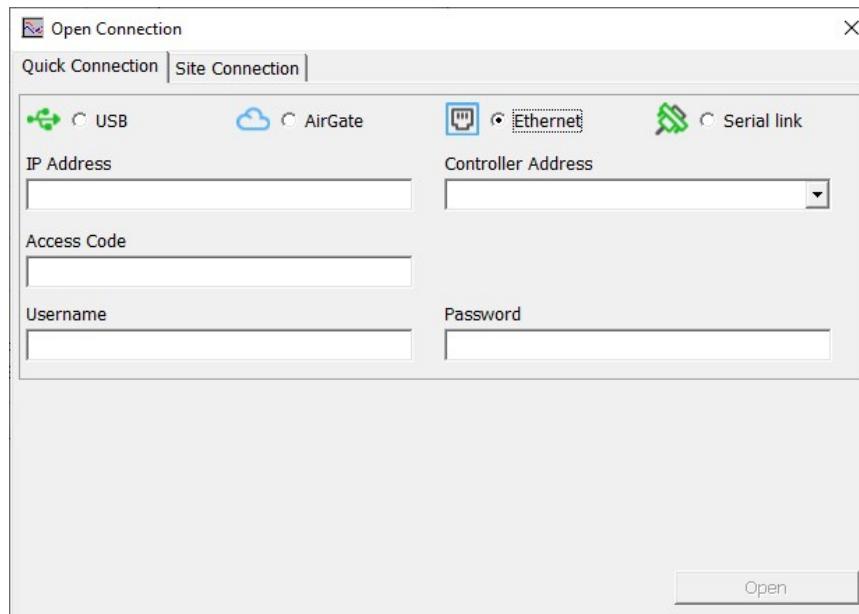
The image shows the 'Open Connection' dialog box in WinScope. It has two tabs: 'Quick Connection' and 'Site Connection'. Under 'Quick Connection', there are four radio buttons: 'USB', 'AirGate', 'Ethernet' (which is selected), and 'Serial link'. Below these, there are four input fields: 'IP Address', 'Controller Address' (a dropdown menu), 'Access Code', and 'Username'. There is also a 'Password' field. An 'Open' button is located at the bottom right of the dialog box.

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 15) 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 15)**. 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 352)** - has to be **ENABLED**
- **AirGate Address (page 353)** - manually adjusted address of AirGate server
- **AirGate Port (page 353)** - manually adjusted port for communication between Controller and AirGate server
- **AirGate Status (page 425)** - has to be **connected, operable**
- **AirGate ID (page 425)** - 9 numbers long ID of the controller

IMPORTANT: Controller has to be connected to the Internet.

Connection using IntelliConfig

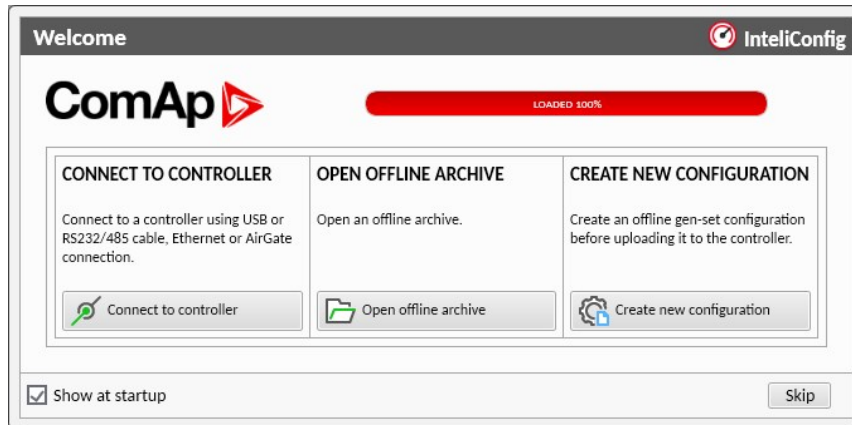


Image 5.8 First screen of IntelliConfig - select connect to controller

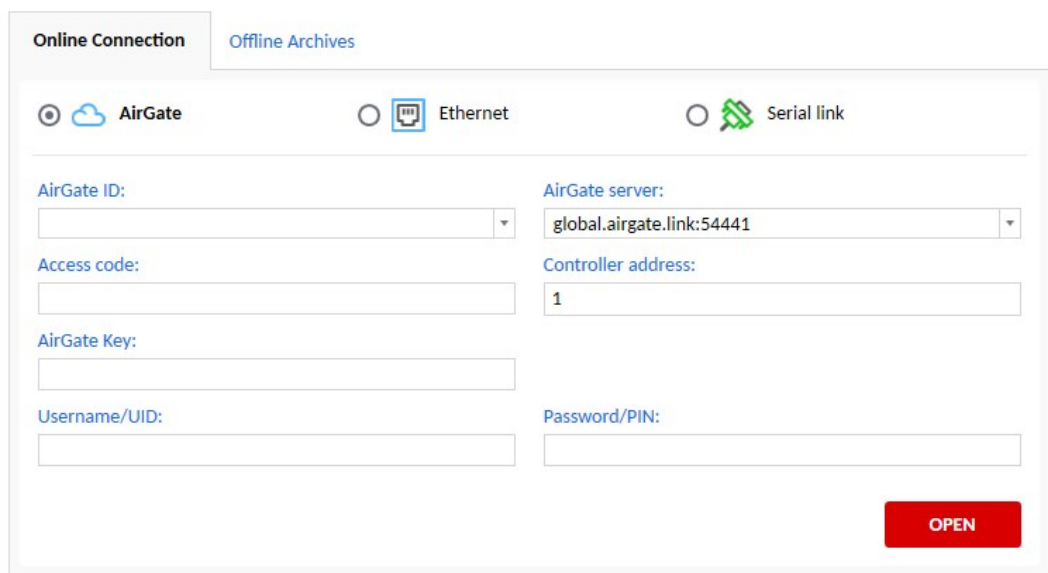
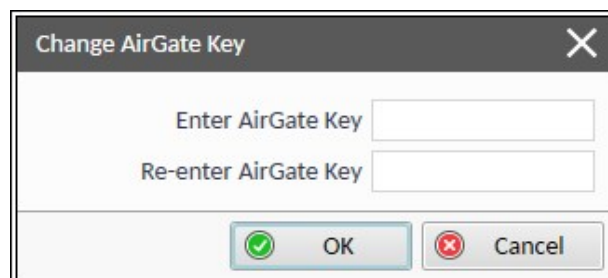
The image shows the 'Online Connection' tab of the IntelliConfig software. It features three radio buttons for connection methods: 'AirGate' (selected), 'Ethernet', and 'Serial link'. Below these are several input fields: 'AirGate ID' (a dropdown menu), 'AirGate server' (a dropdown menu showing 'global.airgate.link:54441'), '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

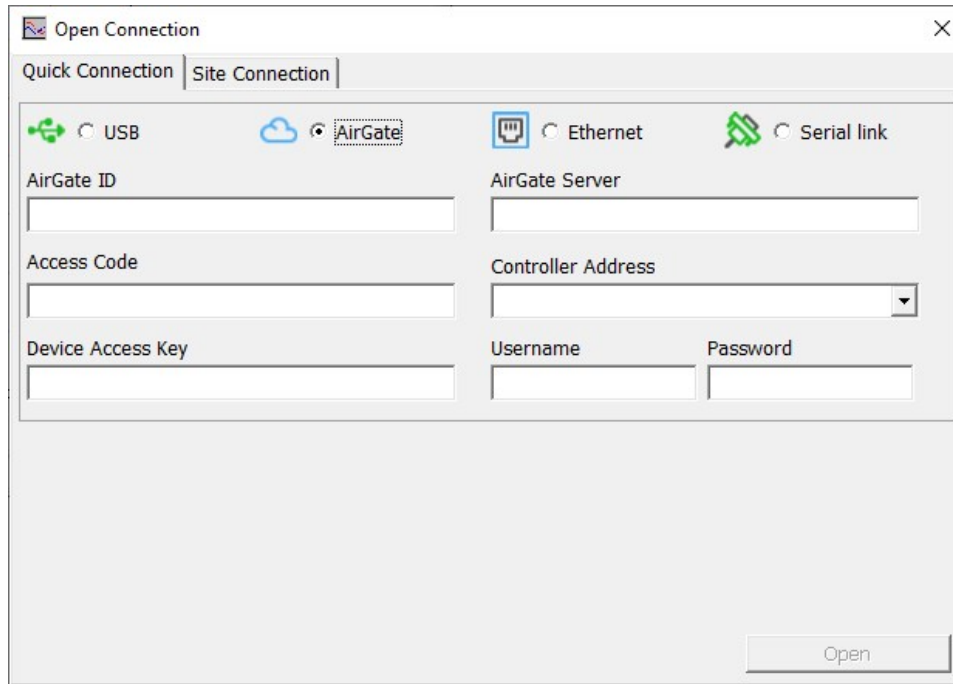


Image 5.10 WinScope1000 screen - select AirGate

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

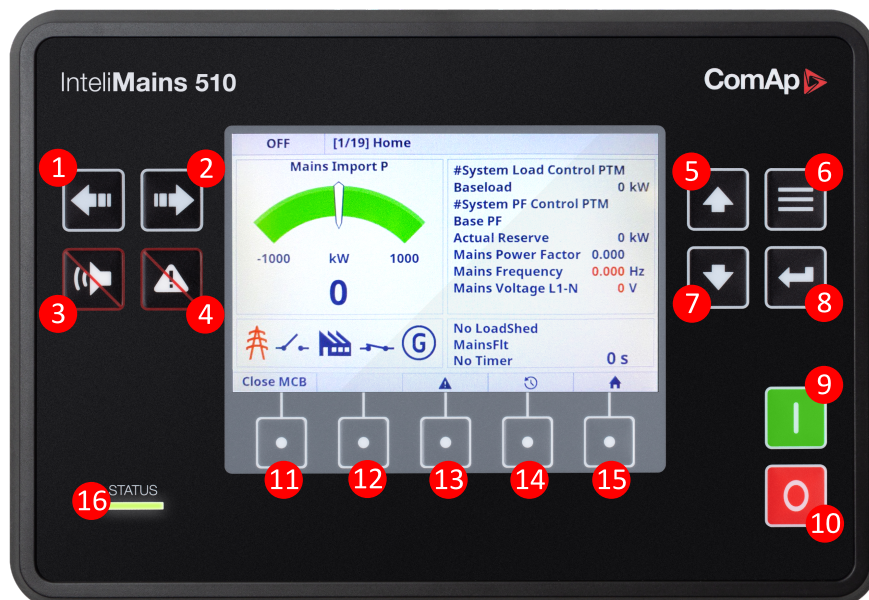












Image 5.11 Operator interface of IntelIMains 510 BTB

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 63.

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.

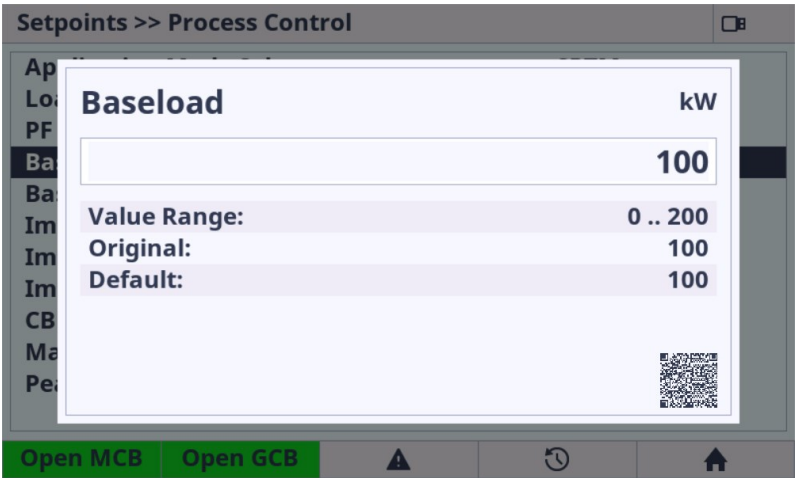


Image 5.13 : Dialog Value overview

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.

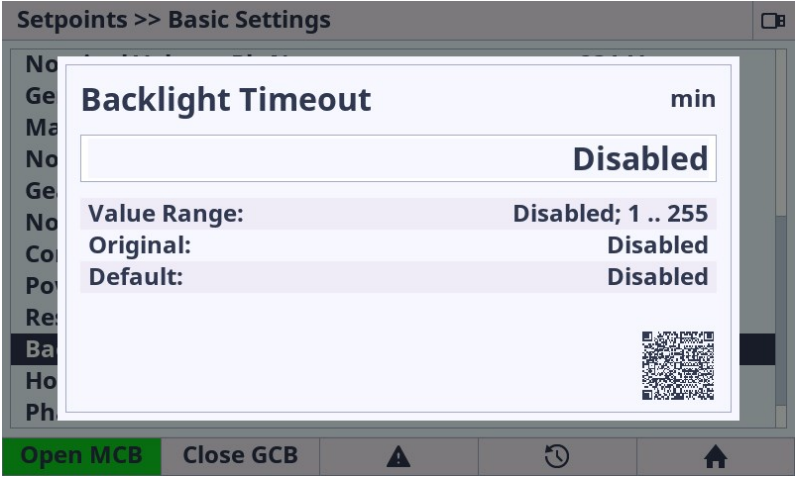


Image 5.14 : Dialog Value Extended overview

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.

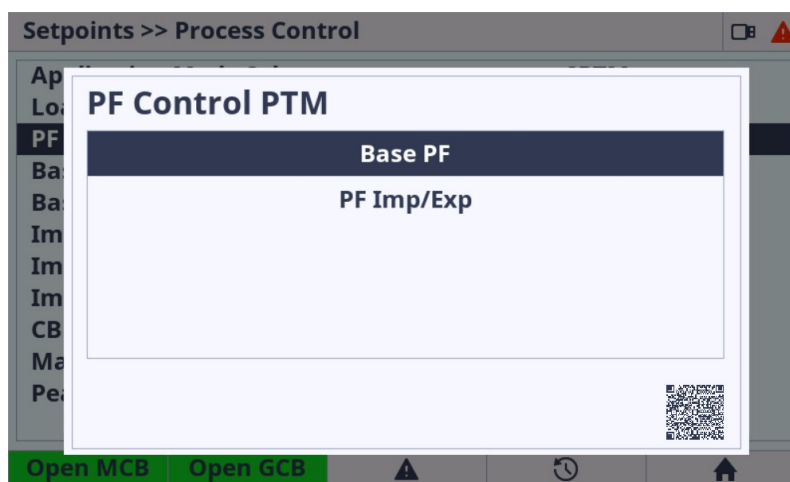


Image 5.15 : Dialog String List overview

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.

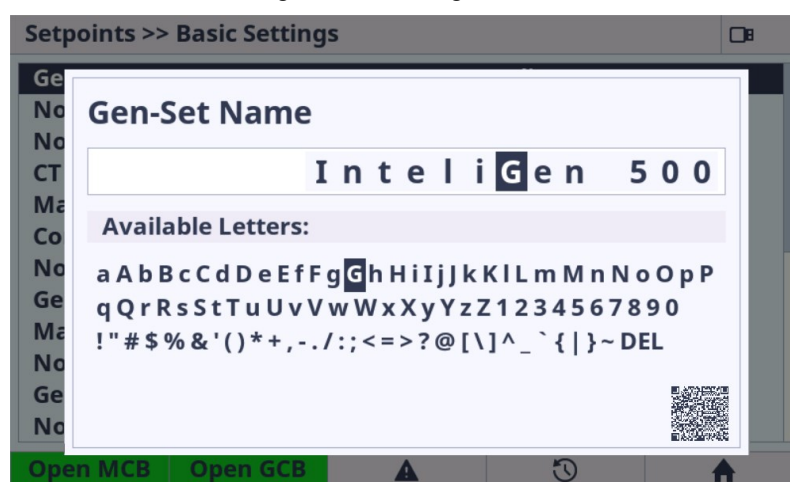


Image 5.16 : Dialog Text overview

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.

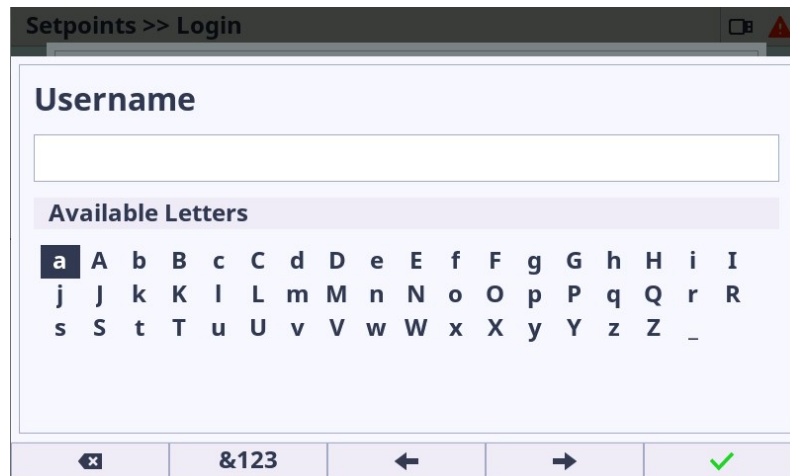


Image 5.17 : Dialog Text from ICD firmware version 1.4.0

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.

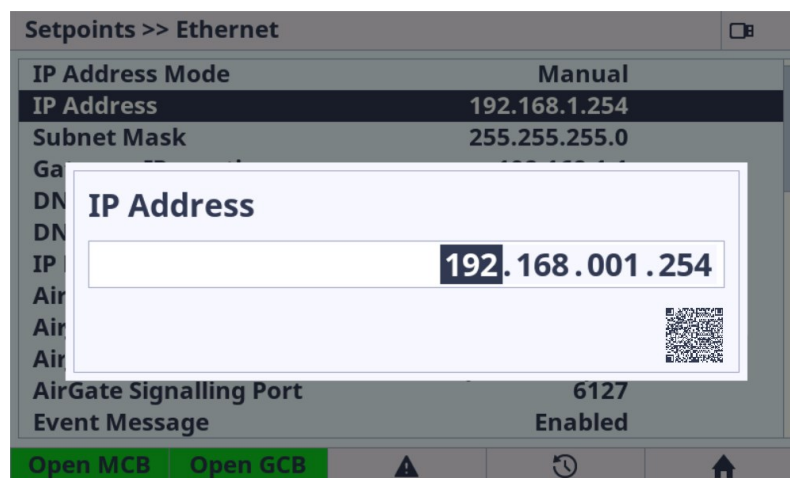


Image 5.18 : Dialog IP address overview

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

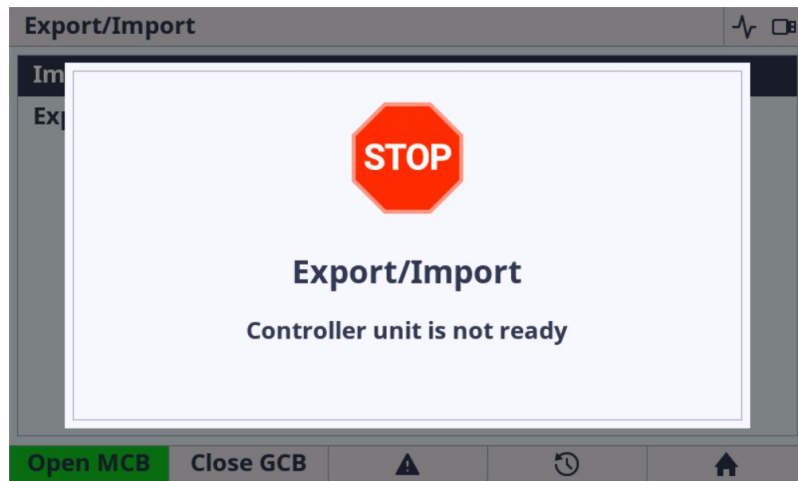


Image 5.19 : Dialog Message overview

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.

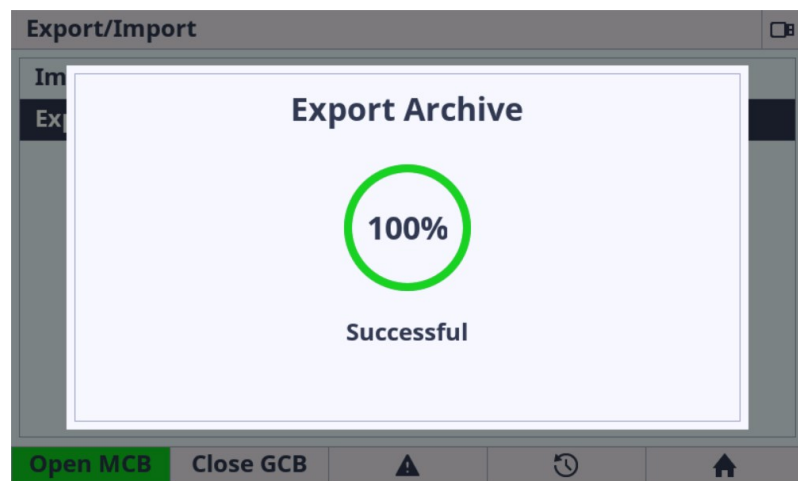


Image 5.20 : Dialog Progress overview

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.

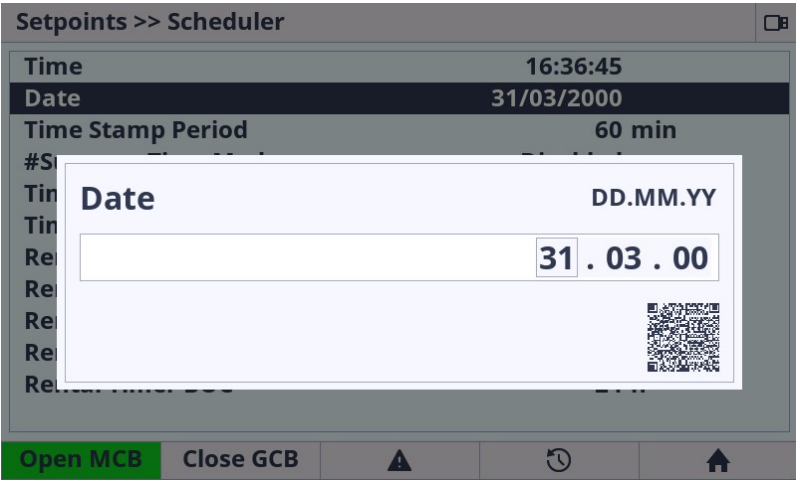


Image 5.21 : Dialog Date overview

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.

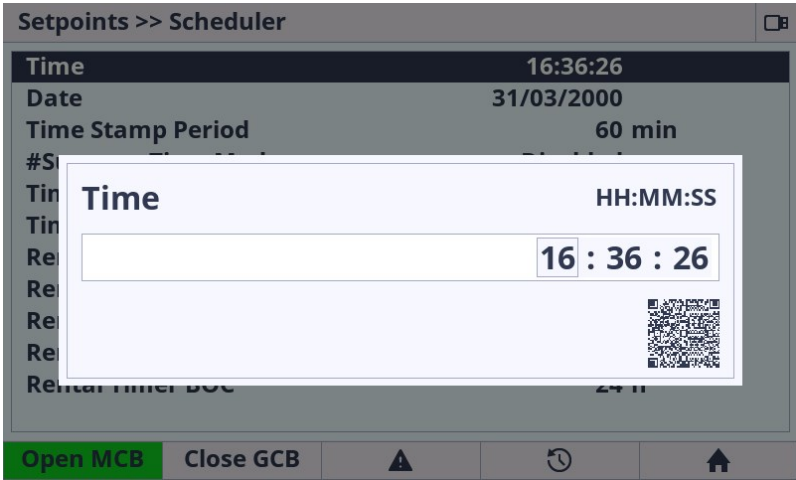


Image 5.22 : Dialog Time overview

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.

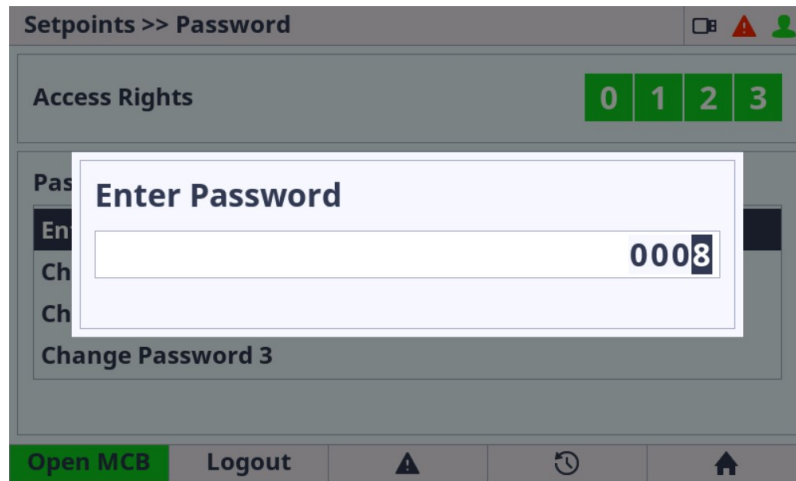


Image 5.23 : Dialog Login overview

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.

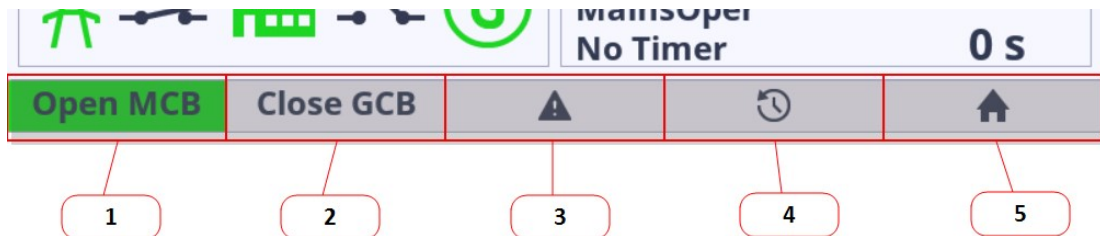


Image 5.24 : Example (bottom status bar on Home metering screen)

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.

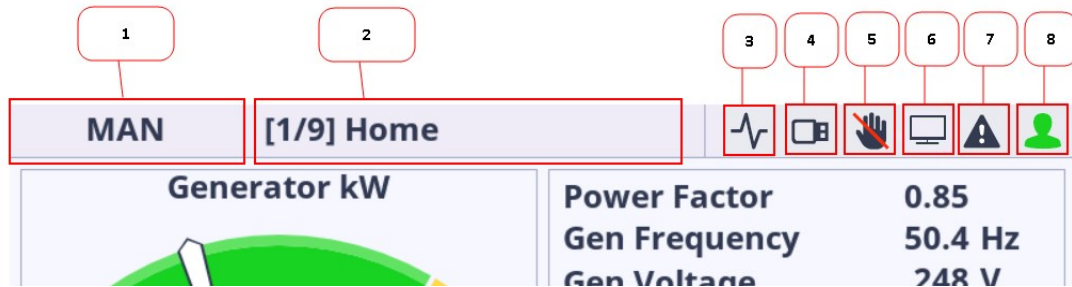


Image 5.25 Top Status Bar description



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 BTB 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 BTB 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.

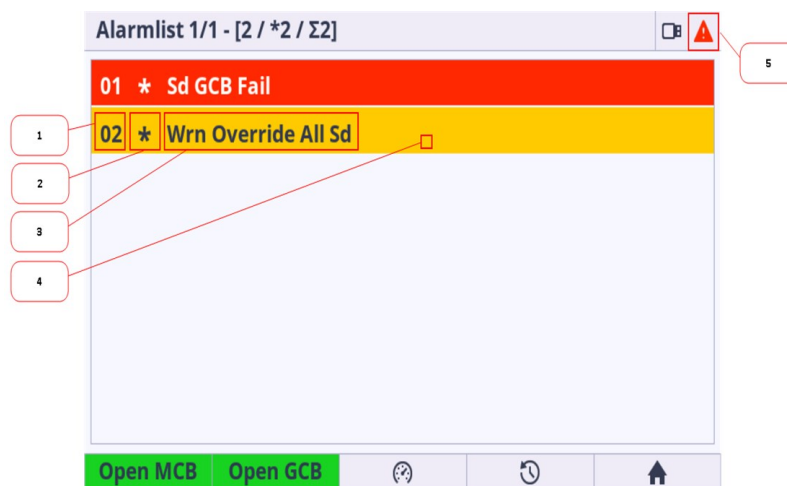


Image 5.27 : Alarmlist Page

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 BTB 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.

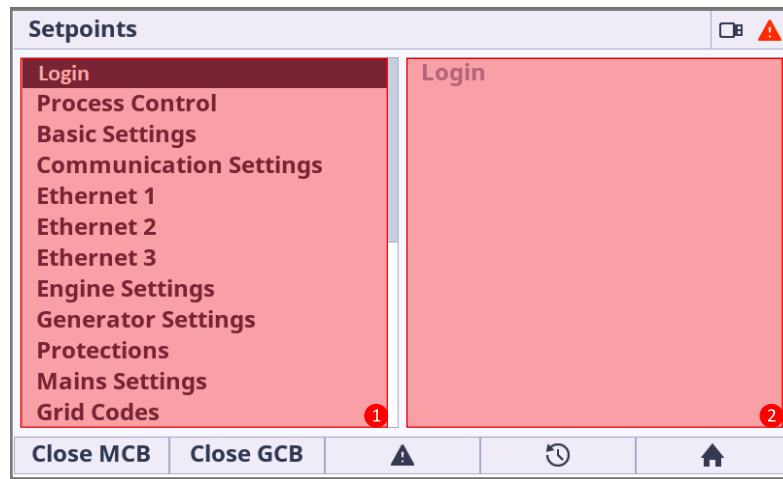


Image 5.28 : Setpoints Page overview

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.

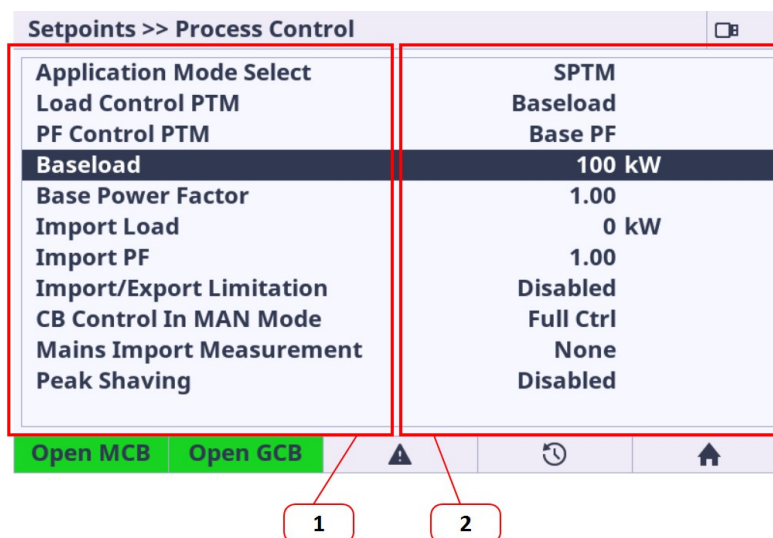


Image 5.29 : Group Setpoints Page

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

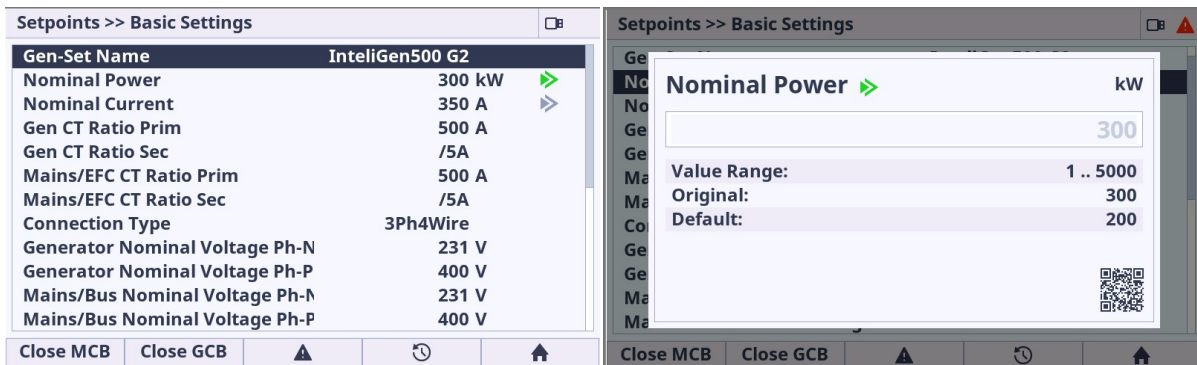


Image 5.30 : Force Value and Protected Setpoint Indication

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.

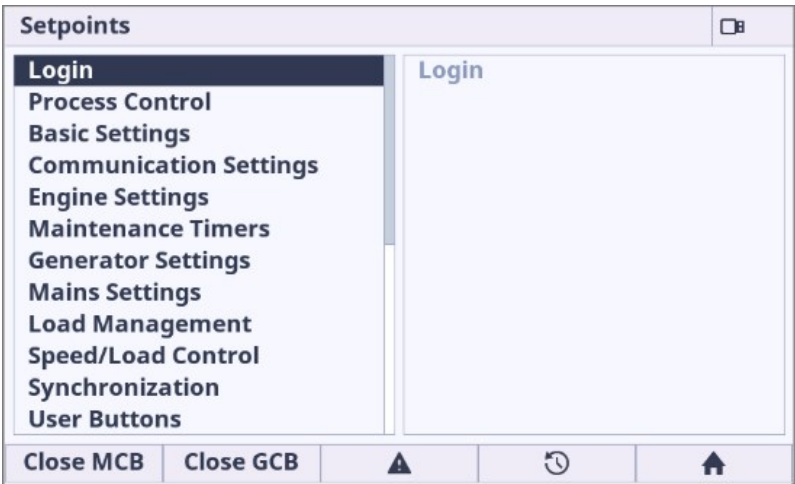


Image 5.31 : Main Setpoints Page

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

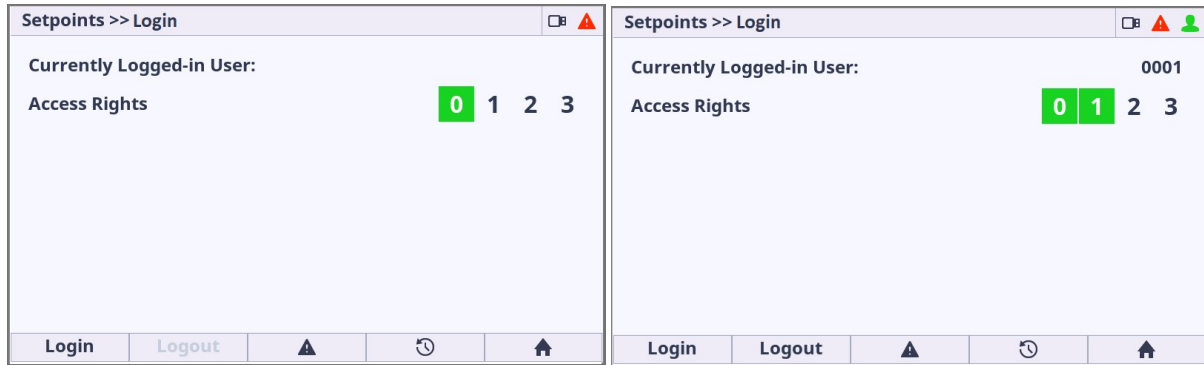


Image 5.32 : Setpoints Password Page

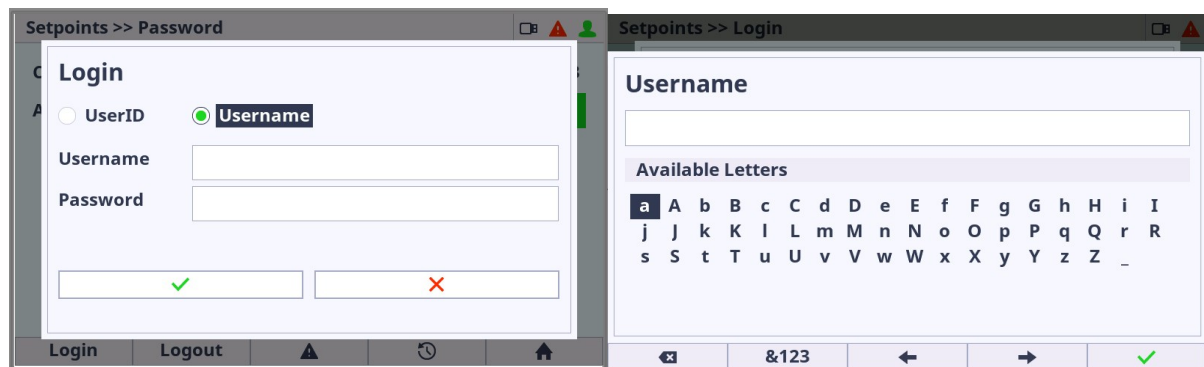


Image 5.33 : Login Dialog

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. A red box labeled '1' highlights the first row. A red box labeled '2' highlights the 'Reason' column. A red box labeled '3' highlights the 'RPM' column. A red box labeled '4' highlights the '1st Row/Col' button. A red box labeled '5' highlights the '1x' button.

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	

1st Row/Col 1x

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' displayed over the table. The dialog box contains the following information:

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

1st Row/Col 1x

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

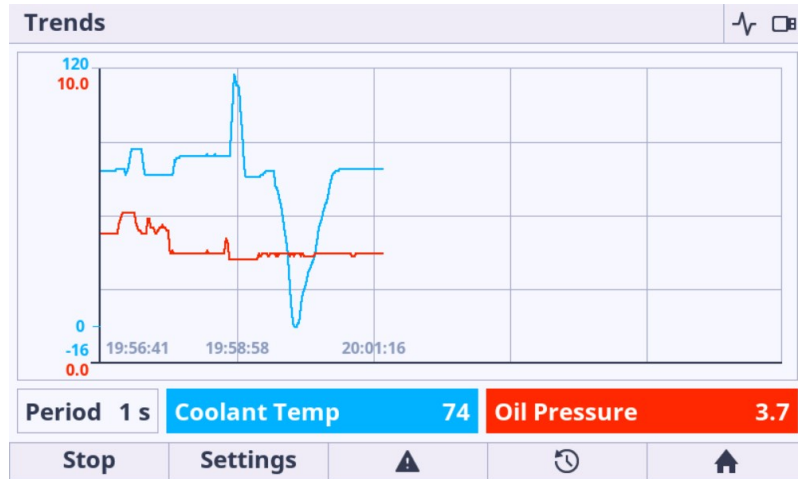


Image 5.36 : Trends page overview

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.

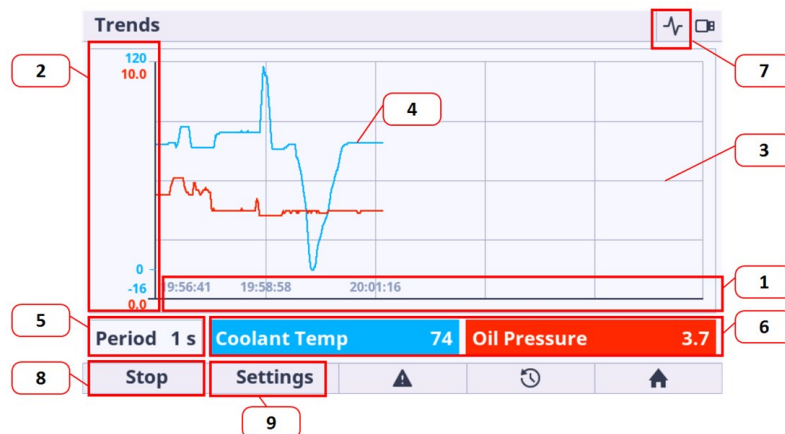


Image 5.37 : Trends page description

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.

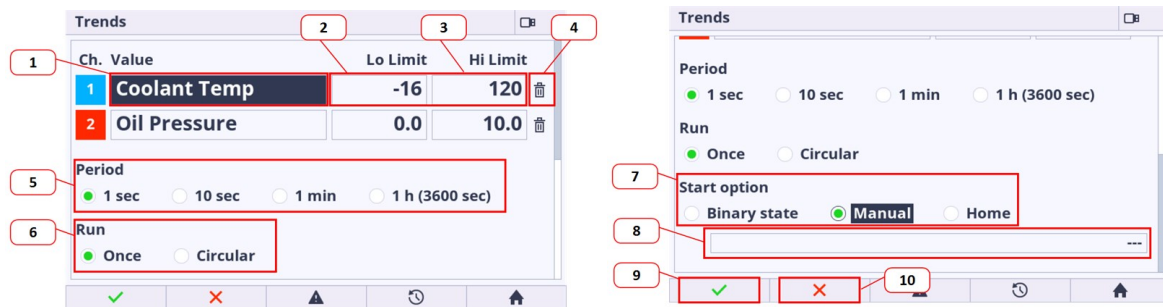


Image 5.38 : Trends page settings overview

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.

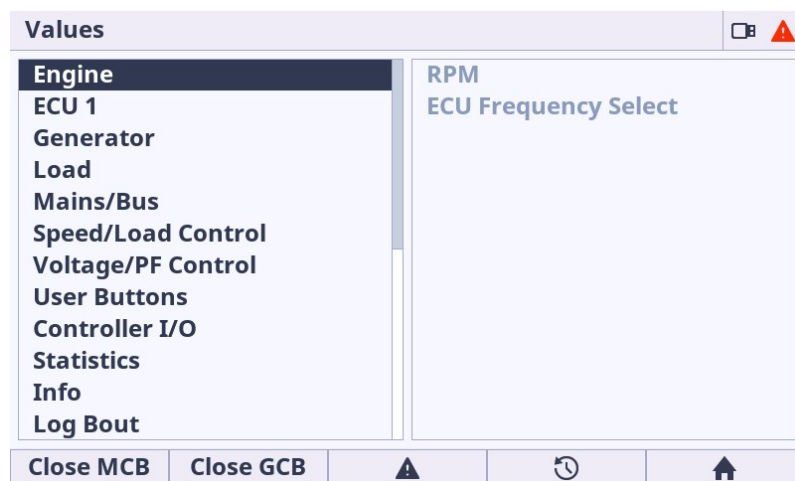


Image 5.39 : Values screen overview

5.3.8 Administration

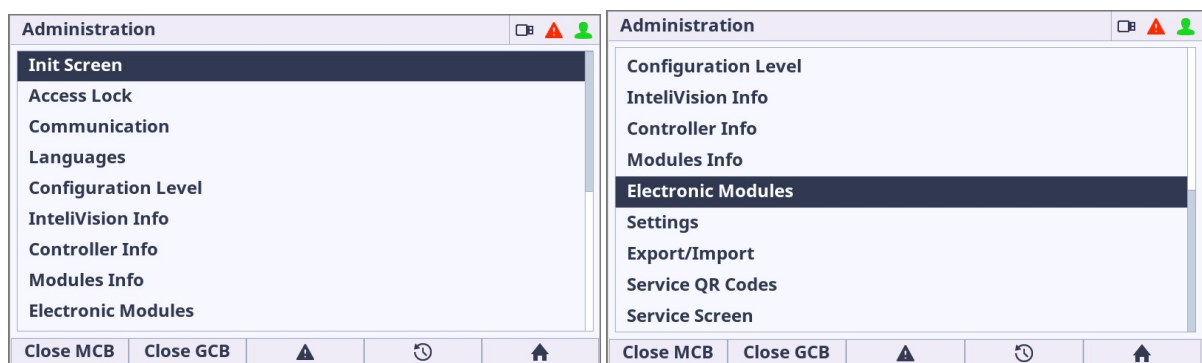


Image 5.40 : Administration Screen Overview

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.

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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

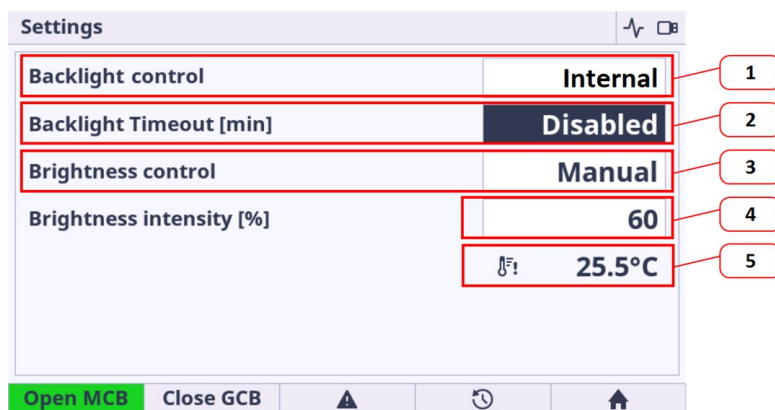


Image 5.45 : Administration Page – Settings

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

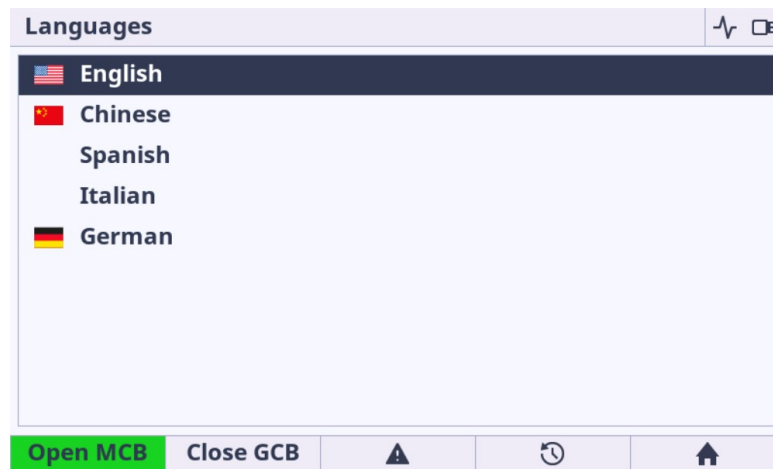


Image 5.46 : Administration Page – Languages

- > **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, Lithunian, Vietnamese, Italian, Portuguese, Bosnian
- > The integrated color display unit supports the following Unicode standard character sets
 - » Basic Latin, Latin-1 Supplement, Latin Extended-A, Latin Extended-B, Latin Extended Additional, Cyrillic, Greek, Greek Extended, Arabic, Arabic Supplement, General Punctuation, Superscripts and Subscripts, Currency Symbols, Arrows, CJK Unified Ideographs, Kanji, Hiragana, Katakana, Hangul Jamo, Thai

IMPORTANT: Even the language is configured in 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

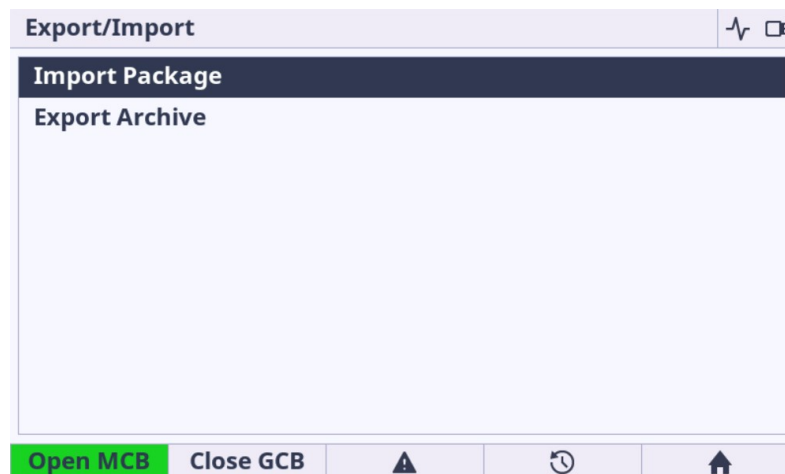
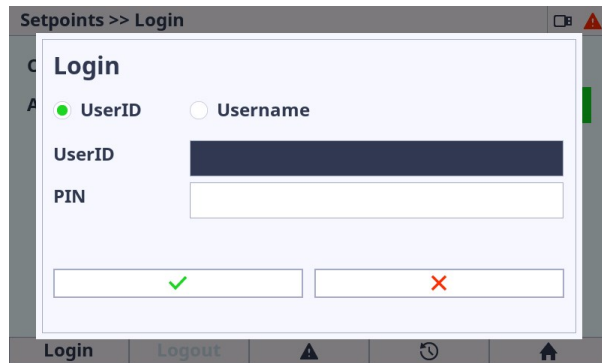


Image 5.48 : Administration Page – Export & Import

- **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

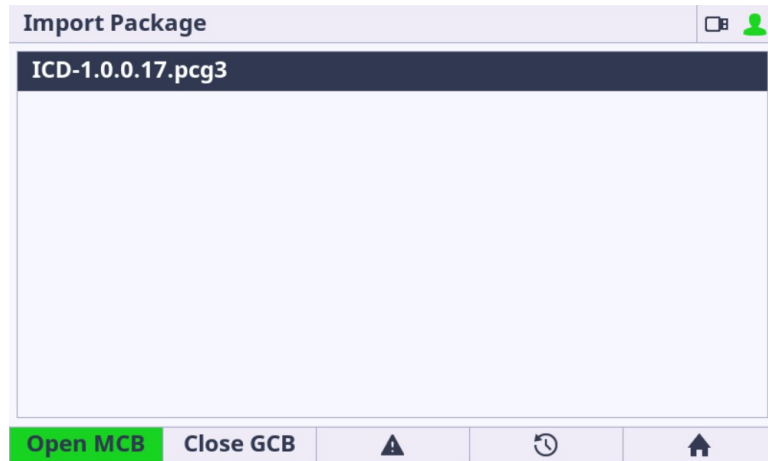


Image 5.49 : Administration Page – Export & Import – File selection

- **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.

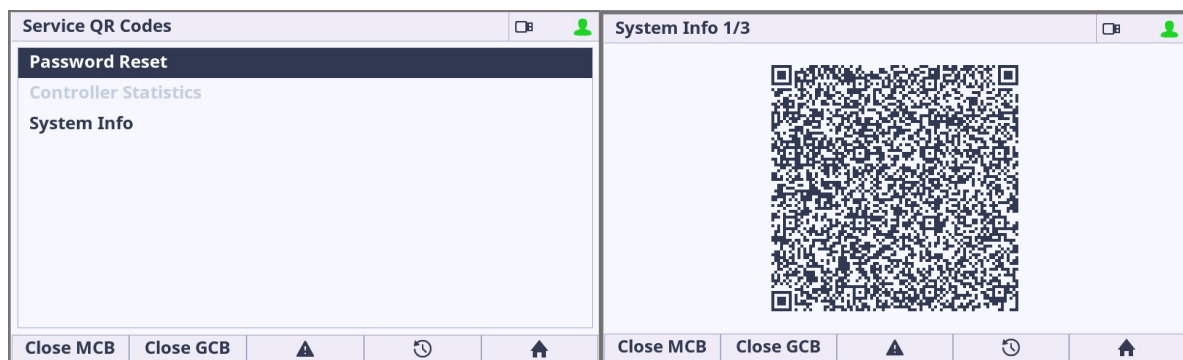


Image 5.51 : Administration Page – Service QR Codes

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

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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.

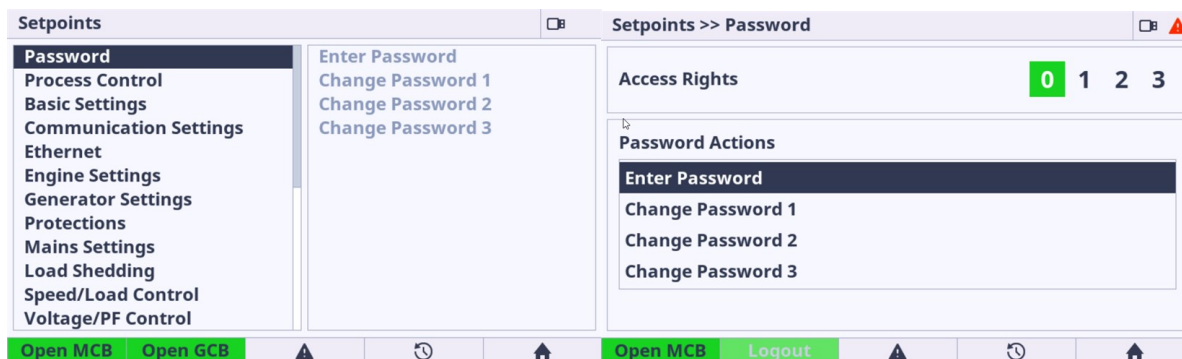


Image 5.53 : Password menu

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.

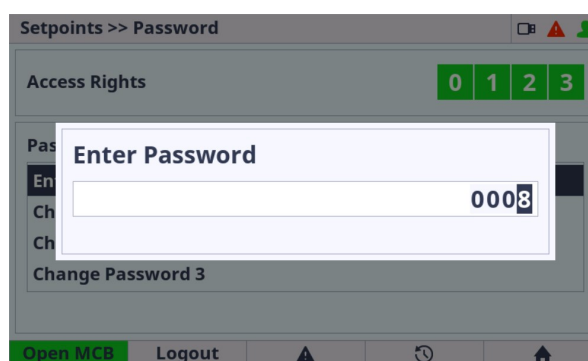


Image 5.54 : Password dialog

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.

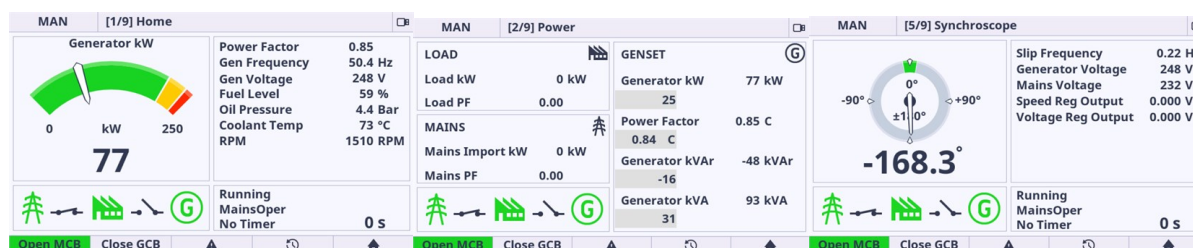


Image 5.55 : Important values

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.

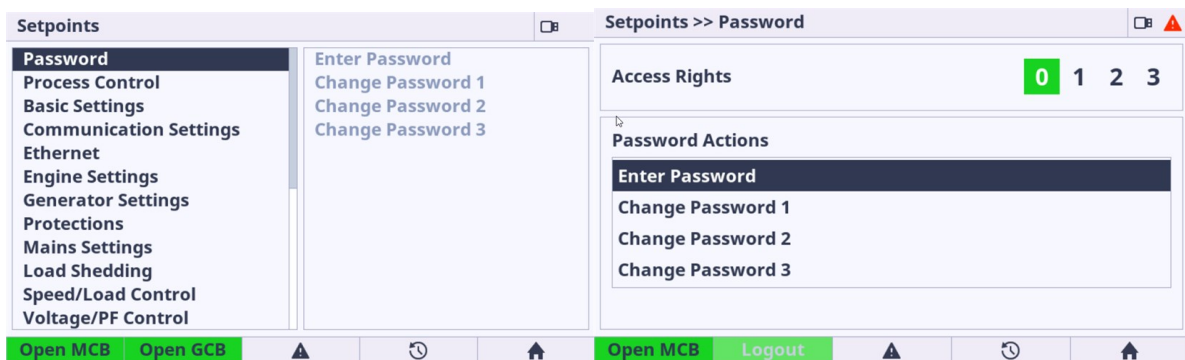


Image 5.57 : Password menu

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.

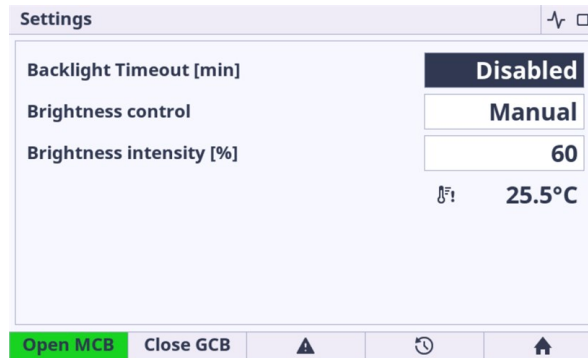


Image 5.58 : Display brightness settings

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.

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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

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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 97)** with **Fixed Protection States (page 500)**.
- Each alarm is written to the **Alarmlist (page 97)**.
- 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.

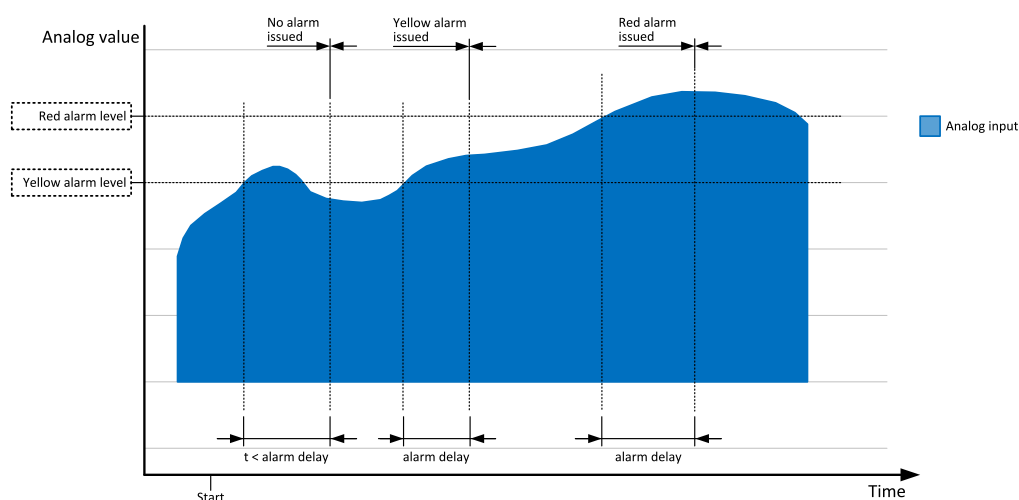


Image 5.59 Analog input alarm evaluation principle

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.

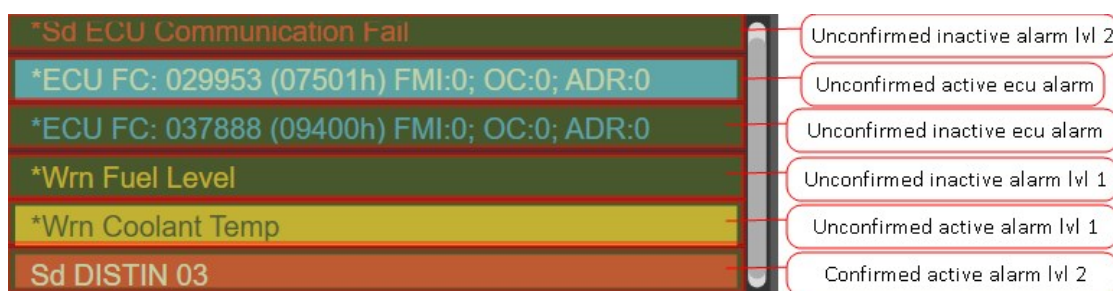


Image 5.60 Alarm List

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 97)** or new event is written in **Event History (page 109)**. The message will contain a copy of the **Alarmlist (page 97)** or reasons from **Event History (page 109)**. To enable this function, adjust setpoints **BOR Message (page 365)**, **Wrn Message (page 365)**, or **Event Message (page 365)** to ON. Also enter a valid email address to the setpoints, **E-mail Address 1 (page 361)**, **E-mail Address 2 (page 361)**, **E-mail Address 3 (page 361)**, or **E-mail Address 4 (page 362)**.

The list of all supported terminals shows the table below:

Terminal	Event email	Warning email	BOC email	Breaker Open 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 161)**. 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 Breaker Control

The following power switches are controlled by the controller:

- The Bus Tie Breaker or contactor – MCB

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

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

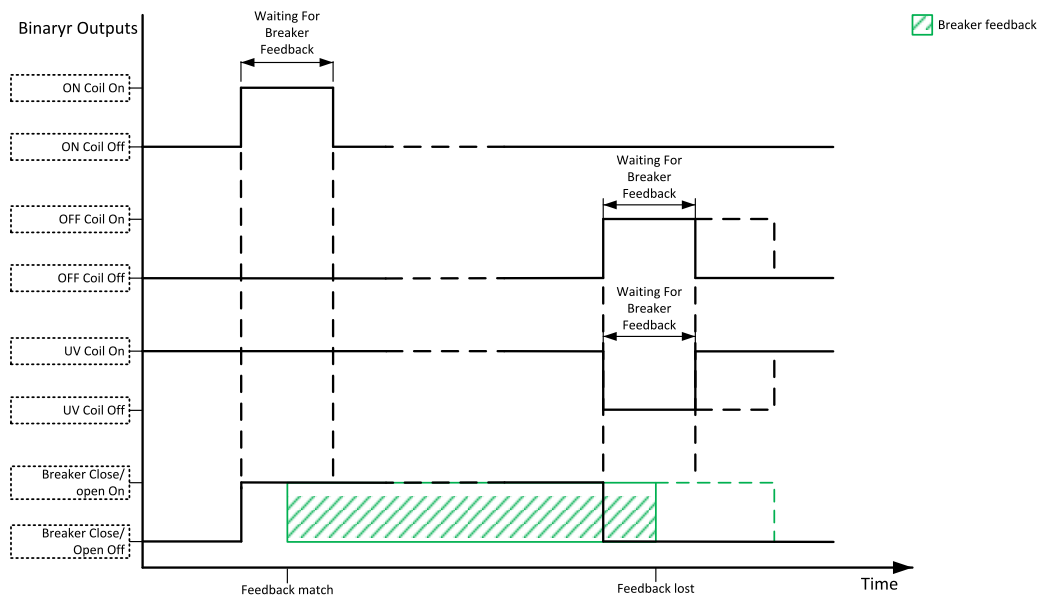


Image 5.61 Breaker control outputs

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 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 1)** is issued. The alarm is issued also after 500 ms when there is mismatch of LBI **GCB FEEDBACK (PAGE 1)** and LBI **GCB FEEDBACK NEGATIVE (PAGE 1)**.

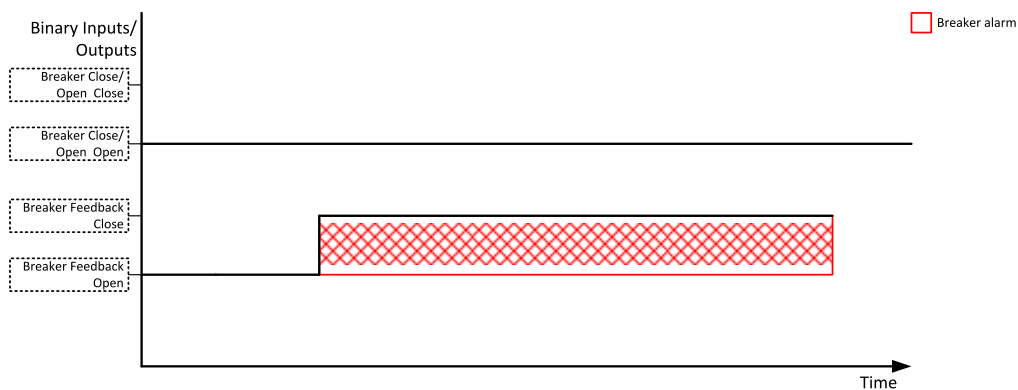


Image 5.62 Breaker fail - breaker close/open in steady position - open

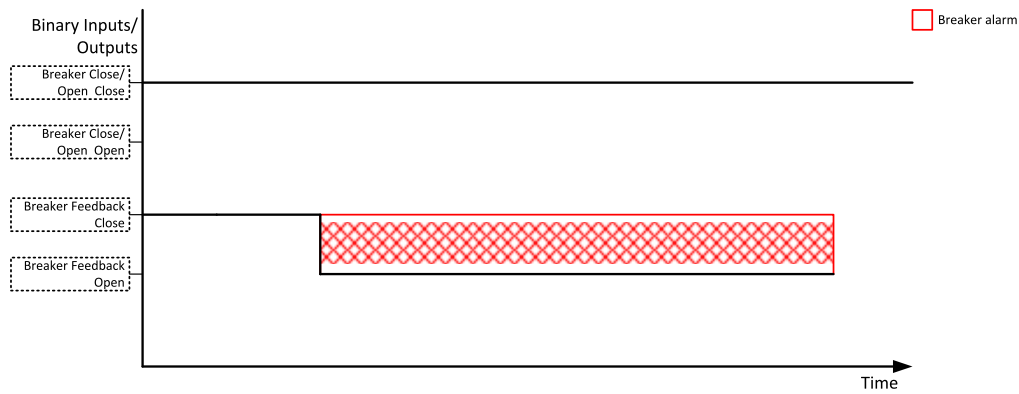


Image 5.63 Breaker fail - breaker close/open in steady position - close

- When binary output breaker close/open is opened, there is 2 seconds waiting time for feedback. If feedback doesn't match, the alarm **/Wrn MCB Fail To Open (page 560)** is issued.

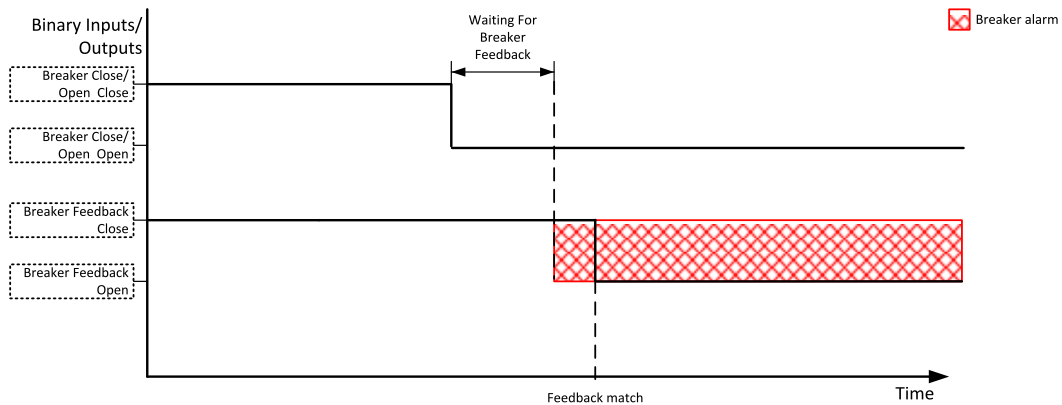


Image 5.64 Breaker fail - breaker close/open opens

- 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 214)**. If feedback doesn't match after second try and 2 seconds delay elapsed, the alarm **/Wrn MCB Fail To Close (page 559)** is issued.

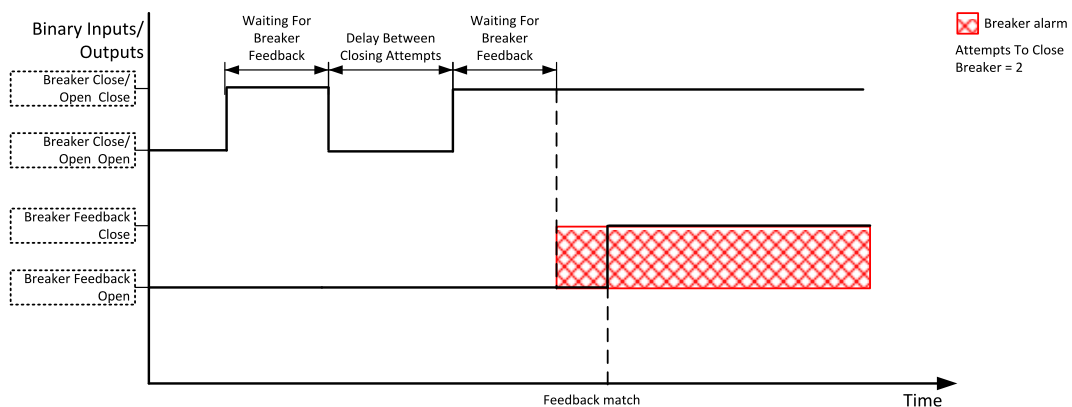


Image 5.65 Breaker fail - breaker close/open closes

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 1)** 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

5.4.3 Connecting To Load

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Connecting to load (closing BTB) depends on the measured Bus Left and Bus Right voltage. In case one of the side of BTB is without power (Bus Left or Bus Right voltage is below 2 % of nominal voltage) the connecting to dead bus is applied, in other case the synchronization process is needed. See more information about synchronization process in chapter **Synchronization (page 101)**.

Connecting To Dead Bus

BTB

Behavior of connecting to dead bus is adjusted by the setpoint **Dead Bus Closing (page 218)** which defined whether the BTB can be automatically closed to the deadbus or not.

Note: There is also a protection of "Bus power loss sensing". The "Bus Measurement Error" is detected when the BTB is closed and the bus parameters are out of limit for 20s. Bus Measurement Error can be disabled by setpoint.

Synchronization

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Synchronization Process

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:

- **Mains Coupling (page 211)**
- **Synchronization R to Mains (page 216)**
- **Synchronization L to Mains (page 216)**
- **Synchronization R to L (page 217)**
- **Synchronization L to R (page 217)**
- **Dead Bus Closing (page 218)**
- **BTB Opening (page 218)**

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 BTB in AUTO mode

BTB controller controls the synchronization process. The behavior of synchronization process depends on power sources of Bus Left and Bus Right.

Bus Left \ Bus Right	Dead bus	Controllers	Mains	Controllers + Mains
Dead bus	BTB Opening (page 218)	Dead Bus Closing (page 218)		
Controllers	Dead Bus Closing (page 218)	Synchronization R to L (page 217)	Synchronization L to R (page 217)	
		Synchronization L to R (page 217)	Synchronization L to Mains (page 216)	
Mains		Synchronization R to L (page 217)	Mains Coupling (page 211)	
Controllers + Mains		Synchronization R to Mains (page 216)		

Synchronization without Mains

In case there are only Gen-sets on both sides, setpoint **Synchronization R to L (page 217)** or **Synchronization L to R (page 217)** has to be enabled in order to allow synchronization.

Synchronization with Mains on one side

In case there are only Controllers on one side and Mains or Controllers on second side, setpoint **Synchronization R to L (page 217)** / **Synchronization L to R (page 217)** or **Synchronization R to Mains (page 216)** / **Synchronization L to Mains (page 216)** has to be enabled in order to allow synchronization.

Synchronization with Mains on both sides

In case there are Mains or Mains + Controllers on both sides, setpoint **Mains Coupling (page 211)** has to be enabled in order to allow close BTB breaker.

Synchronization via BTB in MAN mode

BTB controller controls the synchronization process.

- Behavior is exactly the same as in AUTO mode - but the synchronization does not start again automatically when parameters of the Bus gets out of limits and back. The breaker control button must be pressed again.
- When the BTB 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 281).

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 282). 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 282). If the synchronizing is not successful within this period of time, the alarm will be issued.

The Bus Left or Bus frequency is regulated to match the Bus Right or Mains frequency + **Slip Frequency** (page 284) value and the window is set by setpoint **Slip Frequency Window** (page 284). When the Bus Left or Bus frequency reaches (Bus Right or 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 283) the controller will allow MGCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip Frequency** (page 382) and CB closing delay given by the setpoint **MCB Latency** (page 284)). 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).

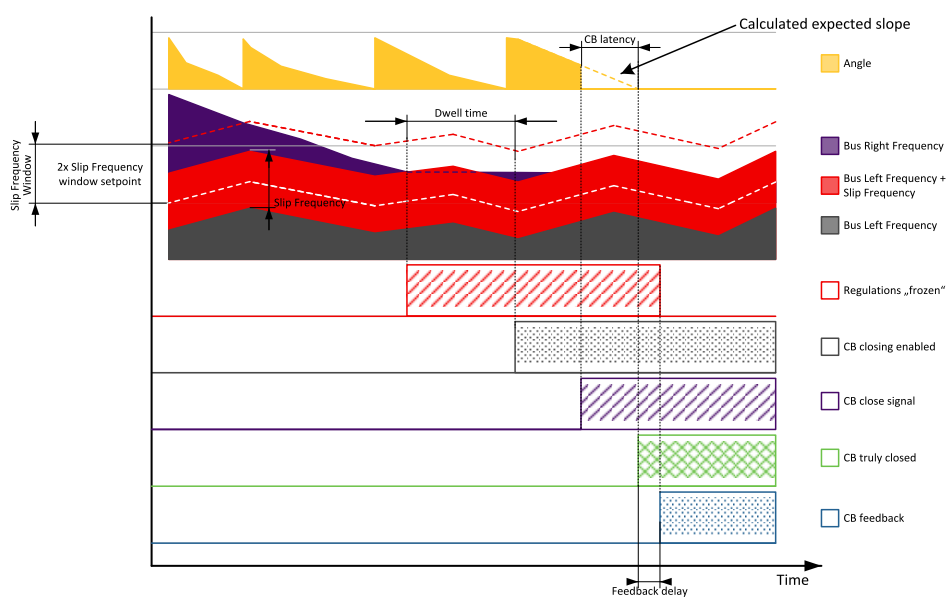


Image 5.66 Slip synchronization

Whenever the **Bus Frequency** (page 389) leaves off the **Slip Frequency Window** (page 284) (either because of **Bus Frequency** (page 389) or setpoint **Slip Frequency Window** (page 284) changes) the controller will reactivate frequency regulation loop and try to reach the target value again. The **Synchronization Timeout** (page 282) timer runs regardless of this while whole slip synchronization process is repeated. If the **Bus Frequency** (page 389) reaches the target frequency again the regulations are frozen and if the **Bus Frequency** (page 389) remains in the window for the time longer than setpoint **Dwell Time** (page 283) the controller will

continue in the standard sequence as seen in the previous case. *If the **Synchronization Timeout** (page 282) elapses the controller will immediately stop synchronization and issue alarm .

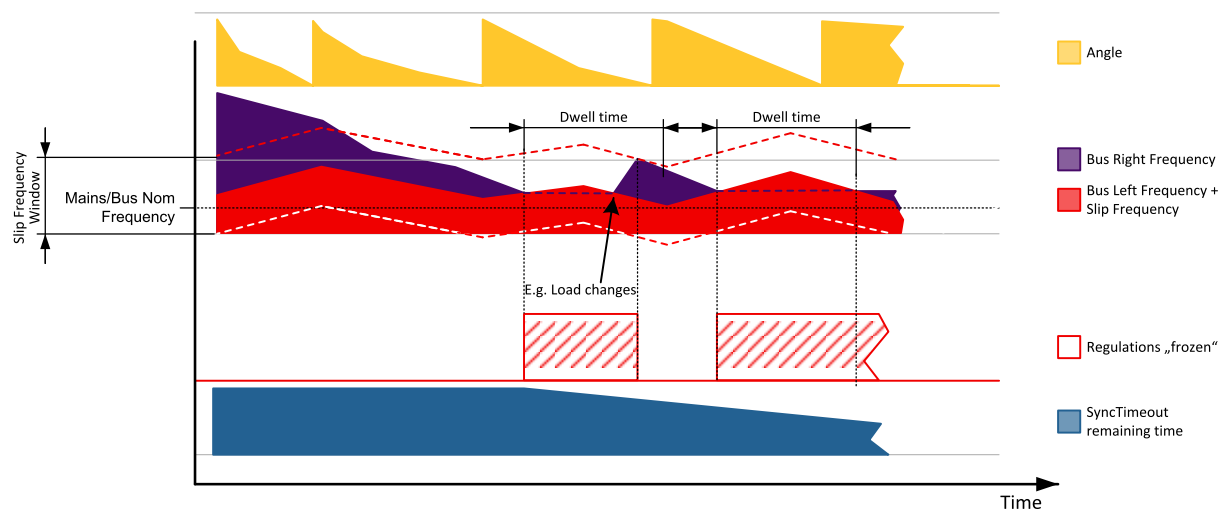


Image 5.67 Slip synchronization

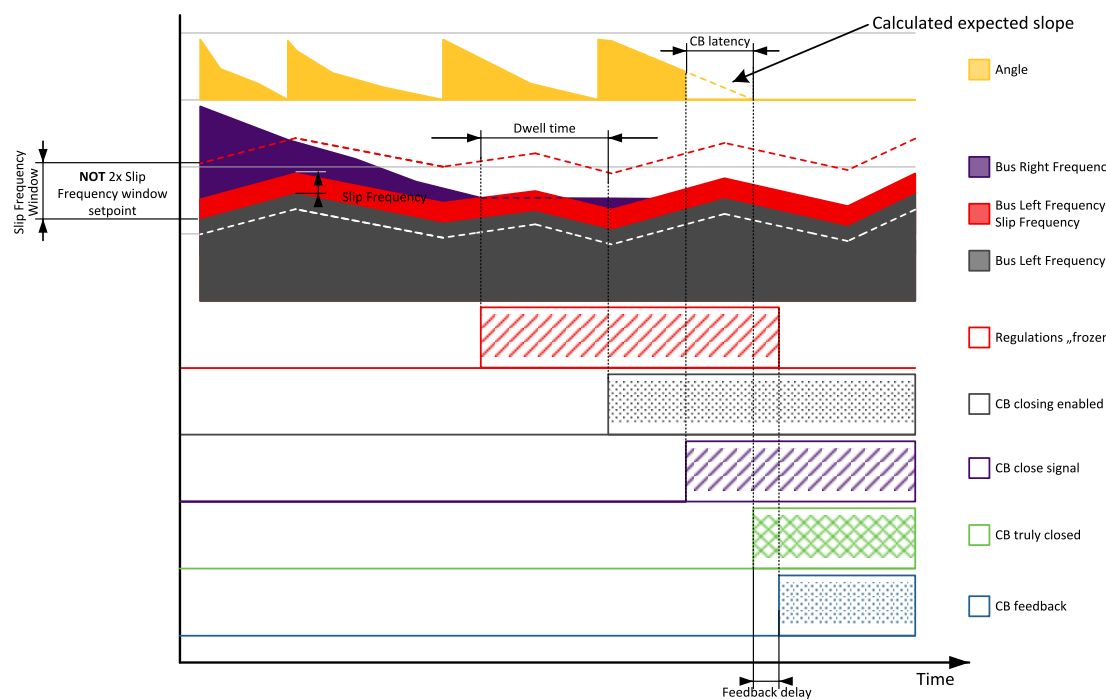


Image 5.68 Slip synchronization

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.

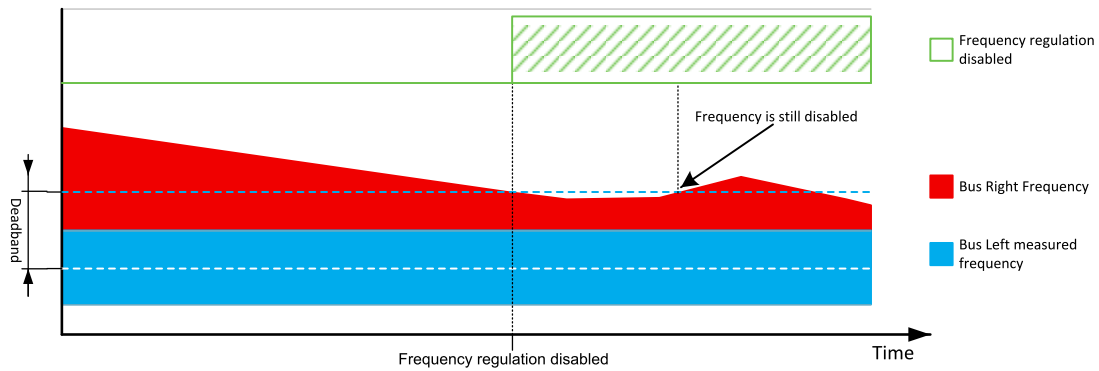
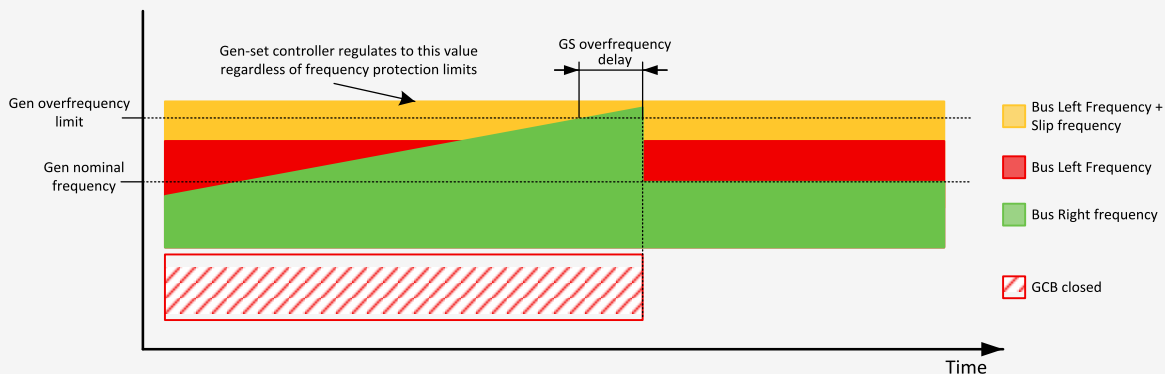


Image 5.69 Slip synchronization - deadband

Note: Due to the nature of this function it is possible that in limit cases the controller will regulate the Mains or 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 284)** 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 284)** 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 284)** 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.



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5.4.4 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 in related non BTB controllers. 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 280) and **Group Link R** (page 280). BTB controller sends via **CAN2** (page 16) (**Communication peripherals** (page 15)) information that controllers from groups *Group Link L* and *Group Link R* are linked 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.

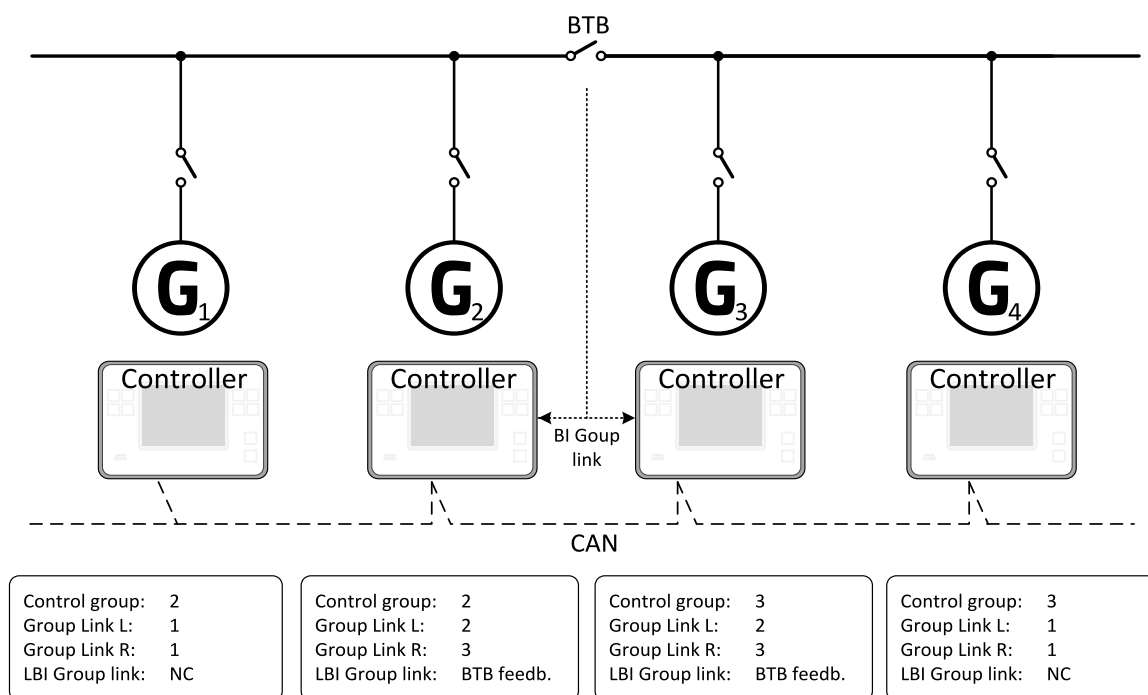


Image 5.70 Example of control groups


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.

5.4.5 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 IntelliConfig either via **USB (page 55)** or **Ethernet (page 56)**.

- 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.

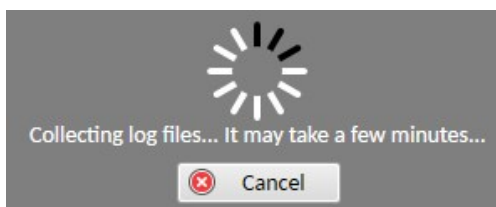


Image 5.71 Crash Dump Collection

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

5.4.6 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 105)**. If you merge Control Groups together, 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.

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 16)** 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

5.4.7 Electric state machine

State	Description
Init	Initialization of the controller. The application is not active yet.
Synchro	Bus Left is being synchronized to healthy Bus Right (or vice versa). LBO Synchronization is active.
Synchro Check	Controller is synchronizing, breaker close command is blocked.
Synchro Perm	Controller is in passive synchronization mode, breaker close command will be issued once synchronization windows is matched.
Synchro Run	Controller is synchronizing, breaker close command will be issued once synchronization window is matched.
BTB Off	BTB is opened. LBO BTB Close/Open is not active and LBI BTB Feedback is not active either.
BTB On	BTB is closed. LBO BTB Close/Open is active and LBI BTB Feedback is active as well.
EmergMan	This state is active while LBI Emergency MAN is active. All control functions are disabled, all Binary Outputs can not be activated.

5.4.8 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, 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.

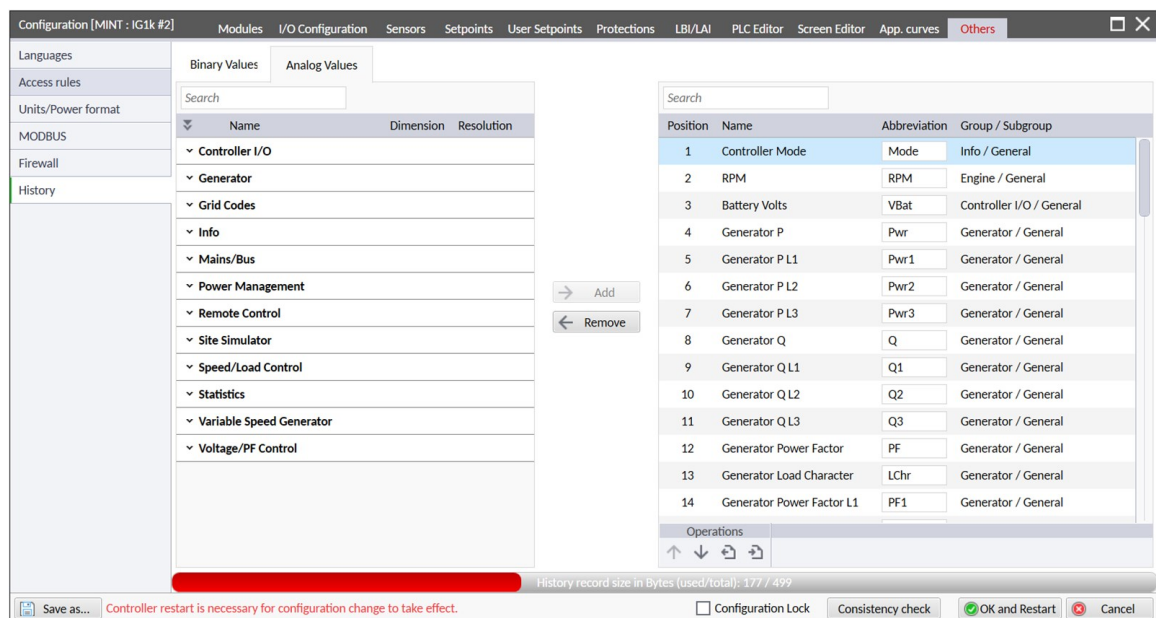


Image 5.72 Configurable history

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 389)	Hz
Bus Voltage L1-N	Vb1	Bus Voltage L1-N (page 389)	V
Bus Voltage L2-N	Vb2	Bus Voltage L2-N (page 389)	V
Bus Voltage L3-N	Vb3	Bus Voltage L3-N (page 389)	V
Bus Voltage L1-L2	Vb12	Bus Voltage L1-L2 (page 389)	V
Bus Voltage L2-L3	Vb23	Bus Voltage L2-L3 (page 390)	V
Bus Voltage L3-L1	Vb31	Bus Voltage L3-L1 (page 390)	V
Mains Frequency	Frqm	Mains Frequency (page 378)	Hz
Mains Voltage L1-N	Vm1	Mains Voltage L1-N (page 379)	V
Mains Voltage L2-N	Vm2	Mains Voltage L2-N (page 379)	V
Mains Voltage L3-N	Vm3	Mains Voltage L3-N (page 379)	V
Mains Voltage L1-L2	Vm12	Mains Voltage L1-L2 (page 379)	V
Mains Voltage L2-L3	Vm23	Mains Voltage L2-L3 (page 379)	V
Mains Voltage L3-L1	Vm31	Mains Voltage L3-L1 (page 380)	V
Mains Current L1	Im1	Mains Current THD L1 (page 378)	%
Mains Current L2	Im2	Mains Current THD L2 (page 378)	%
Mains Current L3	Im3	Mains Current THD L3 (page 378)	%
Battery Volts	VBat	Battery Voltage (page 397)	V
Binary Inputs	BIN	Binary Inputs (page 397)	-
Binary Outputs	BOUT	Binary Outputs (page 398)	-
Controller Mode	Mode	Controller Mode (page 400)	-
Forced value status	FVST	Forced Value Status (page 402)	-
Running Nominal Power Of All	TRPN	Running Nominal Power Of All (page 394)	kW
Available Nominal Power In PM	APN	Available Nominal Power In PM (page 394)	kW

5.4.9 Exercise Timers

Mode Once	112
Mode Daily	113
Mode Weekly	114
Monthly mode	115
Mode Short period	117

The exercise (general-purpose) timers are intended for scheduling of any operations. Main purpose of these timers for BTB is using them in 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 299)**
- **Timer 2 Function (page 301)**
- **Timer 3 Function (page 303)**
- **Timer 4 Function (page 305)**
- **Timer 5 Function (page 307)**
- **Timer 6 Function (page 309)**

Related setpoints for the timer setup:

- **Timer 1 Setup (page 300)**
- **Timer 2 Setup (page 302)**
- **Timer 3 Setup (page 304)**
- **Timer 4 Setup (page 306)**
- **Timer 5 Setup (page 308)**
- **Timer 6 Setup (page 310)**

Related LBOs:

- **Exercise Timer 1 (page 489)**
- **Exercise Timer 2 (page 489)**
- **Exercise Timer 3 (page 490)**
- **Exercise Timer 4 (page 490)**

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 300).

Note: Setpoint **Timer 1 Setup** (page 300) is visible only if setpoint **Timer 1 Function** (page 299) has any other value than disabled.

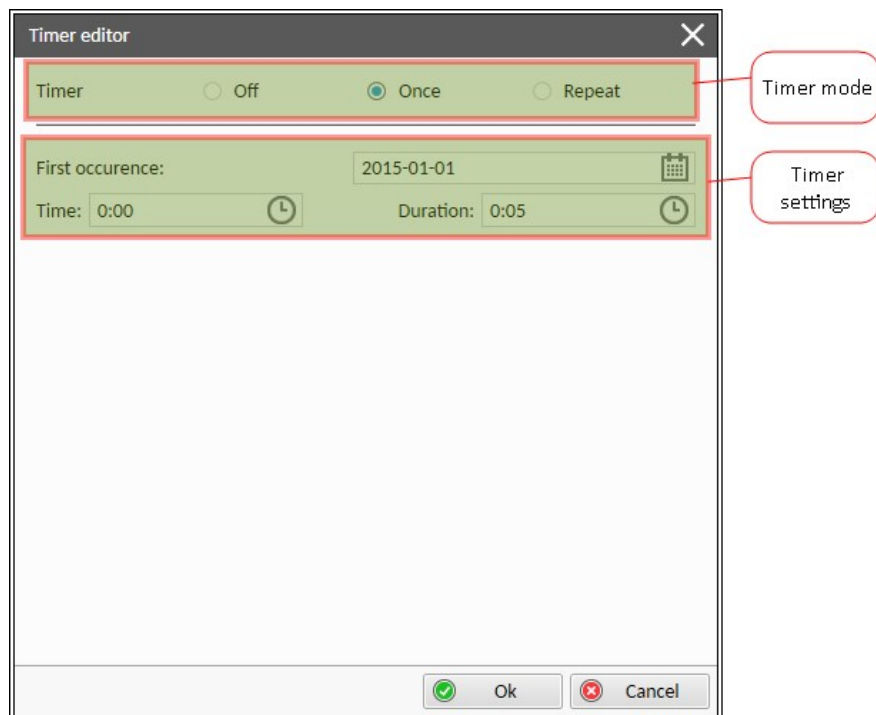


Image 5.73 Mode Once - IntelliConfig

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 299)** setpoint. Then go to **Timer 1 Setup (page 300)** 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 300)**

Note: Setpoint **Timer 1 Setup (page 300)** is visible only if setpoint **Timer 1 Function (page 299)** has any other value than disabled.

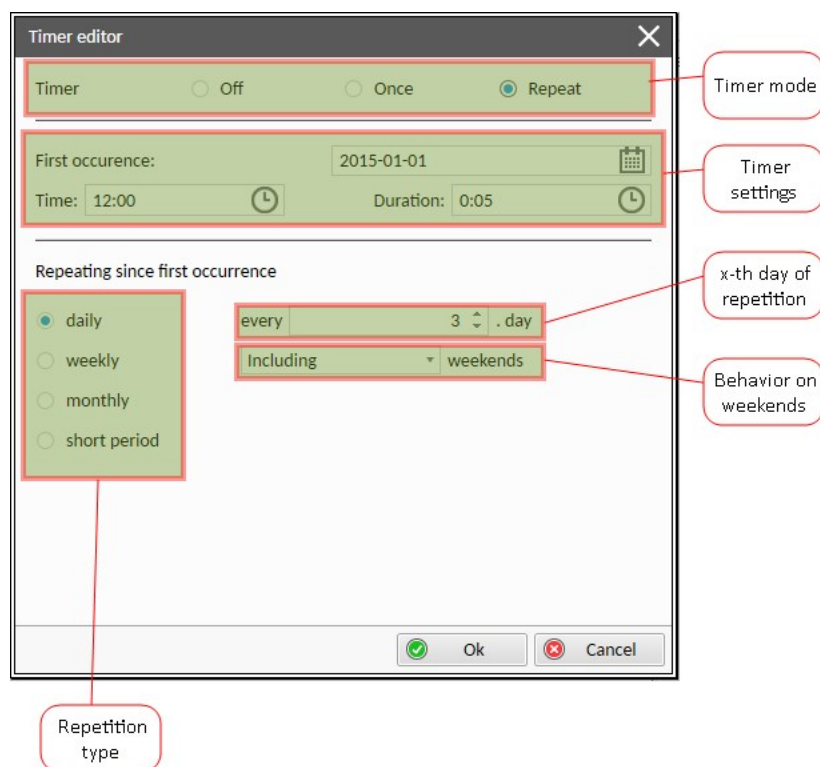


Image 5.74 Daily mode - IntelliConfig

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 299)** setpoint. Then go to **Timer 1 Setup (page 300)** 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 300)**.

Note: Setpoint **Timer 1 Setup (page 300)** is visible only if setpoint **Timer 1 Function (page 299)** has any other value than disabled.

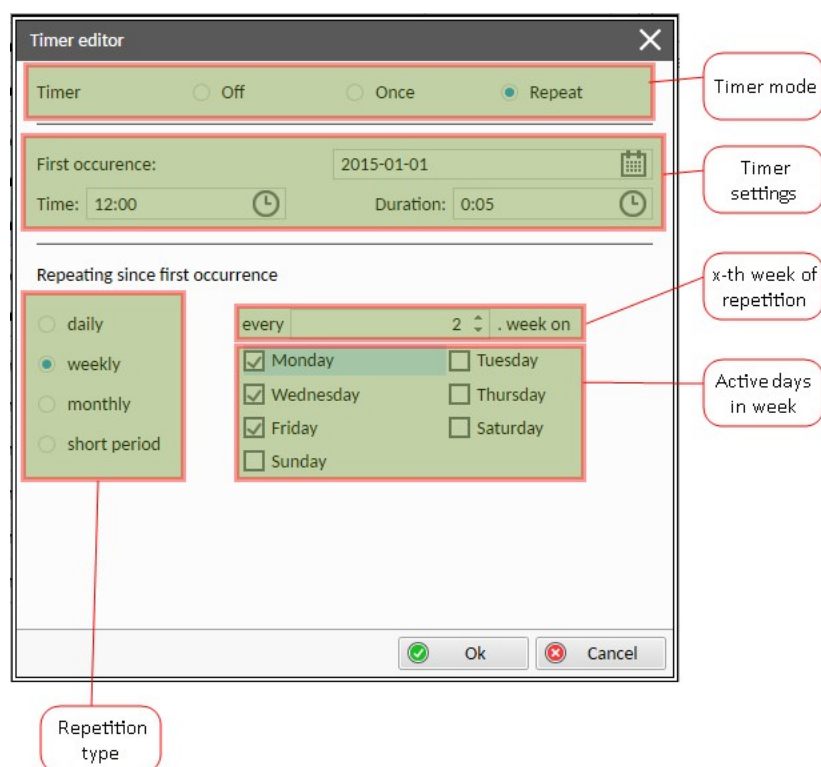


Image 5.75 Mode Weekly - IntelliConfig

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 299)** setpoint. Then go to **Timer 1 Setup (page 300)** 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 300)**.

Note: Setpoint **Timer 1 Setup (page 300)** is visible only if setpoint **Timer 1 Function (page 299)** has any other value than disabled.

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

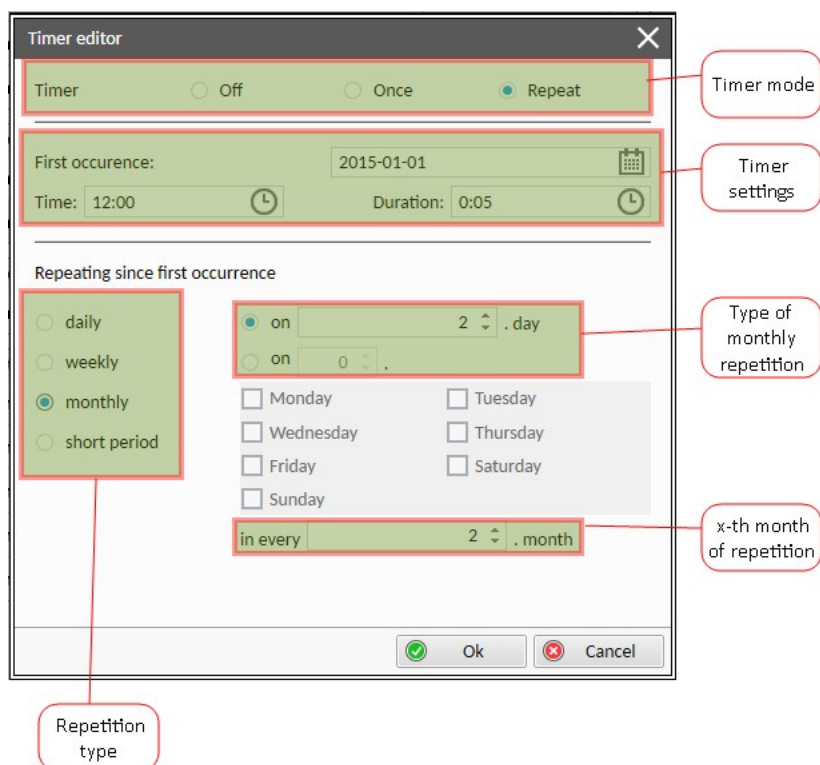


Image 5.76 Mode Monthly - IntelliConfig

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.

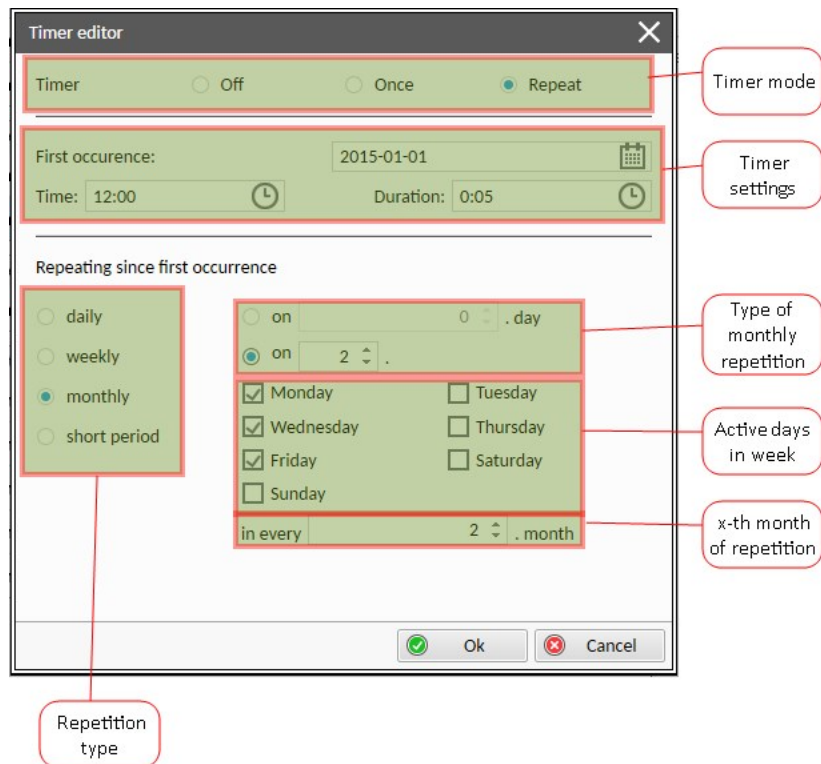


Image 5.77 Mode Monthly - Intelliconfig

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 299)** setpoint. Then go to **Timer 1 Setup (page 300)** 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 299)** setpoint. Than go to **Timer 1 Setup (page 300)** 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 300).

Note: Setpoint **Timer 1 Setup** (page 300) is visible only if setpoint **Timer 1 Function** (page 299) has any other value than disabled.

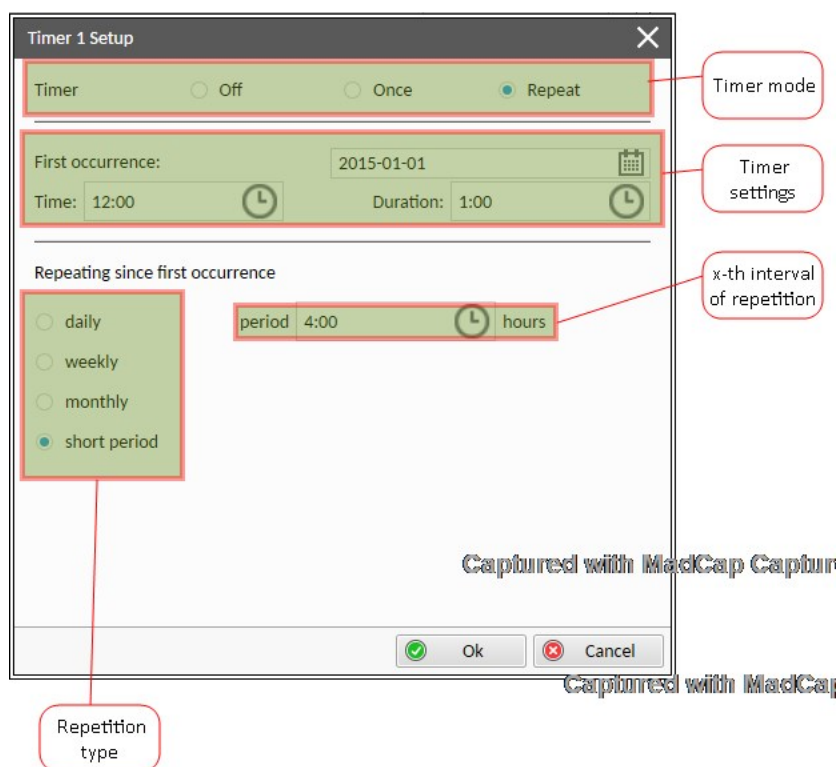


Image 5.78 Mode Short period - IntelliConfig

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 299) setpoint. Then go to **Timer 1 Setup** (page 300) 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

5.4.10 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 **Communication peripherals (page 15)** and **Communication peripherals (page 15)** ports. The firewall can be enabled by the setpoint IP Firewall in the **Group: Ethernet (page 311)**. 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.

5.4.11 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 467) ... FORCED VALUE INPUT 16 (PAGE 470)**. You can see current states of all LBIs in value **Forced Value Status (page 402)**. 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

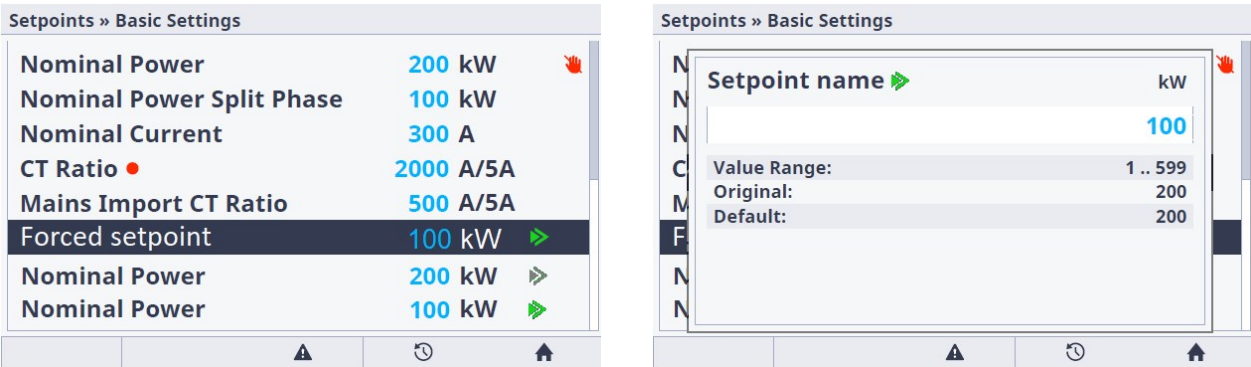


Image 5.79 : Force Value and Protected Setpoint Indication

IntelliConfig

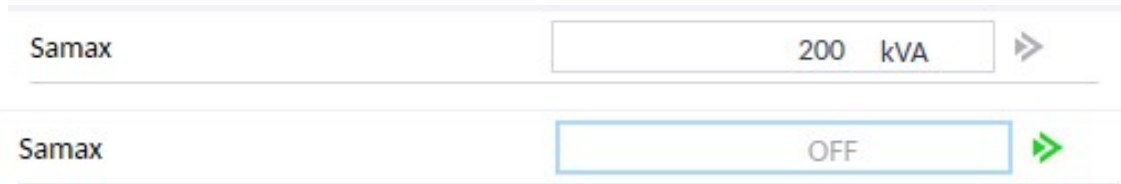


Image 5.80 : Force Value Indication in IntelliConfig

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.

5.4.12 I/O Configuration

Binary Inputs	120
Binary Outputs	121
Functions Configuration	121
Protections Configuration	121
Transfer I/O Configuration	122
Remove I/O Configuration	122

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

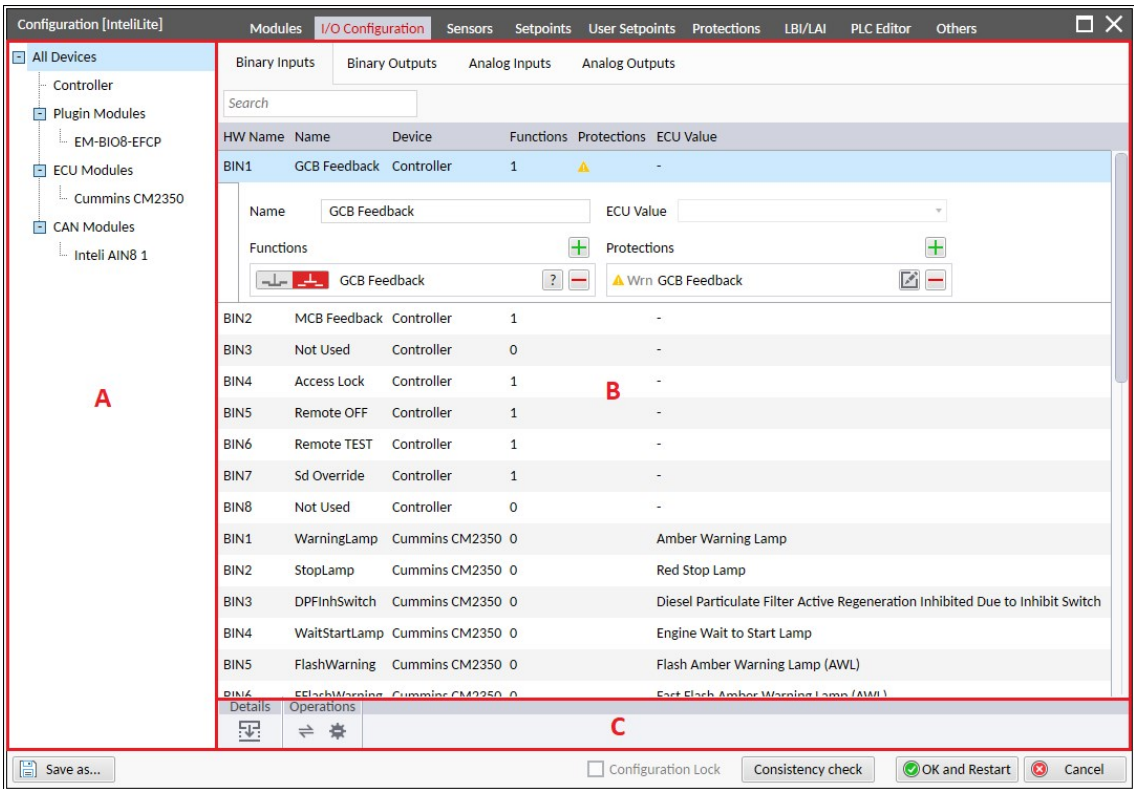


Image 5.81 I/O Configuration window

- 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 122
 - **Remove IO Configuration** - see Remove I/O Configuration on page 122

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 121**
4. **Protections** - the set of protections **see Protections Configuration on page 121**

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

Name:

ECU Value:

Functions

Protections

Image 5.82 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 121**

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 5.83 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 158**

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.

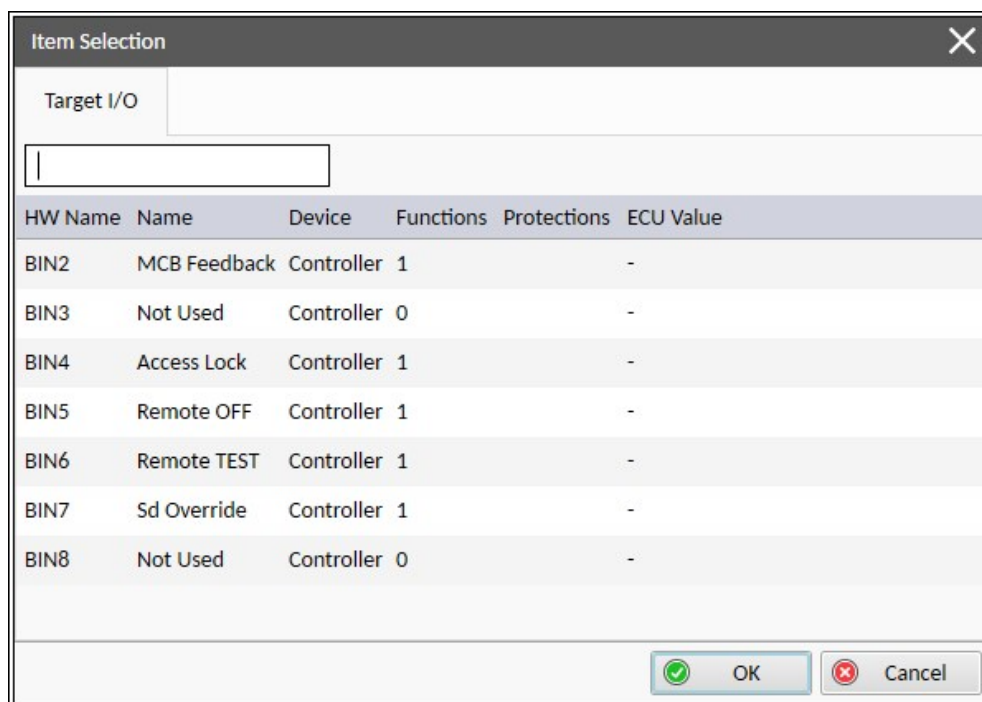




Image 5.84 The window for selecting the target for I/O configuration transfer

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.

5.4.13 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 226)** 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 474)
- > Remote MAN (page 474)
- > Remote AUTO (page 473)

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

The button **MGCB ON/OFF**  does not react, the BTB cannot be closed. Switching controller to OFF mode causes opening of the BTB regardless of the settings.

MAN

It is possible to close/open BTB manually according to the settings in the **Subgroup: BTB Control (page 213).**

AUTO

The controller closes BTB automatically according to the settings in the **Subgroup: BTB Control (page 213)** if bus voltages are within the limits.

The button **MGCB ON/OFF**  does not react.

5.4.14 Output Control – Frequency

The frequency control output is used to control the frequency (speed) of the Controllers presented on the bus. The frequency regulation is 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 396)** 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 Speed/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 285)** to 0 and start the system in MAN Mode.
2. Change the Gen-sets Speed Bias a little bit to get different frequency than Mains frequency.
3. Set **Angle Gain (page 286)** 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.
4. Adjust **Frequency Gain (page 285)** to unstable frequency control and decrease value by 30 % to insure stable performance.
5. Adjust **Frequency Int (page 285)** to stable (fast and smooth) frequency control and change Gen-sets Speed Bias back to original value.

6. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because **Angle Gain (page 286)** control is off).
7. Set **Angle Gain (page 286)**. Synchroscope on the controller measure screen should move slowly and stop in “up” position. Set **Angle Gain (page 286)** to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.
8. Now your frequency regulation loop setup is done.

Load Control Adjustment

SPTM application

Load control loop is active in parallel to mains mode only (**MCB FEEDBACK (PAGE 464)** is closed).

1. Set **Load Control PTM (page 1)** = 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 219)** of Controller and activate **LB BATT CHARGE ENABLE (PAGE 1)/BATT DISCHARGE ENABLE (PAGE 1)**.
2. Set **Load Control PTM (page 1)** = BASELOAD, set **Baseload (page 1)** setpoint to 30 % **Nominal DC Shore Power (page 219)** of Controller.
3. Set **Load Gain (page 1)** to the same value as **Angle Gain (page 286)**. Set **Load Int (page 1)** 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 1)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 1)** 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 1)** 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 219)**. Usually setting **Load Int (page 1)** 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.

5.4.15 Output Control - Voltage

The voltage control output is used to control the voltage of the Gen-set. The voltage regulation is 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 397)** which comes out of the controller via communication line. Gen-set accepts this value and transform this to its AVR control output.

Voltage control adjustment

Voltage Adjustment

1. Set **Voltage Gain** (page 286), **Voltage Int** (page 287) to 0 .
2. Start the System in MAN Mode without load.
3. Increase **Voltage Gain** (page 286) to unstable voltage control and decrease value by 30 % to insure stable performance.
4. Adjust **Voltage Int** (page 287) to stable (fast and smooth) voltage control.
5. Now your voltage regulation loop setup is done.

5.4.16 PLC - Programmable Logic Controller

List of available PLC blocks	127
PLC Editor	127
PLC logic execution rules	133
PLC monitor	134
Other functions	136

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

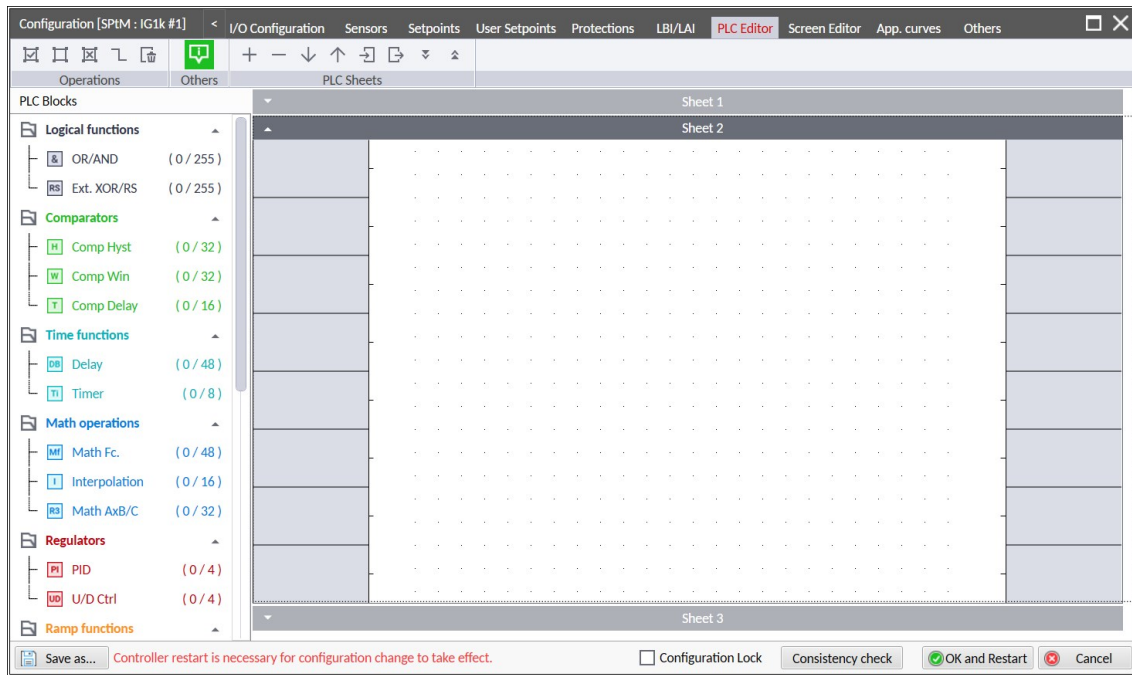


Image 5.85 PLC Editor - main page

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 508)	128
	XOR/RS (page 510)	128
Comparators	Comp Hyst (page 511)	16
	Comp Time (page 512)	8
	Comp Win (page 513)	16
Time functions	Delay (page 514)	16
	Timer (page 516)	4
Math Operations	Interpolation (page 519)	8
	Math AxB/C (page 520)	4
	Math Fc. (page 521)	16
Ramp functions	Inc/Dec (page 522)	2
	LowPassFilt (page 524)	2
	Ramp (page 524)	4
	Up/Down (page 525)	4
Others	Analog Switch (page 527)	8
	Analog Switch 8 (page 527)	8
	Convert (page 529)	8
	Counter (page 531)	4
	Decomp. 4 (page 532)	4

For more information about PLC blocks go to the chapter **PLC (page 507)**

 **back to PLC - Programmable Logic Controller**

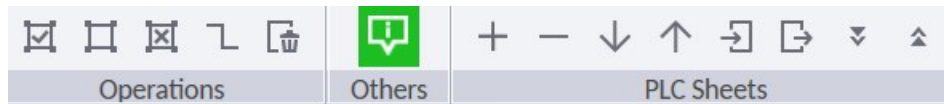
PLC Editor

Toolbar	127
Working with sheets	128
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PLC Block Configuration	130
Define inputs and outputs	131
Creating wires	132

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.

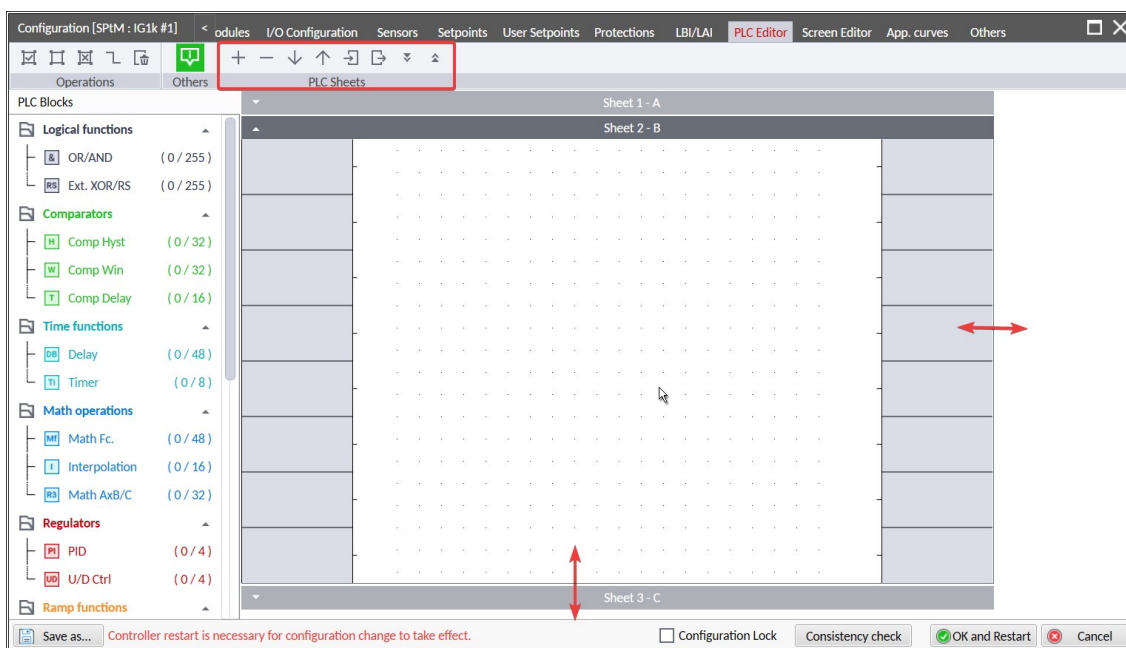


Image 5.86 Adjusting PLC sheet

🔍 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.

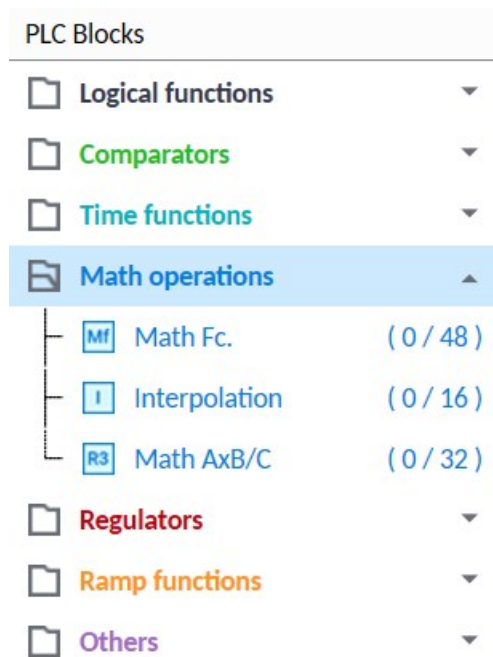


Image 5.87 Blocks selection tree

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.

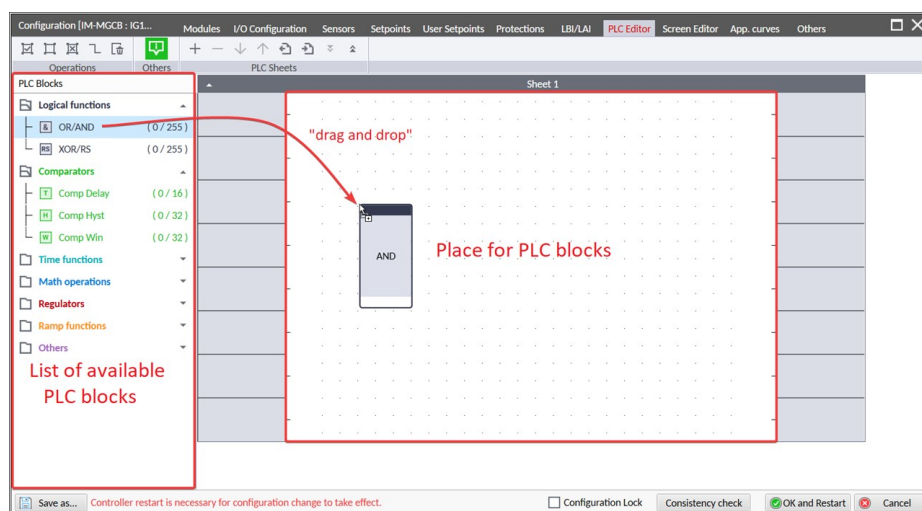
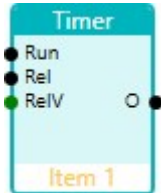


Image 5.88 Adding PLC blocks

⬅ 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 507)** for more information about blocks.



PLC Editor: Function block

• Input run: [] [X] ☐ Inverted input

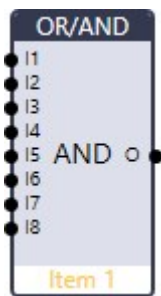
• Input reload: [] [X] ☐ Inverted input

• 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

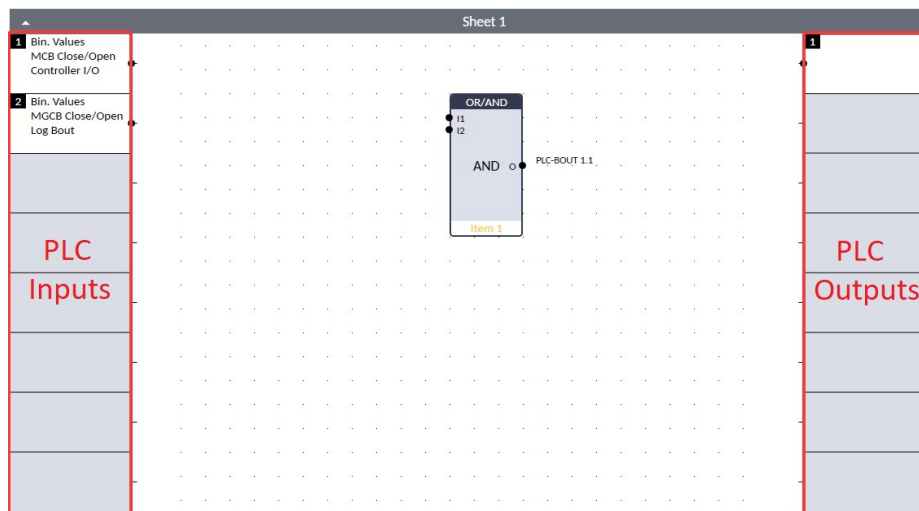


Image 5.89 PLC Inputs and Outputs

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.

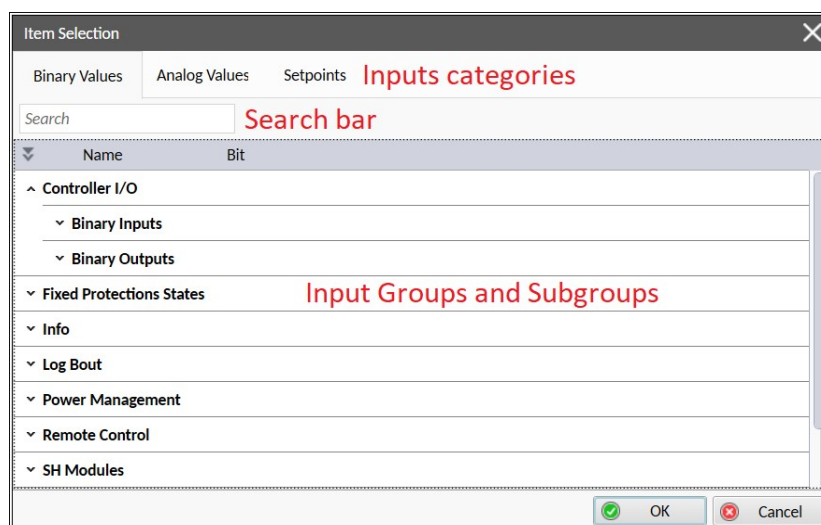


Image 5.90 PLC Inputs

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.

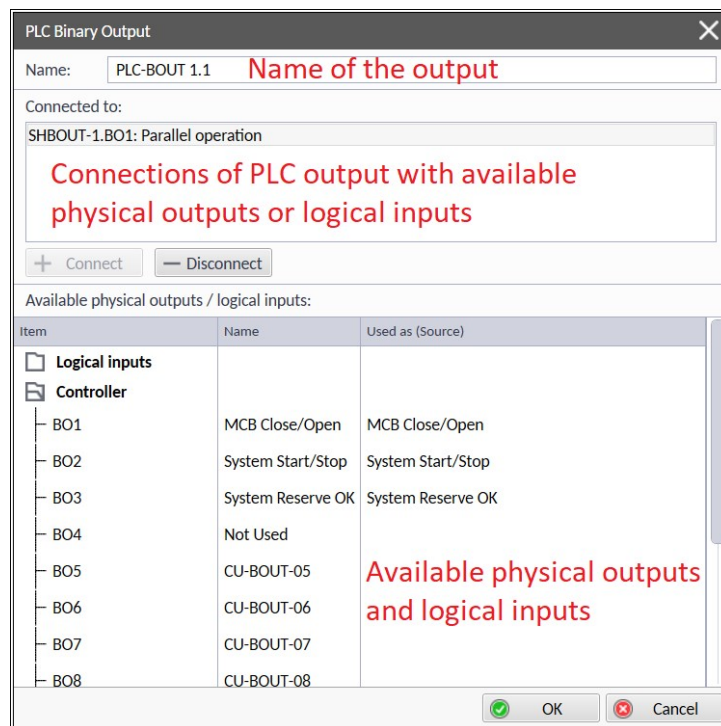


Image 5.91 PLC Outputs

back to PLC Editor

Creating wires

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

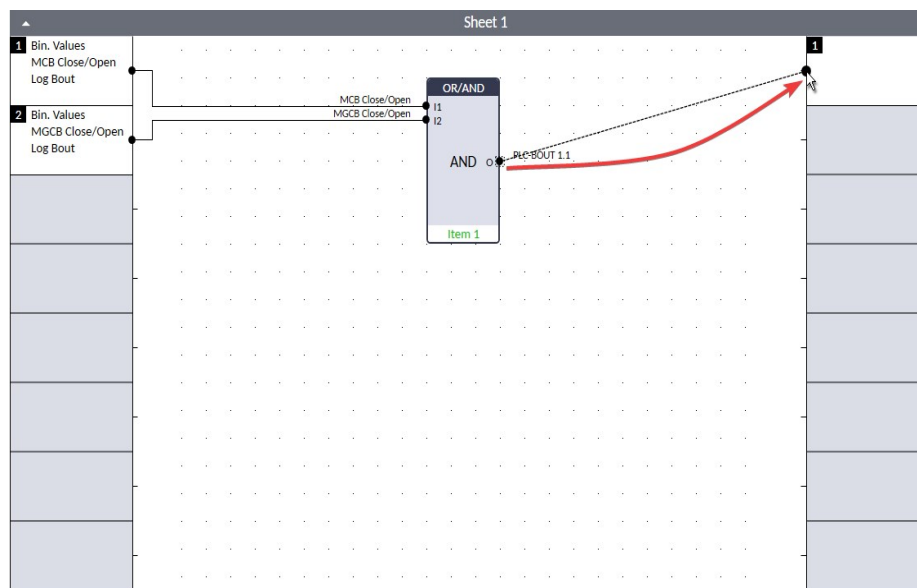


Image 5.92 Wiring PLC blocks

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⬅ 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.

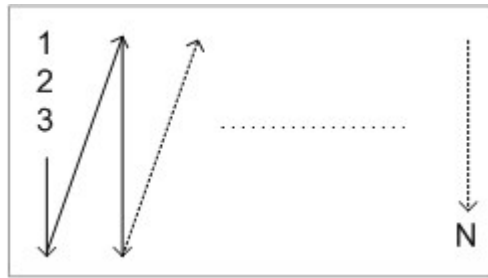
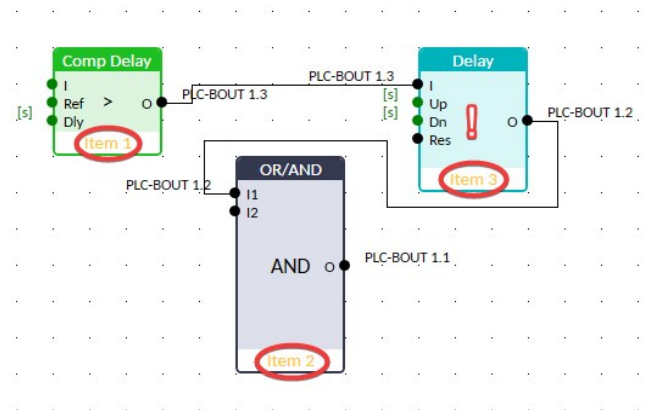
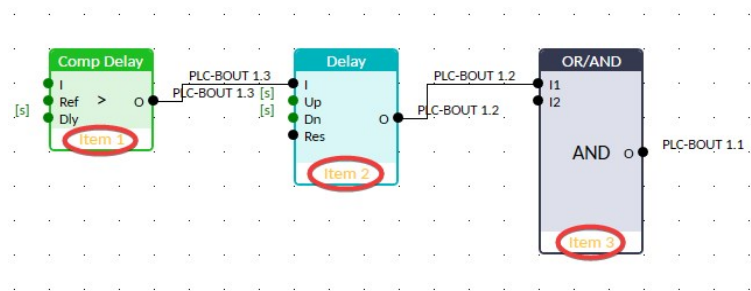


Image 5.93 PLC execution logic

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 5.96 PLC Monitor with multiple sheets

⬅ 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

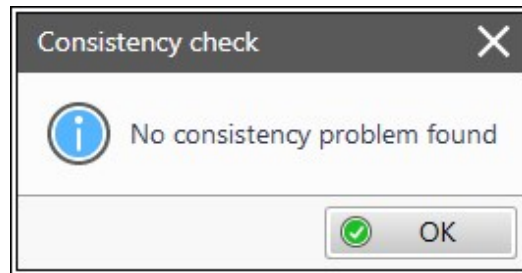


Image 5.97 Consistency Check valid output

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.

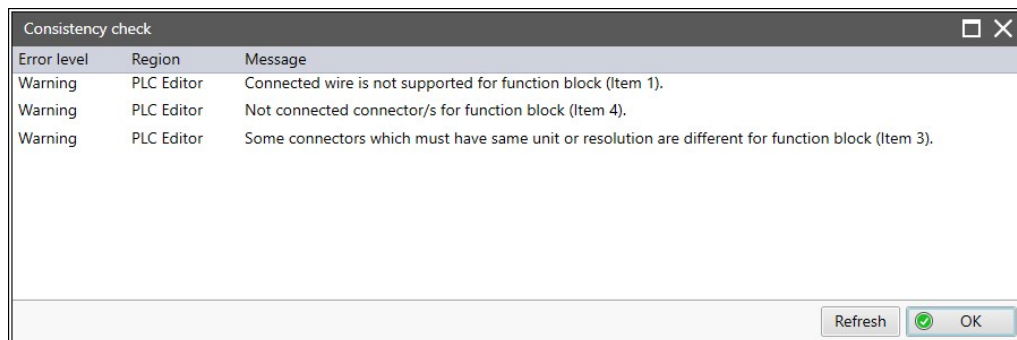


Image 5.98 Consistency Check report output

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".

5.4.17 Power Formats And Units

InteliMains 510 BTB 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.

5.4.18 Power Management

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Dynamic Spinning Reserve	157

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 140)**. 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 259)** is used to select the absolute or relative mode.

The Load Reserve can be influenced by the **Dynamic Spinning Reserve (page 157)** 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 149)** 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 requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 261)** 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 261)** 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 is activated.

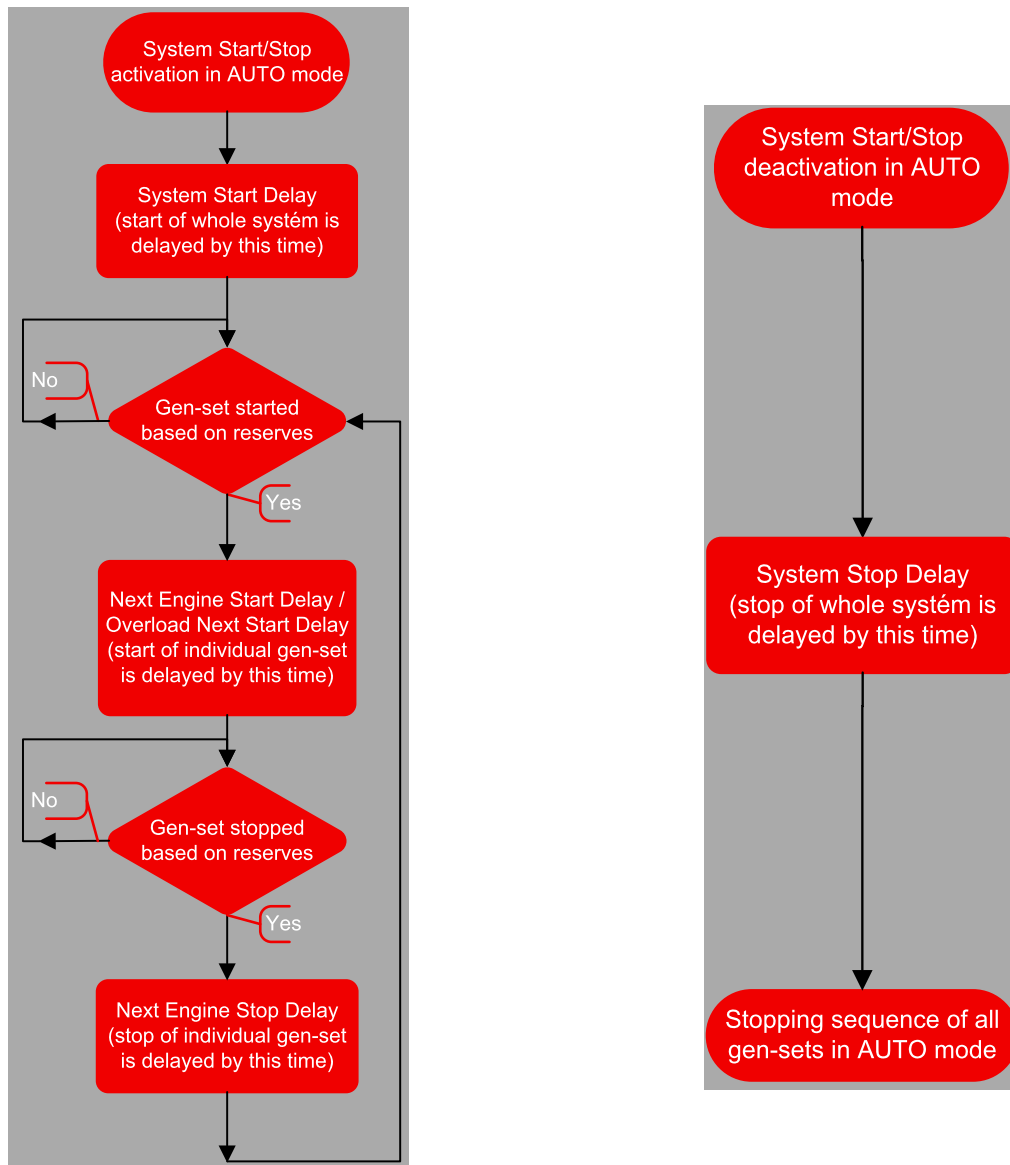
Note: *The Controller performs load and VAR sharing whenever it is connected to the bus bar i.e. it is independent on whether the controller is in AUTO or MAN mode or whether the power management is active or not.*

Function of power management can be temporarily blocked after Remote Start/Stop activation a count down of **#System Start Delay (page 261)**. 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 275)** 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 276)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs Remote Start/Stop deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 261)** has elapsed all Controllers in AUTO mode are stopped. Following figure depicts the system activation and deactivation logic.



Setpoint **#Overload Next Start Delay** (page 278) is used in case that **#Overload Next Start Protection** (page 277) is enabled and Controllers are running at **#Overload Next Start Level** (page 277) or more of their nominal power.

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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 209)**

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.

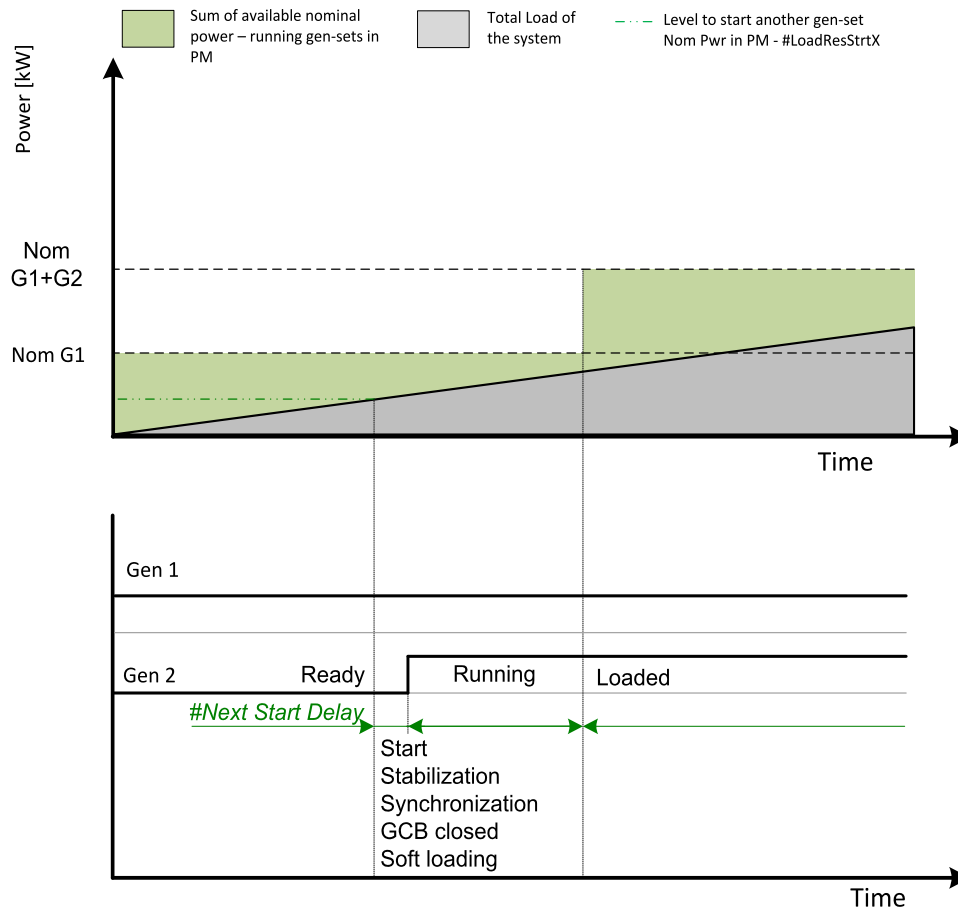


Image 5.99 Start sequence of power management

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 143)** and **Relative power management (page 146)**.

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 275)**, 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.

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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.

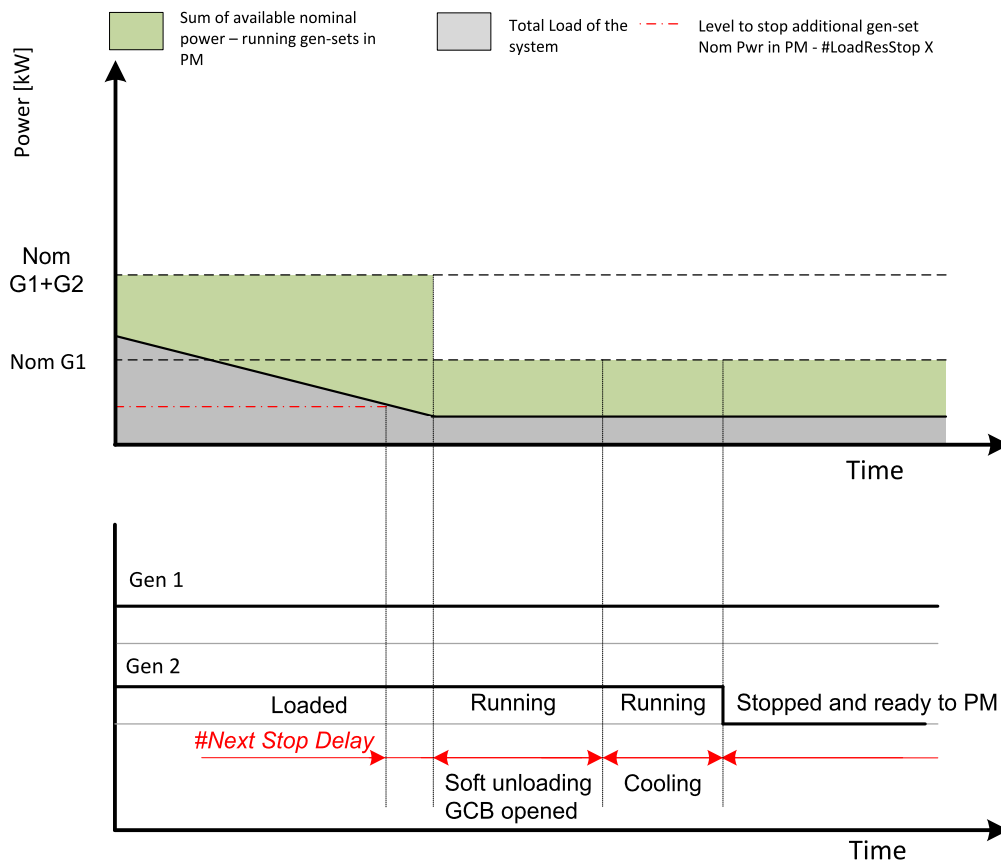


Image 5.100 Stopping sequence of power management

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 143)** and **Relative power management (page 146)**.

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 276)**, 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.

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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 259)** is set to ABS [kW] mode.

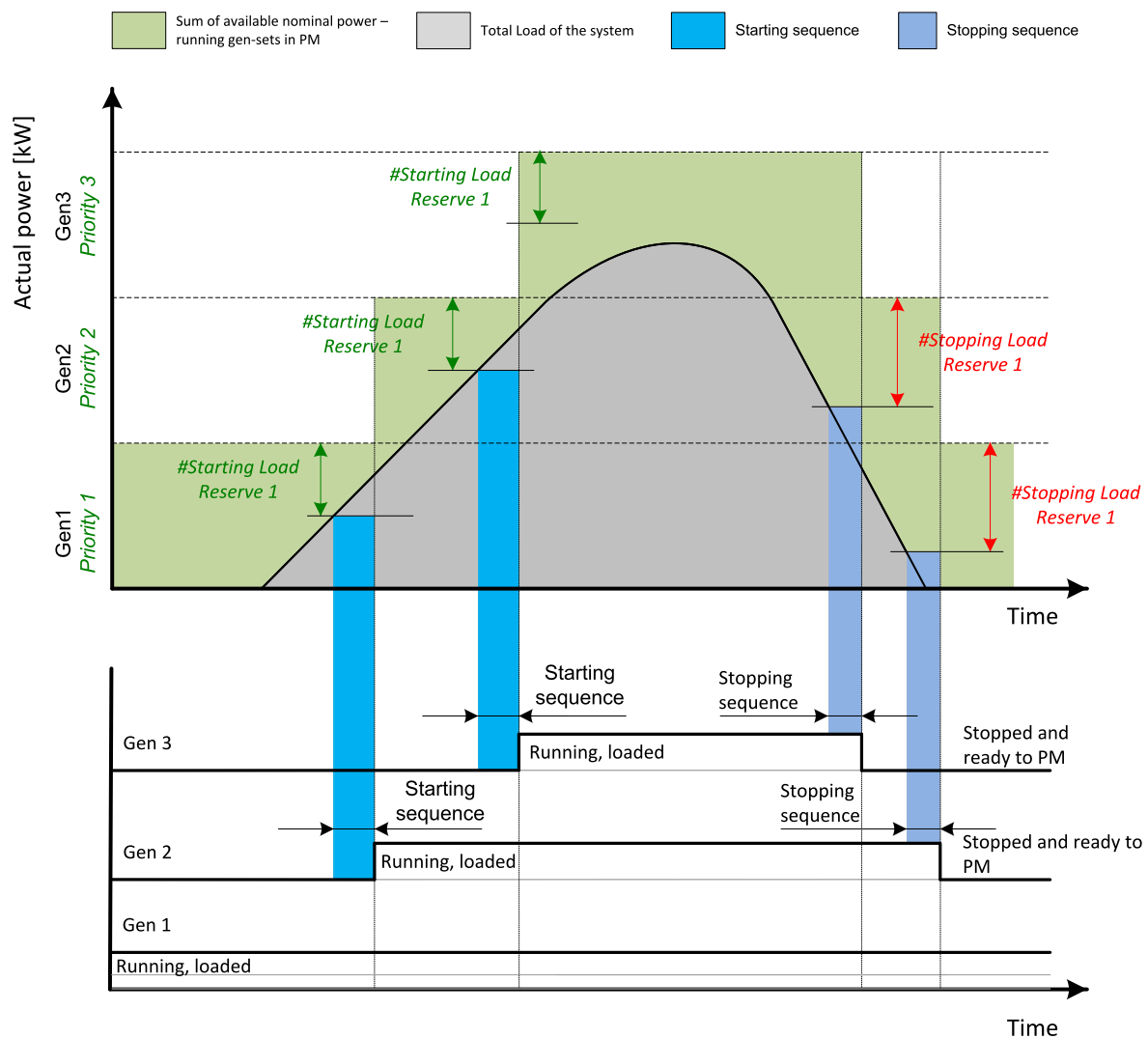


Image 5.101 Power management based on absolute load reserve

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

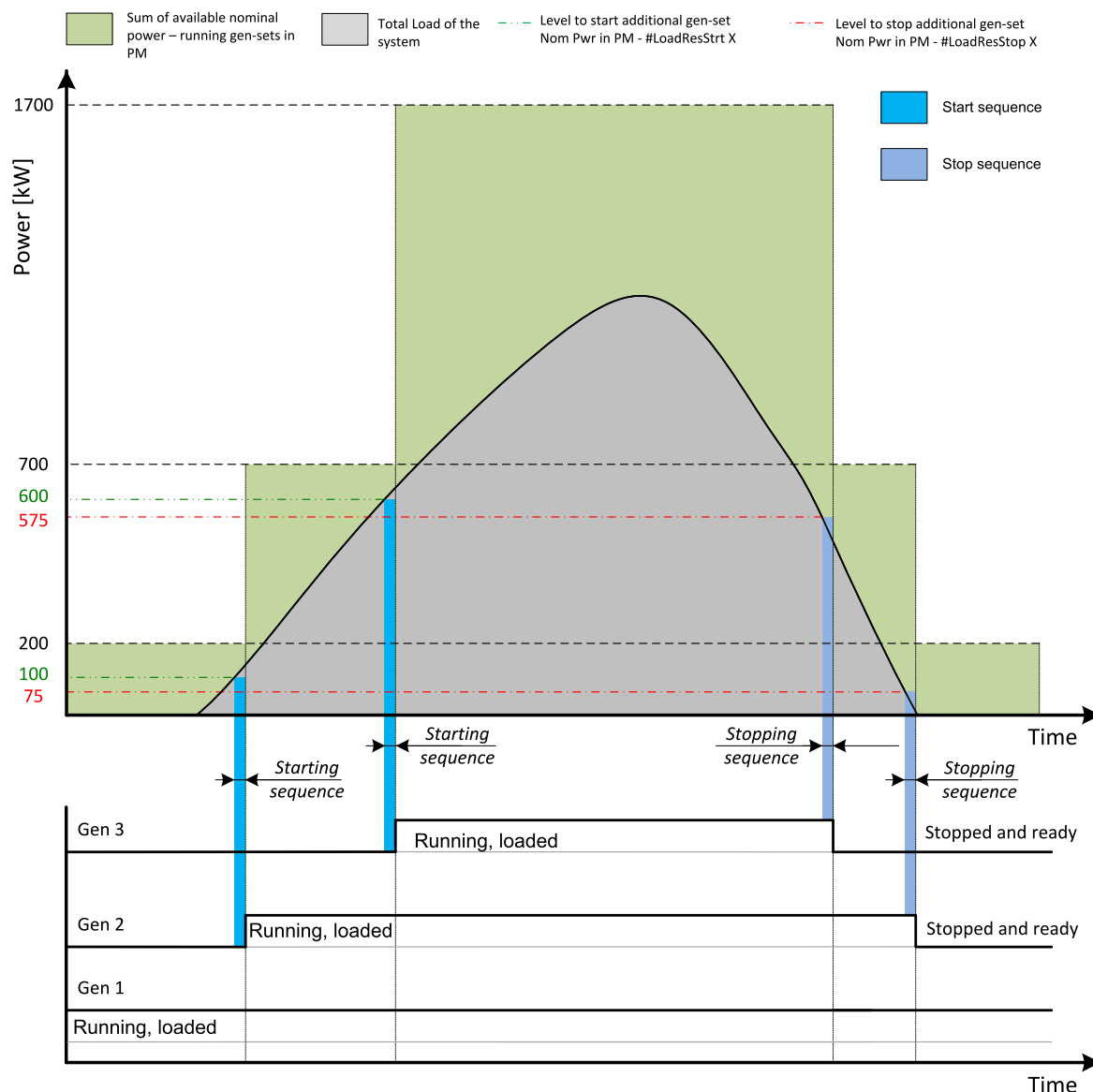


Image 5.102 Absolute power management example

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 262)** (or other selected reserve set) in following way:

Sum of nominal power for start - **#Starting Load Reserve 1 (page 262)** (or other selected reserve set) = value of load when additional Controller requested to start (e.g.: $700 \text{ kW} - 100 \text{ kW} = 600 \text{ kW}$).

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 263)** (or other selected reserve set) in following way:

Sum of nominal power for stop - **#Stopping Load Reserve 1 (page 263)** (or other selected reserve set) = value of load when additional Controller requested to stop (e.g.: $700 \text{ kW} - 125 \text{ kW} = 575 \text{ kW}$).

There are 4 sets of setpoints for starting and stopping Controllers in absolute power management.

- > **#Starting Load Reserve 1 (page 262) and #Stopping Load Reserve 1 (page 263)**
- > **#Starting Load Reserve 2 (page 265) and #Stopping Load Reserve 2 (page 266)** considered if binary input Load Res 2 Active is activated
- > **#Starting Load Reserve 3 (page 268) and #Stopping Load Reserve 3 (page 269)** considered if binary input is activated
- > **#Starting Load Reserve 4 (page 271) and #Stopping Load Reserve 4 (page 272)** considered if binary input 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 259)** is set to REL [%] mode.

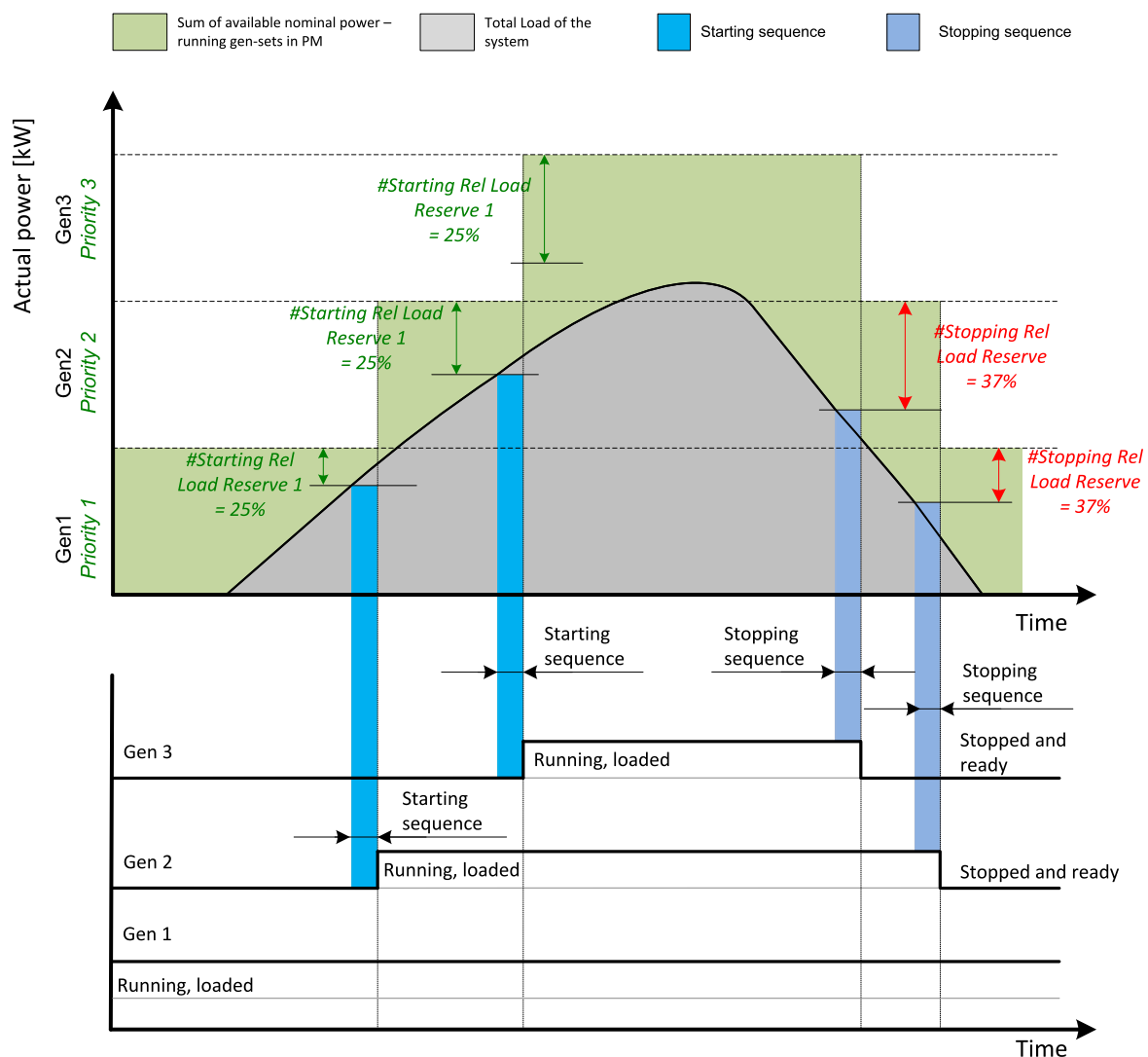


Image 5.103 Power management based on relative load reserve

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 %

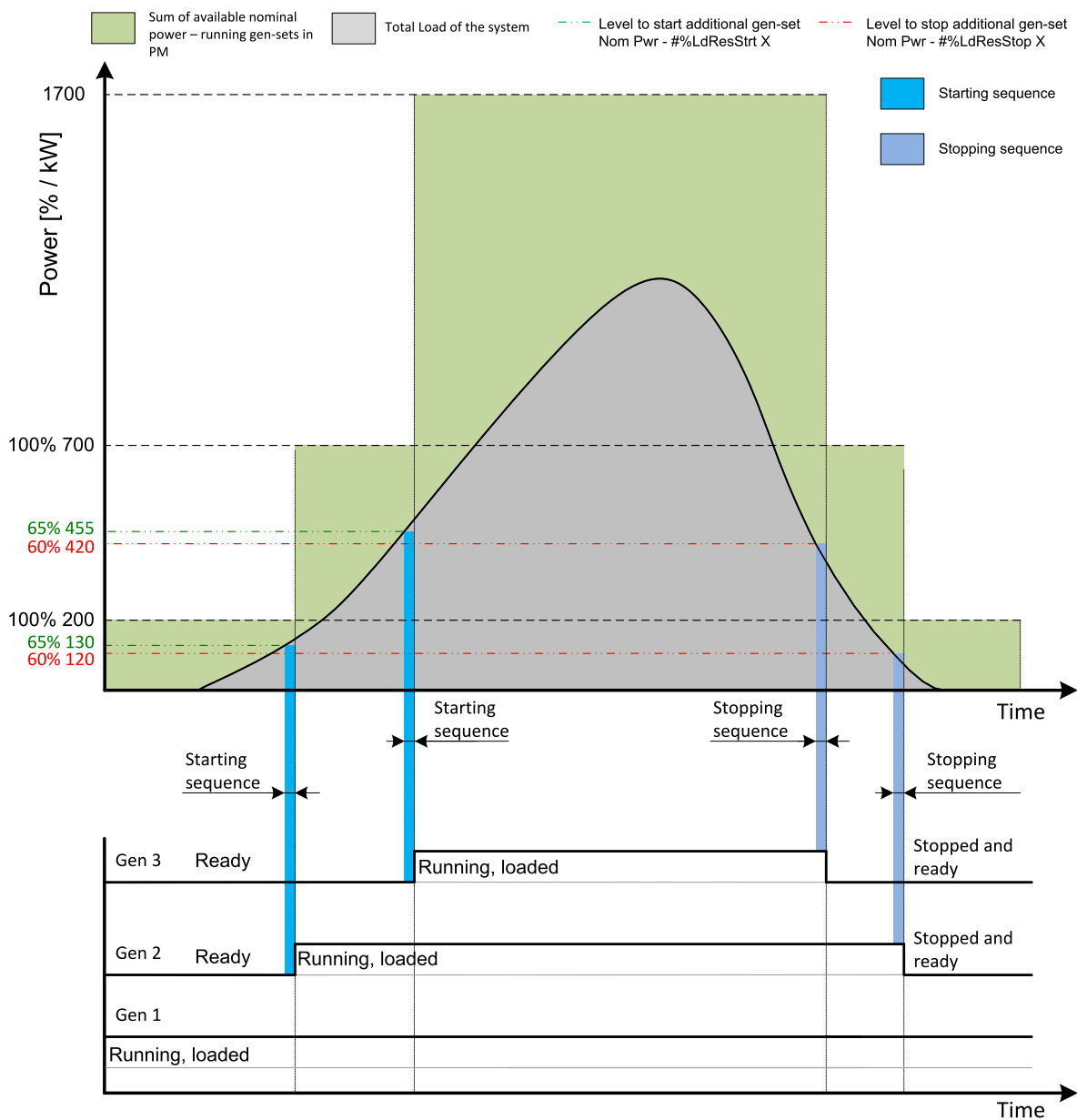


Image 5.104 Relative power management example

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 264)** (or other selected reserve set) in following way:

$(100\% - \text{\#Starting Rel Load Reserve 1 (page 264) (or other selected reserve set)}) \times \text{Sum of Nominal power} =$
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 264)** (or other selected reserve set) in following way:

$(100\% - \text{\#Stopping Rel Load Reserve 1 (page 264) (or other selected reserve set)}) \times \text{Sum of Nominal power} =$
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 264) and #Stopping Rel Load Reserve 1 (page 264)**
- **#Starting Rel Load Reserve 2 (page 267) and #Stopping Rel Load Reserve 2 (page 267)** considered if binary input Load Res 2 Active is activated
- **#Starting Load Reserve 3 (page 268) and #Stopping Load Reserve 3 (page 269)** considered if binary input is activated
- **#Starting Load Reserve 4 (page 271) and #Stopping Load Reserve 4 (page 272)** considered if binary input is activated

Note: All controllers cooperating together in Power management must have the same load reserve set selected.

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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

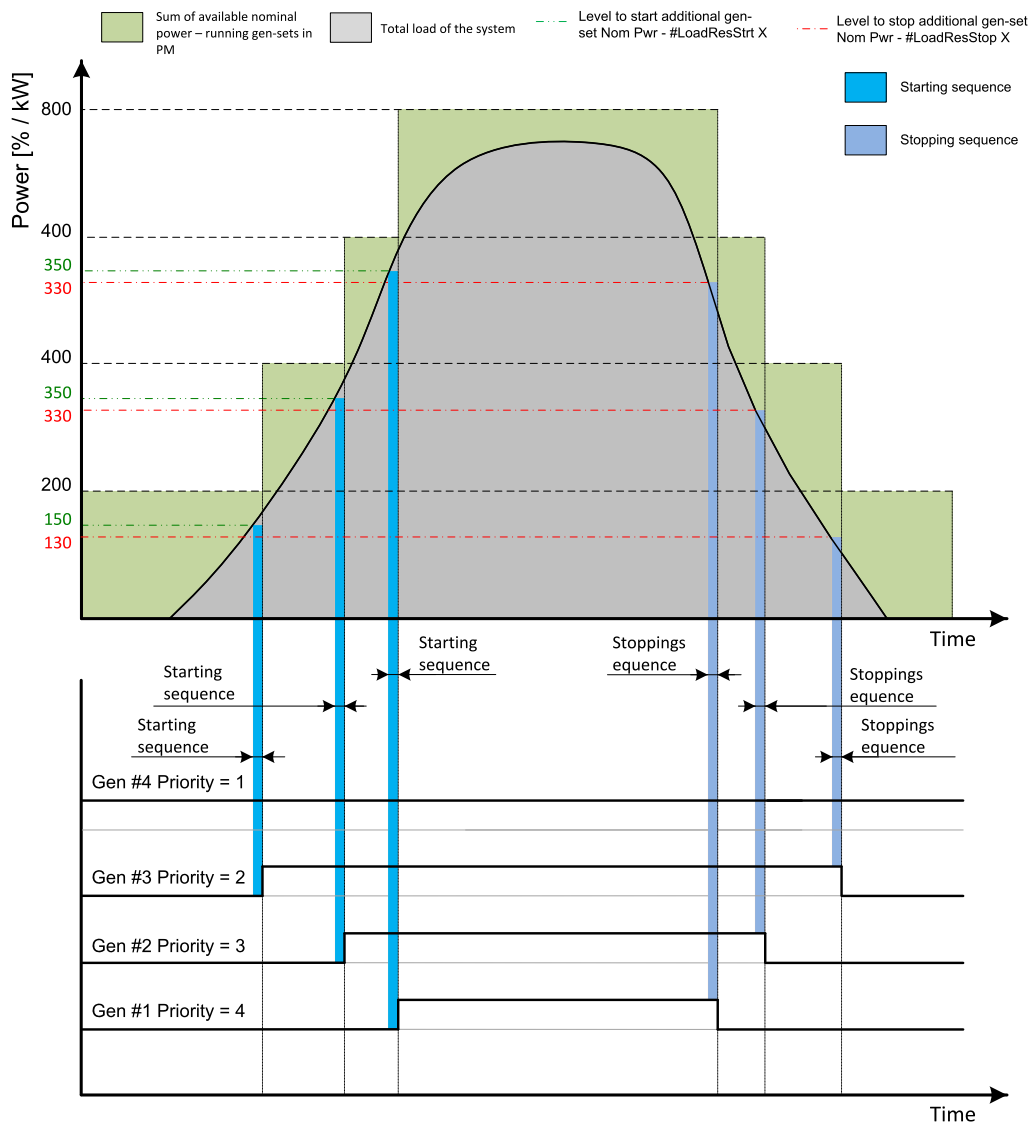


Image 5.105 Example of priorities in power management

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 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.

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Priority auto swap

As stated in the chapter **Priorities (page 148)**, 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 260) = 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 278)** (i.e. **#Run Hours Max Difference (page 278) + 1**), the Controller(s) with the lowest RHE is/are started.

Example: The system structure and its settings is shown on the figure below.

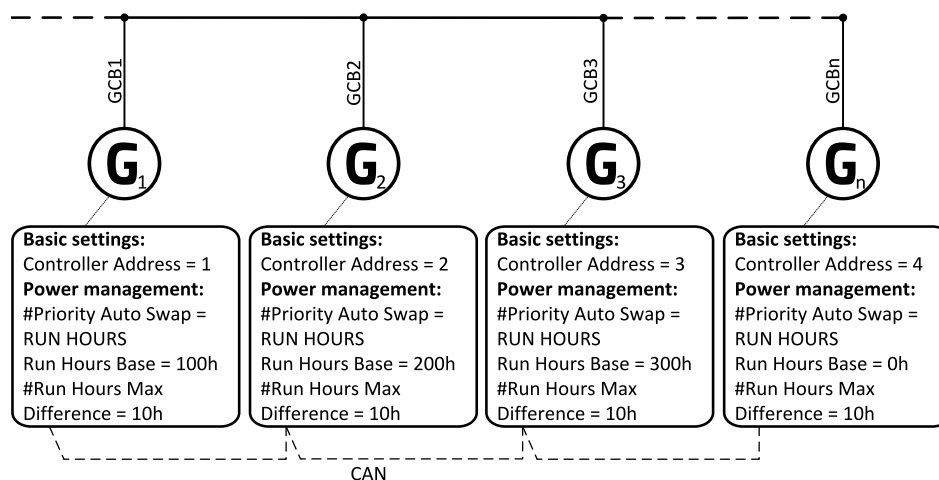


Image 5.106 Example of the system

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 (250 - Run Hours Base)
- > Controller 2 running hours = 450 -> running hours considered in RHE = 200 (450 - 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 278)** 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 278)** (i.e. 10h). The Controller 1 runs $100 + \text{\#Run Hours Max Difference (page 278)} + 1 = 100 + 10 + 1 = 111$ 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 278)**. The Controller 2 runs 11 hours to equalize the RHE of both Controllers and then additional **#Run Hours Max Difference (page 278) + 1** hours (i.e. $11 + 10 + 1 = 22$ hours). The evaluation of RHE1 and RHE2 is shown on the figure below.

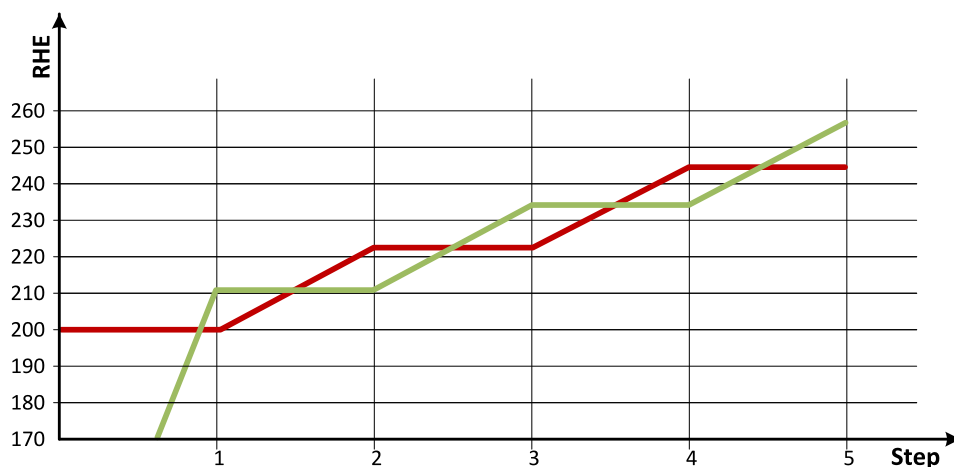


Image 5.107 Run hours equalization - case #1

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 278) + 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.

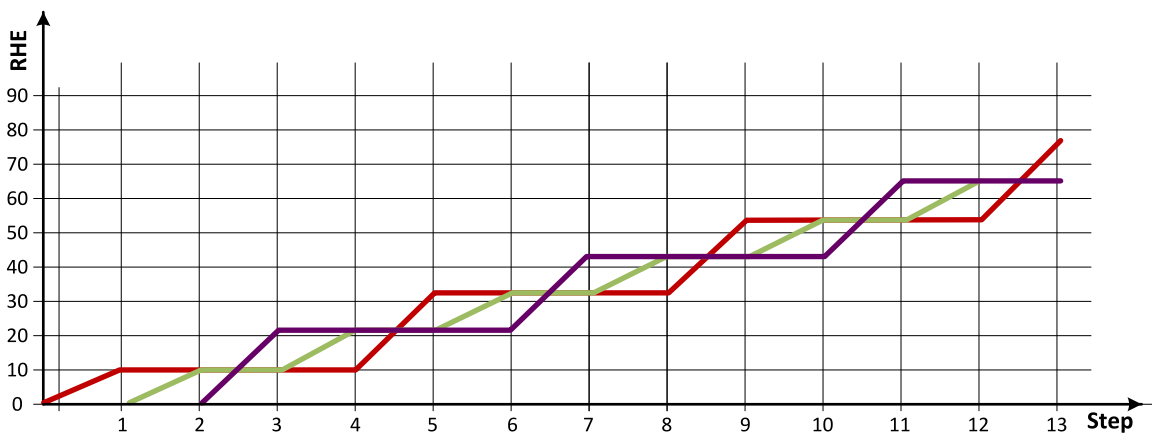


Image 5.108 Run hours equalization - case #2

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.

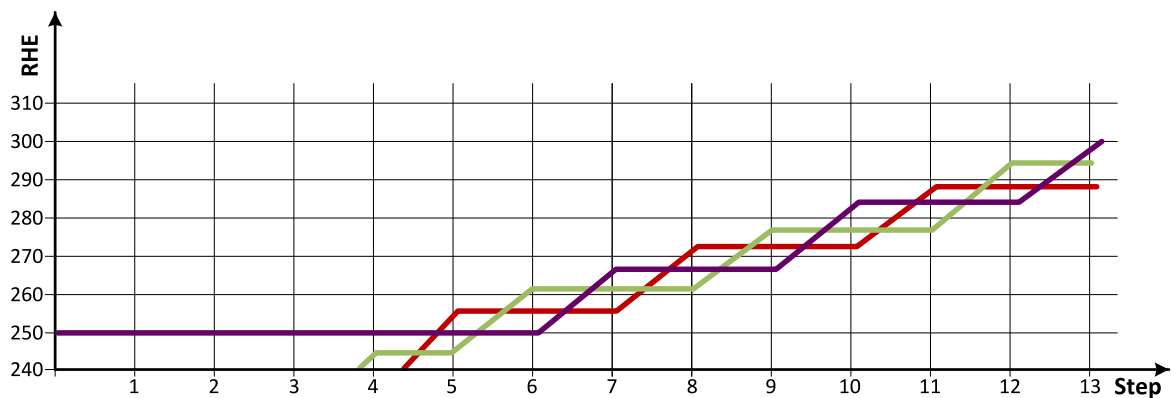


Image 5.109 Run hours equalization - case #3

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 278) = 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 278) 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 260) = 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 259) = ABS (kW)**
 - Nominal power of Controller > actual load demand + **#Starting Load Reserve 1 (page 262)**
 - **#Power Management Mode (page 259) = REL (%)**
 - Nominal power of Controller > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 264)**)
- 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.

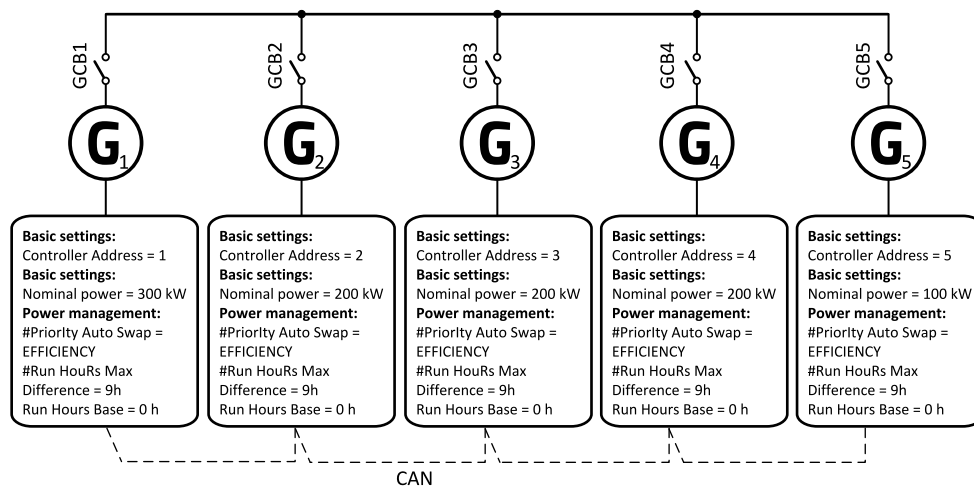


Image 5.110 Example of the system

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 259) = ABS (kW)** and **#Starting Load Reserve 1 (page 262) = 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

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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, Min Run Power Act 2 and Min Run Power Act 3 in IG 1000 or IM 1010 MC controllers.

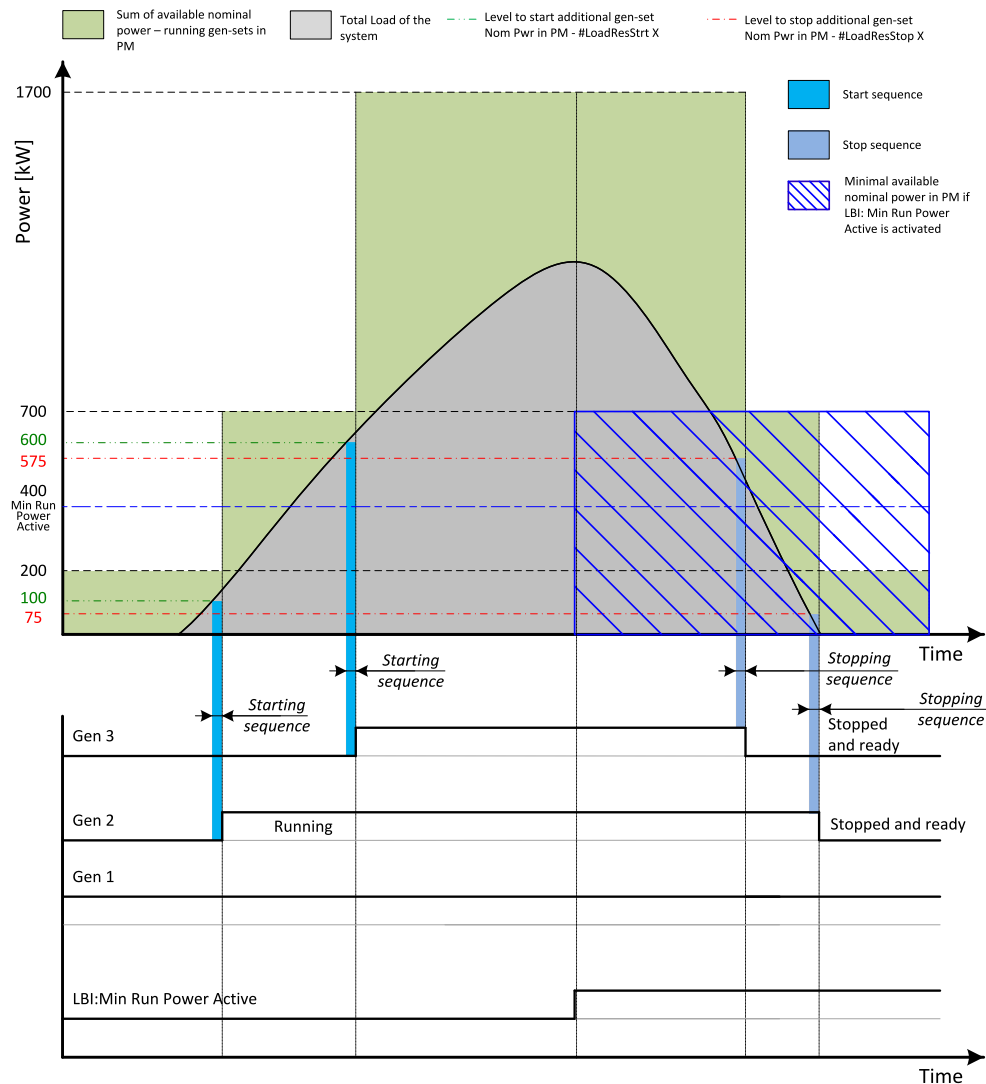


Image 5.111 Minimal running power

Setpoints **#Min Run Power** (page 274), **#Min Run Power 2** (page 274) or **#Min Run Power 3** (page 275) are adjusted to 400 kW. Once the **#Min Run Power** (page 274), **#Min Run Power 2** (page 274) or **#Min Run Power 3** (page 275) 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.

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Dynamic Spinning Reserve

The values **Dynamic Spinning Reserve** (page 392) and **Dynamic Spinning Reserve Offset** (page 392) 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 392) is added to required load reserve given by setpoints **#Starting Load Reserve 1** (page 262) and **#Stopping Load Reserve 1** (page 263) (according to actual load reserve set 1, 2, 3 or 4). The value **Dynamic Spinning Reserve Offset** (page 392) is added only to required stopping load reserve given by setpoints **#Stopping Load Reserve 1** (page 263) (according to actual load reserve set 1, 2, 3 or 4) to create some dynamic offset between starting and stopping load reserve.

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5.4.19 Protections

Protection types	159
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Fixed protections	160
User protections	161
Protection states	166

InteliMains 510 BTB combines **Fixed protections (page 160)** with **User protections (page 161)** 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 161)** is limited to 200. The maximum number of configured **fast User protections (page 161)** is limited to 50.

Protection types

Level 1 Protections

- ✓ LBO COMMON ALARM LEVEL 1 (PAGE 487)
- ✓ LBO COMMON ALARM ACTIVE LEVEL 1 (PAGE 487)
- ✗ 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 488)	COMMON ALARM ONLY (PAGE 487)	COMMON HISTORY RECORD (PAGE 488)	✗	✗

Level 2 Protections

- ✓ LBO COMMON ALARM LEVEL 2 (PAGE 487); except **Mains Protection**
- ✓ LBO COMMON ALARM ACTIVE LEVEL 2 (PAGE 487) ; except **Mains Protection**

Name
Abbreviation
Alarm List indication
History record
Fault Reset needed
Action: CB open
LBO Alarm activation
LBO Horn activation
Common LBO

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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.

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Protection blocking

It is possible to configure one Protection Blocking to any **User protections (page 161)**. 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 160)**.

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.

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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 471) PROTECTION FORCE DISABLE 2 (PAGE 472) PROTECTION FORCE DISABLE 3 (PAGE 472)	Disabling of the protection can be forced by LBI

Table 5.1 Bus protections

Table 5.2 Mains protections

Bus protections

	Protection	Alarms / Protection name	Fixed Protection State
Voltage	Bus <>V Protection (page 251) <i>Note: This protection can not be disabled.</i>	MP Mains Overvoltage L1-N (page 573) MP Mains Overvoltage L2-N (page 573) MP Mains Overvoltage L3-N (page 573) MP Mains Overvoltage L1-L2 (page 574) MP Mains Overvoltage L2-L3 (page 574) MP Mains Overvoltage L3-L1 (page 574)	FIXED PROTECTIONS STATES 2 (PAGE 502) FIXED PROTECTIONS STATES 3 (PAGE 503)
	Bus <>f Protection (page 254) <i>Note: This protection can not be disabled.</i>	MP Mains Overfrequency (page 577)	FIXED PROTECTIONS STATES 3 (PAGE 503)

Table 5.3 Bus protections

User protections

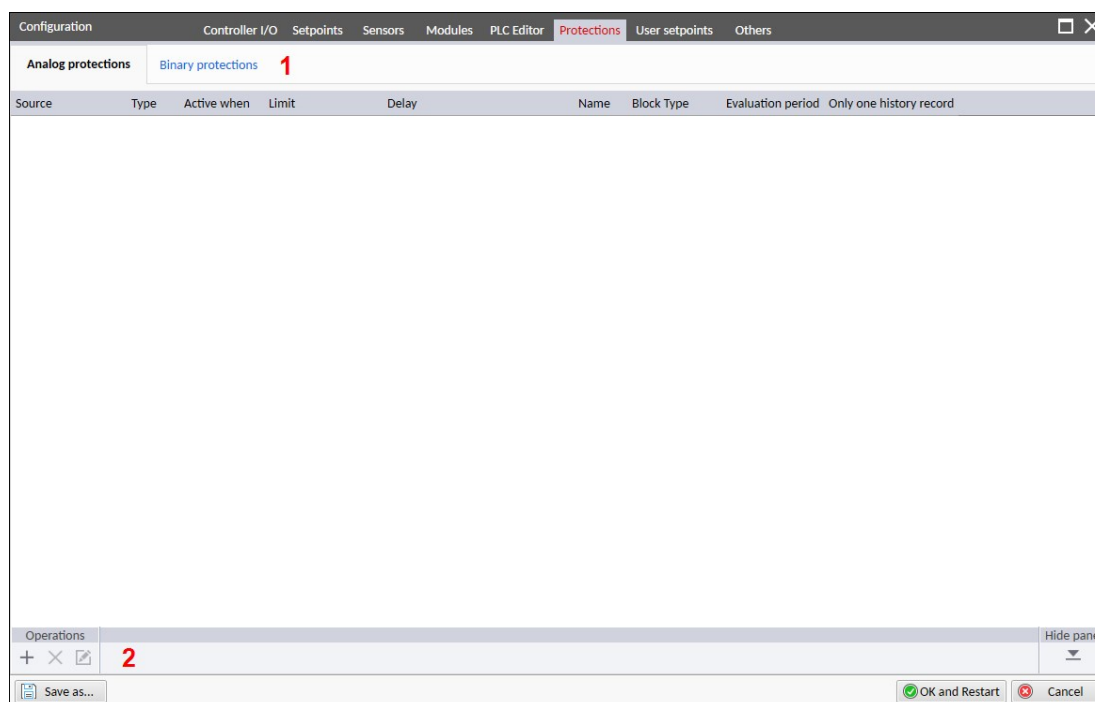
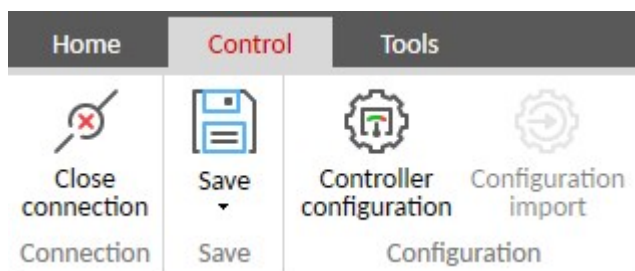
Source upon which the protection is configured can be selected. It can be any analog value or binary state.




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 InteliConfig

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 annotations:

- Source Value:** A text input field containing '1' (annotated with a red circle 1).
- Type / Level:** A dropdown menu showing 'Warning' with a yellow triangle icon (annotated with a red circle 2).
- Custom Name:** A text input field containing 'Wrn' (annotated with a red circle 3).
- Active When:** A dropdown menu showing 'Over Limit' (annotated with a red circle 4).
- Block Type:** A dropdown menu showing 'All the time' (annotated with a red circle 5).
- History Record:** A dropdown menu showing 'Always' (annotated with a red circle 6).
- Evaluation Period:** A dropdown menu showing 'Standard (0.1 s)' (annotated with a red circle 7).
- Protection State:** A checkbox that is currently unchecked (annotated with a red circle 8).
- Limit:** A section header.
- Limit Source:** A text input field containing '9' (annotated with a red circle 9).
- Delay:** A section header.
- Delay Source:** A text input field containing '10' (annotated with a red circle 10).

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

1	Selecting the input source see User protections on page 161
2	Selecting the protection type see Protection types on page 159
3	Text input for Alarm / History message
4	Selecting the protection activation see Protection activation on page 160
5	Selecting the block type see Protection blocking on page 160
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 the 'Binary Protection' dialog box. It contains the following fields and controls:

- Source Value:** A text input field containing '1'.
- Type / Level:** A dropdown menu showing 'Warning' with a yellow triangle icon.
- Custom Name:** A text input field containing 'Wrn'.
- Active When:** A dropdown menu showing 'True'.
- Block Type:** A dropdown menu showing 'All the time'.
- History Record:** A dropdown menu showing 'Always'.
- Protection State:** A checkbox that is currently unchecked.
- Delay:** A section containing a 'Source' text input field with '8' and several icons (dots, square, arrow, question mark).

At the bottom of the dialog are 'OK' and 'Cancel' buttons.

1	Selecting the input source see User protections on page 161
2	Selecting the protection type see Protection types on page 159
3	Text input for Alarm / History message
4	Selecting the protection activation see Protection activation on page 160
5	Selecting the block type see Protection blocking on page 160

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

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Protection states

Protection states is a new feature introduced in IntelliMains 510 BTB, which helps with better management of alarms. Until now, you could only use LBO **ALARM** (PAGE 479) 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 160) 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 501)
- >> **FIXED PROTECTIONS STATES 2** (PAGE 502)
- >> **FIXED PROTECTIONS STATES 3** (PAGE 503)

User protections states

During the **Configuration of protections in IntelliConfig** (page 161), 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 504), 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.

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5.4.20 Pulse Counters

IntelliMains 510 BTB 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 230)	Pulse Counter 1 (page 399)	PULSE COUNTER 1 (PAGE 473)
Conversion Coefficient Pulse 2 (page 230)	Pulse Counter 2 (page 400)	PULSE COUNTER 2 (PAGE 473)

Note: Value of the internal counters remains even if the controller is unplugged from power.

Note: Counter counts leading edges.

5.4.21 Regulation Loops

Regulation loops overview

Regulation loops overview

Loop type	Related applications	Related setpoints	Related Operation
Frequency	BTB	Frequency Gain (page 285) Frequency Int (page 285)	Unloaded Run Synchronization Single Island
Voltage	BTB	Voltage Gain (page 286) Voltage Int (page 287)	Unloaded Run Synchronization Single Island
Angle regulation	BTB	Angle Gain (page 286)	Phase Match Synchronization

Frequency, Load sharing, Load regulation loops have one common output = **Loadsharing Output (page 396)** 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 397)** 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.

Loop type	Description
Load	The load regulation loop is active when the system is running in parallel with mains and during 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.

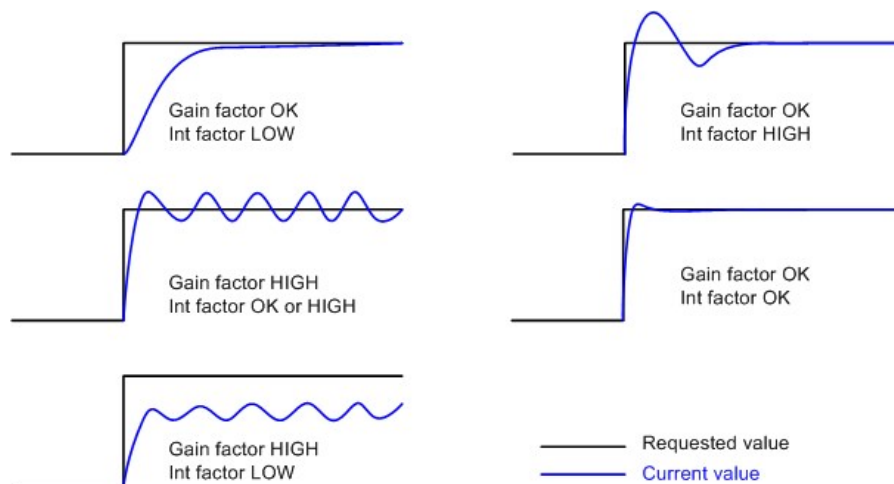


Image 5.112 Typical responses of PI regulator

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.

5.4.22 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 BTB 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** M

Sensors Add line Delete line Open Save

StarterKit OilPress	■	<div>HW configuration</div> <div>0-10 V</div> <div>Sensor Name</div> <div>StarterKit OilPress</div> <div>Resolution</div> <div>0,1</div> <div>Dim</div> <div>Bar</div> <div> <table border="1"> <thead> <tr> <th></th> <th>0-10 V</th> <th>Bar</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0,000</td> <td>0,0</td> </tr> <tr> <td>1</td> <td>1,000</td> <td>10,0</td> </tr> </tbody> </table> </div>		0-10 V	Bar	0	0,000	0,0	1	1,000	10,0
	0-10 V		Bar								
0	0,000		0,0								
1	1,000		10,0								
StarterKit CoolTemp	■										
StarterKit FuelLev	■										
General line 1											
General line 2											
General line 3											
General line 4											
General line 5											

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: ☒

5.4.23 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.

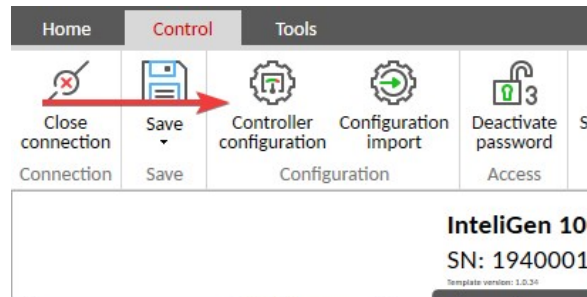
There are following commands:

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.

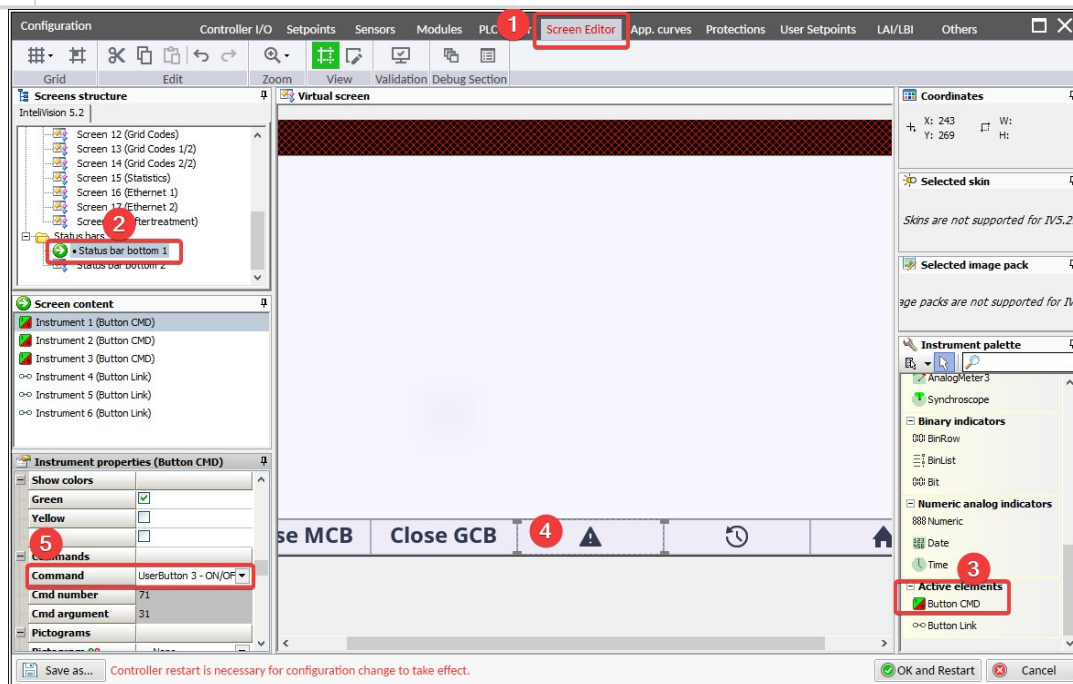
See list of MODBUS comands in chapter [List of commands and arguments \(page 190\)](#).

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



5.4.24 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 173**) 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 173)** 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 IntelIVision display when connected via Ethernet).
PIN	4-digit "password" to be used together with UID.
Access level	Determines Access to controller data (page 177)

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 174**).
- > 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 18)**, **WebSupervisor (page 18)**).

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 176**.

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 173)** 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 561)** 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.

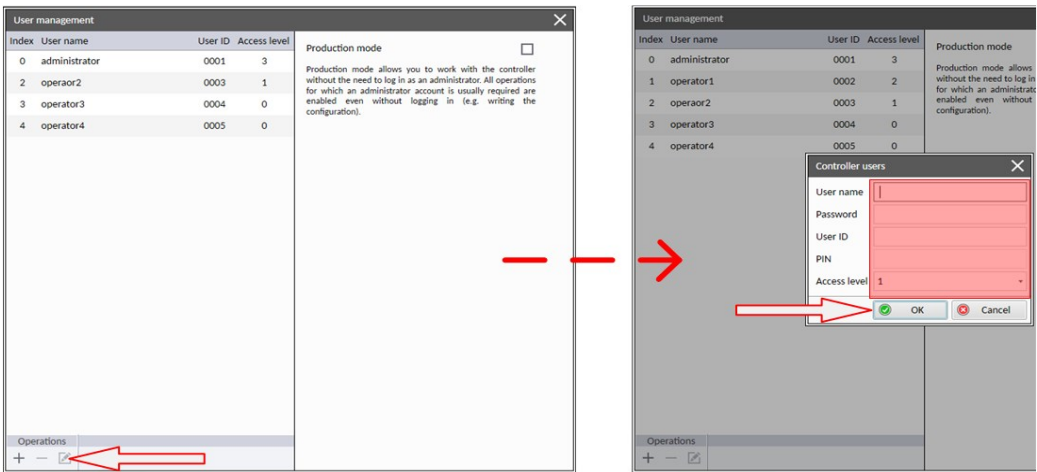
IMPORTANT: The total available number of accounts in the controller is 10.



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 173)**.

Note: Rules for the User accounts (page 173) credentials apply and some items are optional



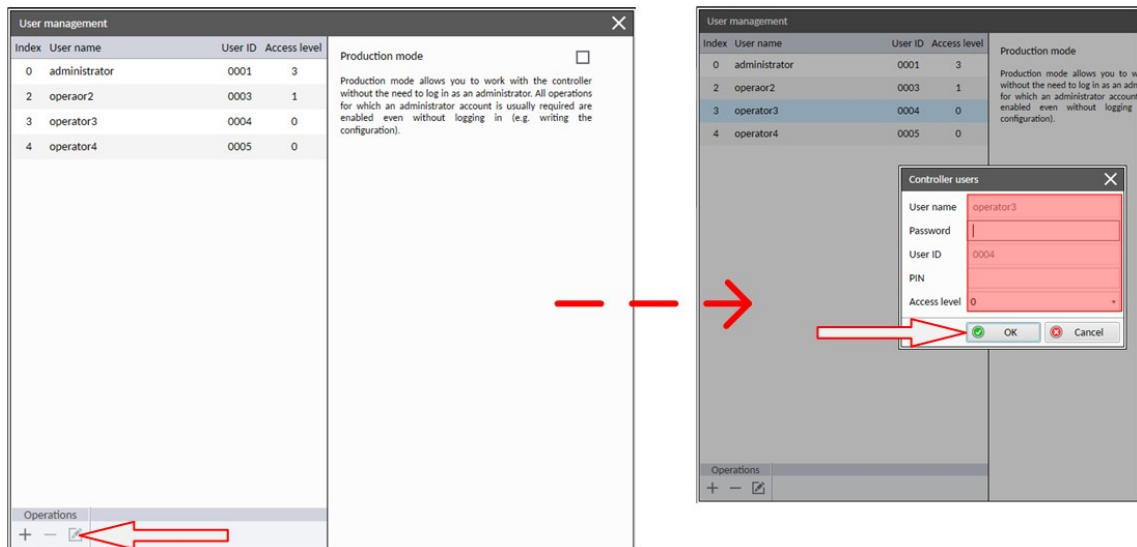
Deleting an account

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 539)** 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.

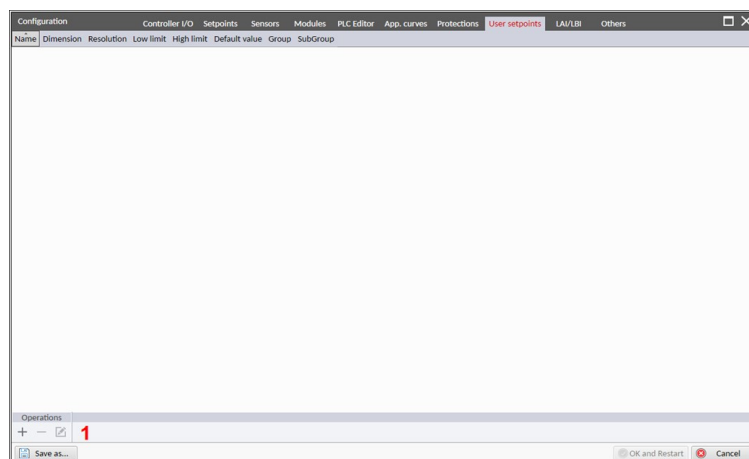
Special situations

There are several operations that require administrator level:

- Programming firmware
- Programming configuration
- Managing user accounts

5.4.25 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 5.113 User setpoints tab in InteligConfig

Image 5.114 Setting parameters of an user setpoint

Contents of the user setpoint

Name	<p>Max. 32 characters</p> <p>Note: Does not consider duplicities (It is possible to have setpoints with the same name, but it is not recommended.)</p>
Dimension	<p>Can be chosen from a list or</p> <p>User can create their own with a limit of 32 characters.</p>
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

5.4.26 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 225).

 **back to General Functions**

6 Communication

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6.1 PC

6.1.1 Direct communication	180
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6.1.1 Direct communication

A RS232, USB, RS485 or ethernet interface can be used for direct cable connection to a PC.

Connection via RS232

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

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 51**.

RS232 interface uses **COM1 Mode (page 325)** 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.

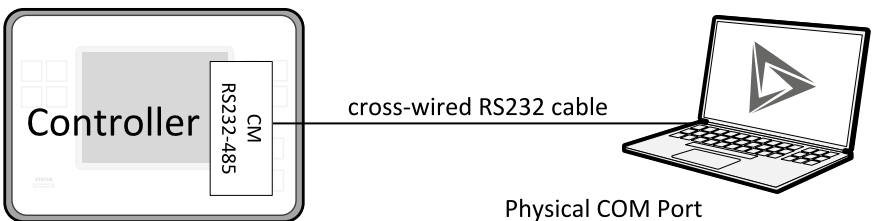


Image 6.1 Cross-wired RS232 cable is used

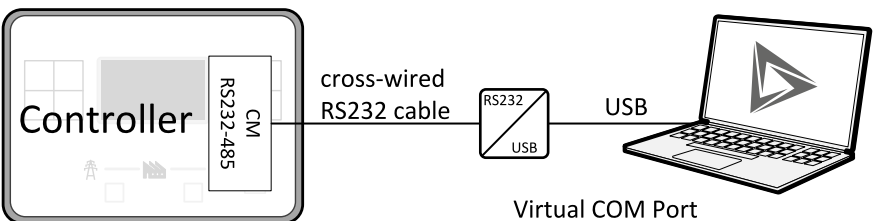


Image 6.2 Cross-wired RS232 cable and USB is used

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 327)** setpoint is set to the option Direct. To find more information about installation of the modules **see Plug-in module installation on page 51**.

Note: Also USB-RS485 convertor can be used.

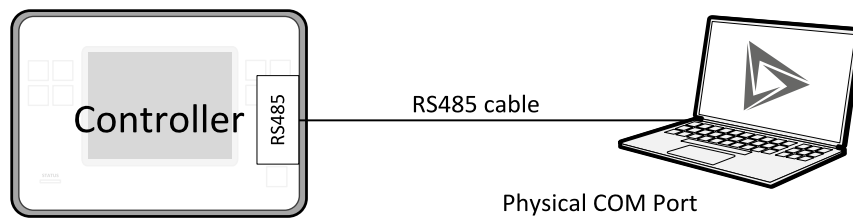


Image 6.3 Built-in RS485 is used

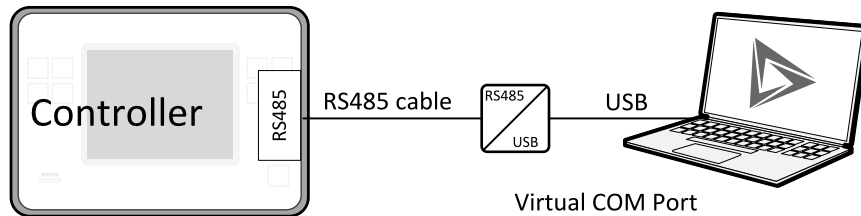


Image 6.4 RS485 and USB is used

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 51**).

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.

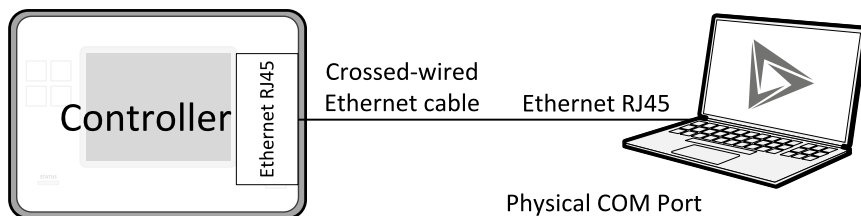


Image 6.5 Ethernet cable is used

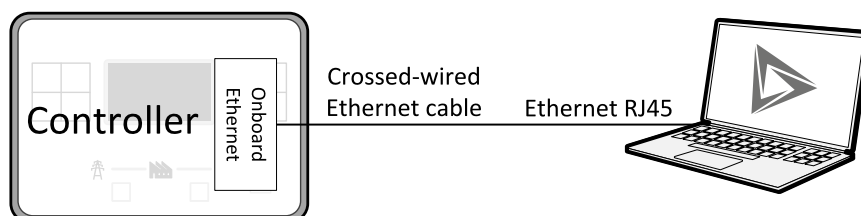


Image 6.6 Onboard Ethernet cable is used

Connection via USB

USB interface uses HID profile.

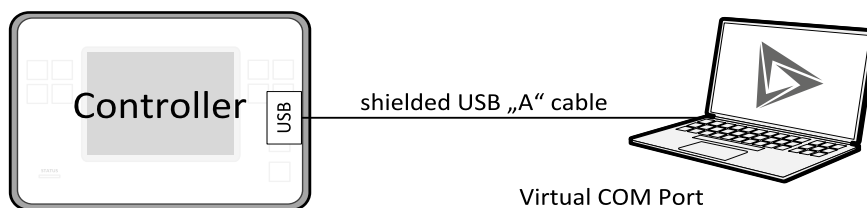


Image 6.7 Shielded USB type A cable is used

🔍 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.

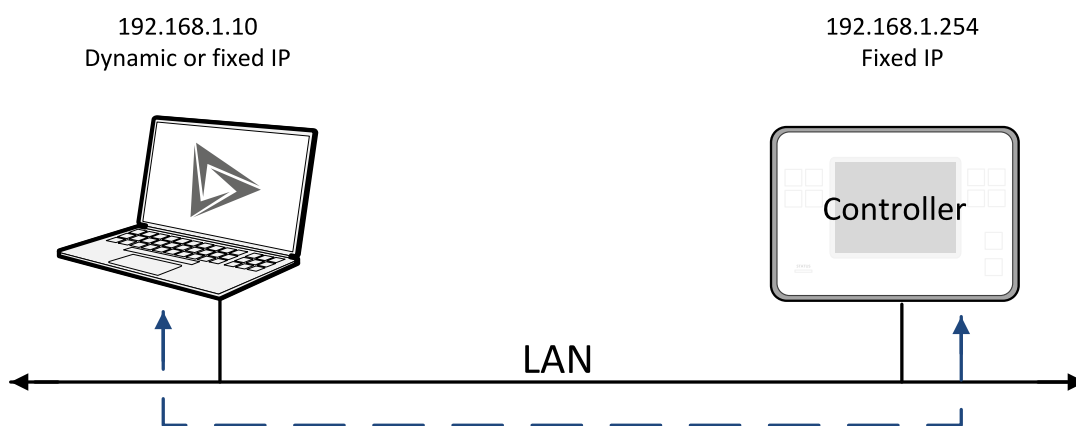


Image 6.8 Ethernet LAN connection

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 311)**.

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.

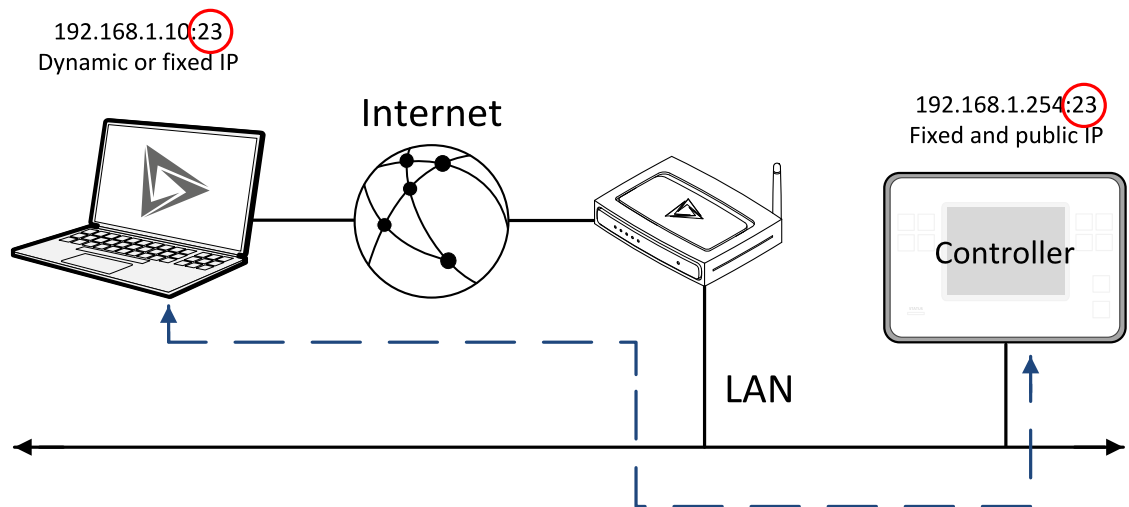


Image 6.9 Ethernet WAN connection

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.

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6.2 Connection to 3rd party systems

6.2.1 SNMP	184
6.2.2 Modbus-RTU, Modbus/TCP	185

🔍 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

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 InteliConfig

- 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 29)** . The serial speed for Modbus-RTU communication is adjusted by the setpoint **RS485 Modbus Speed (page 233)** and the serial mode is adjusted by the setpoint **RS485 Modbus Mode (page 232)**. Only 1 client can be connected at once through this type of connection.
- Modbus/TCP (Modbus server) can be used with the **Communication peripherals (page 15)**. 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 355)**.

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 187)**.

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 187)**.

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
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

Data type	Meaning	Number of registers	Data mapping
			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
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

Register addresses	Number of registers	Access	Data type	Meaning
				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 IntelliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01228	9018	Nominal Bus 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	CU-BIN-2	Controller I/O
00002	Value	8235	Binary Inputs	2	CU-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.lammertbies.nl/comm/info/crc-calculation.html> Use CRC-16 (Modbus)

Write LSB first.

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

🔍 back to 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

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8.1 Controller objects

8.1.1 List of controller objects types

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8.1.2 Setpoints

What setpoints are:

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

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

IMPORTANT: Do not write setpoints repeatedly (e.g. power control from a PLC by repeated writing of baseload setpoint via Modbus). The setpoints are stored in 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 202)**.

List of group of setpoints

Group: Process Control	208
Group: Basic settings	218
Group: Communication Settings	231
Group: Bus Left Settings	233
Group: Protections	244
Group: Generator settings	256
Group: Power Management	259
Group: Synchronization	281
Group: User Buttons	287
Group: Scheduler	295
Group: Plug-In Modules	310
Group: Ethernet	311
Group: CM-RS232-485	325
Group: CM-4G-GPS	329
Group: CM-Ethernet	348

List of setpoints

Group: Process Control	208	Mains CT Ratio Prim	220
Subgroup: Load Control	208	Mains CT Ratio Sec	221
#System Load Control PTM	208	Subgroup: Voltage settings	221
#System Baseload	209	Connection type	221
Subgroup: PF/Q Control	209	Gen AC Bus Nominal Voltage Ph-N	222
#System PF Control PTM	209	Gen Nominal Voltage Ph-Ph	222
#System Power Factor	210	MainsAC Shore Nominal Voltage Ph-N	223
#System Base Q	210	Mains/Bus Nominal Voltage Ph-PhMains	
Subgroup: Mains Coupling	211	Nominal Voltage Ph-Ph	223
Mains Coupling	211	Mains VT Ratio	223
Subgroup: Mains Power Measurement	211	Bus VT Ratio	224
Mains Measurement P	211	Bus Dead Level	224
Mains Measurement Q	212	Subgroup: Phase Rotation	225
Subgroup: Breaker Control Mode	212	Phase Rotation	225
MCB Control Mode	212	Subgroup: Frequency settings	225
Attempts To Close Breaker	213	Nominal Frequency	225
Delay Between Closing Attempts	213	Subgroup: Controller settings	226
Subgroup: BTB Control	213	Controller mode	226
MCB Control Mode	213	Power On Mode	226
Attempts To Close Breaker	214	Backlight Timeout	227
Delay Between Closing Attempts	214	Horn Timeout	227
Subgroup: Controller Redundancy	215	Fail Safe Binary State	228
Watched Controller	215	User Logging Record	228
Subgroup: Breaker Control Mode	216	Subgroup: Battery Protections	229
Synchronization R to Mains	216	Battery Undervoltage	229
Synchronization L to Mains	216	Battery Overvoltage	229
Synchronization R to L	217	Battery Under And Overvoltage Delay	229
Synchronization L to R	217	Subgroup: Pulse counters	230
BTB Opening	218	Conversion Coefficient Pulse 1	230
Dead Bus Closing	218	Conversion Coefficient Pulse 2	230
Group: Basic settings	218	Group: Communication Settings	231
Subgroup: Name	218	Subgroup: Controller Address	231
Controller Name	219	CAN Controller Address	231
Subgroup: Power settings	219	Subgroup: RS485 Settings	231
Nominal DC Shore Power	219	RS485 Mode	231
Subgroup: Current settings	220	RS485 Communication Speed	232
Nominal Current	220	RS485 Modbus Mode	232

RS485 Modbus Speed	233	Bus <>V Protection	251
Subgroup: Intercontroller Settings	233	Bus Voltage Unbalance Protection	251
CAN Intercontroller Empty Check	233	Subgroup: Frequency Protection	253
Group: Bus Left Settings	233	Mains <>f Protection	253
Subgroup: Overload Protection	233	Bus <>f Protection	254
Overload BOR	233	Subgroup: Bus Meas Error Protection	255
Overload Wrn	235	Bus Meas Error Protection	255
Overload Delay	235	Subgroup: Phase Rotation Protection	255
Subgroup: Current Protection	236	Phase Rotation Protection	255
Short Circuit	236	Group: Generator settings	256
Short Circuit Delay	237	Subgroup: Bus Voltage Protection	256
IDMT Mains Overcurrent Delay	237	Bus Undervoltage	256
Current Unbalance	238	Bus Overvoltage	256
Current Unbalance Delay	238	Bus <>V Delay	257
Subgroup: Mains Voltage Protections	239	Bus V Unbalance	257
Mains Overvoltage	239	Bus V Unbalance Delay	257
Mains Overvoltage Delay	239	Subgroup: Bus Frequency Protection	258
Mains Overvoltage Hys	240	Bus Right Overfrequency	258
Mains Undervoltage	240	Bus Underfrequency	258
Mains Undervoltage Delay	241	Bus Right <>f Delay	258
Mains Undervoltage Hys	241	Group: Power Management	259
Mains Voltage Unbalance	242	Subgroup: Power Management Control	259
Mains Voltage Unbalance Delay	242	#Power Management Mode	259
Subgroup: Mains Frequency Protection	243	#Priority Auto Swap	260
Mains Overfrequency	243	#System Start Delay	261
Mains Overfrequency Hys	243	#System Stop Delay	261
Mains Underfrequency	243	Dynamic Spinning Reserve	262
Mains Underfrequency Hys	244	Subgroup: Load Reserve Set 1	262
Mains <>f Delay	244	#Starting Load Reserve 1	262
Group: Protections	244	#Stopping Load Reserve 1	263
Subgroup: Overload Protection	244	#Starting Rel Load Reserve 1	264
Overload Protection	244	#Stopping Rel Load Reserve 1	264
Subgroup: Current Protection	245	Subgroup: Load Reserve Set 2	265
IDMT Mains Overcurrent Protection	245	#Starting Load Reserve 2	265
Current Unbalance Protection	247	#Stopping Load Reserve 2	266
Short Circuit Protection	248	#Starting Rel Load Reserve 2	267
Subgroup: Voltage Protection	248	#Stopping Rel Load Reserve 2	267
Mains <>V Protection	248	Subgroup: Load Reserve Set 3	268
Mains Voltage Unbalance Protection	250	#Starting Load Reserve 3	268

#Stopping Load Reserve 3	269	MCB Latency	284
#Starting Rel Load Reserve 3	270	Subgroup: Frequency Regulation Loop	285
#Stopping Rel Load Reserve 3	270	Frequency Gain	285
Subgroup: Load Reserve Set 4	271	Frequency Int	285
#Starting Load Reserve 4	271	Angle Gain	286
#Stopping Load Reserve 4	272	Subgroup: Voltage Regulation Loop	286
#Starting Rel Load Reserve 4	273	Voltage Gain	286
#Stopping Rel Load Reserve 4	273	Voltage Int	287
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#Min Run Power 2	274	User Button 1	287
#Min Run Power 3	275	User Button 2	288
Subgroup: Start/Stop Timing	275	User Button 3	288
#Next Engine Start Delay	275	User Button 4	289
#Next Engine Stop Delay	276	User Button 5	289
Subgroup: Slow Stop Protection	276	User Button 6	290
#Slow Stop Delay	276	User Button 7	290
Subgroup: Over Load Next Start Protection ...	277	User Button 8	291
#Overload Next Start Protection	277	User Button 9	291
#Overload Next Start Level	277	User Button 10	292
#Overload Next Start Delay	278	User Button 12	293
Subgroup: Run Hours Equalization	278	User Button 13	293
#Run Hours Max Difference	278	User Button 14	294
Subgroup: Efficient Mode	279	User Button 15	294
#Power Band Change Up Delay	279	User Button 16	295
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Subgroup: Group Settings	280	Subgroup: Time & Date	295
Group Link L	280	Time	295
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Group: Process Control

Subgroup: Load Control

#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	BTB
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 209) . 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 209) 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 209)) 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 209)** in parallel to mains operation and does not depend on active load control mode.

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#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 137)))		
Default value	1 000 kW (depends on the selected Power Formats And Units (page 137)))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137)))		
Comm object	8775	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Required total active power of the controller group in parallel to mains operation in Baseload mode.			
Note: The # setpoints are shared with all controllers on site.			
Note: The # setpoints are shared with all controllers on site via intercontroller CAN line.			

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Subgroup: PF/Q Control

#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	BTB				
Config level	Standard						
Setpoint visibility	Always						
Description							
Power factor control mode in parallel to mains operation of the whole controller group.							
<table><tr><td>Base PF</td><td>PF of the System is controlled by their PF control loops to provide constant system power factor adjusted by setpoint #System Power Factor (page 210).</td></tr><tr><td>Var Shar</td><td>PF of the System (reactive power) is controlled through the VAr sharing line.</td></tr></table>				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 210) .	Var Shar	PF of the System (reactive power) is controlled through the VAr sharing line.
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 210) .						
Var Shar	PF of the System (reactive power) is controlled through the VAr sharing line.						

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#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	BTB
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 209) = Base PF</div>			
<div><div>></div>Setpoint #System PF Control PTM (page 209) = Var Shar</div>			
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.			

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#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 137))		
Default value	0 kVAr (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kVAr (depends on the selected Power Formats And Units (page 137))		
Comm object	16407	Related applications	BTB
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 209) = Base Q</div>			
<div><div>></div>Setpoint #System PF Control PTM (page 209) = Load Shar</div>			
Note: The # setpoints are shared with all controllers on site via intercontroller CAN line.			

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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	BTB
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.			
Disabled	It is forbidden to close the BTB if mains voltage is connected to the both sides of the BTB.		
Enabled	It is allowed to close BTB if mains voltage is connected to the both sides of the BTB.		

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Subgroup: Mains Power Measurement

Mains Measurement P

Setpoint group	Process Control	Related FW	1.0.0				
Range [units]	None / Mains CT [-]						
Default value	None	Force value	NO				
Step	[-]						
Comm object	10599	Related applications	BTB				
Config level	Advanced						
Setpoint visibility	Always						
Description							
Defines source value of the Mains Import P (page 373) .							
<table><tr><td>None</td><td>The value Mains Import P (page 373) is not measured.</td></tr><tr><td>Mains CT</td><td>The value Mains Import P (page 373) is measured via Mains CTs which isare located on phase L1, L2 and L3.</td></tr></table>				None	The value Mains Import P (page 373) is not measured.	Mains CT	The value Mains Import P (page 373) is measured via Mains CTs which isare located on phase L1, L2 and L3.
None	The value Mains Import P (page 373) is not measured.						
Mains CT	The value Mains Import P (page 373) is measured via Mains CTs which isare located on phase L1, L2 and L3.						

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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	BTB				
Config level	Advanced						
Setpoint visibility	Always						
Description							
Defines source value of the Mains Import Q (page 373) .							
<table><tr><td>None</td><td>The value Mains Import Q (page 373) is not measured.</td></tr><tr><td>Mains CT</td><td>The value Mains Import Q (page 373) is measured via Mains CTs which isare located on phase L1, L2 and L3.</td></tr></table>				None	The value Mains Import Q (page 373) is not measured.	Mains CT	The value Mains Import Q (page 373) is measured via Mains CTs which isare located on phase L1, L2 and L3.
None	The value Mains Import Q (page 373) is not measured.						
Mains CT	The value Mains Import Q (page 373) is measured via Mains CTs which isare located on phase L1, L2 and L3.						

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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	BTB
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 464) to internal MCB Close/Open command causes Wrn MCB Fail (page 558)		
	Controller does not control the MCB at all. The MCB is controlled externally, when the MCB FEEDBACK (PAGE 464) gets changed, then the event "MCB Opened" or "MCB Closed" is recorded to the history log. Controller always accepts the MCB FEEDBACK (PAGE 464) without of issuing any alarm. The controller informs the superordinate system about the status of the breaker		

automaton using the signals

> LBO SYNCHRONIZATION (PAGE 495)

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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	BTB
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>			

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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	BTB
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.			
<div>Example:</div> If this setpoint is set to 10 seconds, the delay between another attempt to close the breaker will be 11 seconds.			

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Subgroup: BTB Control

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	BTB
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 464) to internal MCB Close/Open command causes Wrn MCB Fail (page 558)		
	External	Controller does not control the MCB at all. The MCB is controlled externally, when the MCB FEEDBACK (PAGE 464) gets changed, then the event "MCB Opened" or "MCB Closed" is recorded to the history log. Controller always accepts the MCB FEEDBACK (PAGE 464) without of issuing any alarm. The controller informs the superordinate system about the status of the breaker automaton using the signals ➤ LBO SYNCHRONIZATION (PAGE 495)	

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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	BTB
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><div></div><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></div>			

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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	BTB
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.			
<div>Example: If this setpoint is set to 10 seconds, the delay between another attempt to close the breaker will be 11 seconds.</div>			

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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	BTB
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.			

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Subgroup: Breaker Control Mode

Synchronization R to Mains

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	16047	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the direction of the BTB synchronization.			
Disabled	It is forbidden to synchronize the Bus Right to Bus Left if there is mains on left side.		
Enabled	It is allowed to synchronize the Bus Right to Bus Left if there is mains on left side.		

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Synchronization L to Mains

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	16048	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the direction of the BTB synchronization.			
Disabled	It is forbidden to synchronize the Bus Left to Bus Right if there is mains on right side.		
Enabled	It is allowed to synchronize the Bus Right to Bus Left if there is mains on left side.		

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Synchronization R to L

Setpoint group	Process Control	Related FW	1.0.0				
Range [units]	Enabled / Disabled [-]						
Default value	Enabled	Force value	NO				
Step	[-]						
Comm object	16049	Related applications	BTB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoint defines the direction of the BTB synchronization.							
<table><tr><td>Disabled</td><td>It is forbidden to synchronize the Bus Right Gensets to Bus Left Gensets.</td></tr><tr><td>Enabled</td><td>It is allowed to synchronize the Bus Right Gensets to Bus Left Gensets.</td></tr></table>				Disabled	It is forbidden to synchronize the Bus Right Gensets to Bus Left Gensets.	Enabled	It is allowed to synchronize the Bus Right Gensets to Bus Left Gensets.
Disabled	It is forbidden to synchronize the Bus Right Gensets to Bus Left Gensets.						
Enabled	It is allowed to synchronize the Bus Right Gensets to Bus Left Gensets.						

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Synchronization L to R

Setpoint group	Process Control	Related FW	1.0.0				
Range [units]	Enabled / Disabled [-]						
Default value	Enabled	Force value	NO				
Step	[-]						
Comm object	16050	Related applications	BTB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoint defines the direction of the BTB synchronization.							
<table><tr><td>Disabled</td><td>It is forbidden to synchronize the Bus Left Gensets to Bus Right Gensets.</td></tr><tr><td>Enabled</td><td>It is allowed to synchronize the Bus Left Gensets to Bus Right Gensets.</td></tr></table>				Disabled	It is forbidden to synchronize the Bus Left Gensets to Bus Right Gensets.	Enabled	It is allowed to synchronize the Bus Left Gensets to Bus Right Gensets.
Disabled	It is forbidden to synchronize the Bus Left Gensets to Bus Right Gensets.						
Enabled	It is allowed to synchronize the Bus Left Gensets to Bus Right Gensets.						

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BTB Opening

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	14028	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines whether the BTB is automatically opened (in AUTO mode) when both sides are dead.			
Disabled	BTB will not be automatically opened when both sides (Bus Left and Bus Right) are dead.		
Enabled	BTB is automatically opened when both sides (Bus Left and Bus Right) are dead.		

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Dead Bus Closing

Setpoint group	Process Control	Related FW	1.0.0
Range [units]	Disabled / Left To Right / Right To Left / Both [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	11038	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines whether the BTB might be automatically closed to deadbus (in AUTO mode).			
Disabled	Closing to dead bus is forbidden. Controller does not close breaker unless there is voltage on both sides.		
Left To Right	Closing to dead bus is allowed only if there is healthy voltage on Bus Left or both sides.		
Right To Left	Closing to dead bus is allowed only if there is healthy voltage on Bus Right or both sides.		
Both	Closing to dead bus is allowed if at least one of the buses is healthy, it does not matter whether Bus Left or Bus Right.		

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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	BTB
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 IntelliConfig or from controller's configuration menu.			

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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 137))		
Default value	200 kW (depends on the selected Power Formats And Units (page 137))	Force value	YES
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	19476	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal power imported from the Mains.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Current limit for current protections and maximal continuous current.			

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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	BTB
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			

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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	BTB
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>			

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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	BTB
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)

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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	BTB
Config level	Standard		
Setpoint visibility	Only ifConnection type (page 221) != High Leg D or Connection type (page 221) != MonoPhase		
Description			
Nominal Bus voltage (phase to neutral).			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal Bus voltage (phase to phase).			

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MainsAC 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	BTB
Config level	Standard		
Setpoint visibility	Only ifConnection type (page 221) != High Leg D or Connection type (page 221) != MonoPhase		
Description			
Nominal Mains voltage (phase to neutral).			

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Mains/Bus Nominal Voltage Ph-PhMains 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal Mains voltage (phase to phase).			

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the converting ratio of the voltage meas transformer used on Terminal Diagram			
<i>Note: This setpoint is applied on all three phases of Mains voltage.</i>			

Example:

- > No VT is in use - voltage conversion is 1/1
Mains VT Ratio = 1.00
- > VT 22kV/100V - voltage conversion is 22000/100
Mains VT Ratio = 220.00
- > VT 3.3kV/110V - voltage conversion is 3300/110
Mains VT Ratio = 30.00

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the converting ratio of the voltage meas transformer used on Terminal Diagram			
Note: This setpoint is applied on all three phases of Bus Right voltage.			
Example:			
<div><div>></div>No VT is in use - voltage conversion is 1/1 Bus VT Ratio = 1.00</div>			
<div><div>></div>VT 22kV/100V - voltage conversion is 22000/100 Bus VT Ratio = 220.00</div>			
<div><div>></div>VT 3.3kV/110V - voltage conversion is 3300/110 Bus VT Ratio = 30.00</div>			

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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 222) and Gen Nominal Voltage Ph-Ph (page 222)		
Default value	6.5 % of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)	Force value	NO
Step	0.1 % of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)		
Comm object	14473	Related applications	BTB

Config level	Advanced
Setpoint visibility	Always
Description	
This setpoint defines the percentage voltage level below which is Bus considered as dead.	

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjust the phase sequence of voltage terminals.			

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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	BTB
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.			

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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	BTB
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).			

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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	BTB				
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							

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
The display backlight is switched off when this timer exceed. When setpoint is adjusted to disabled then the display will be backlighted all the time.			

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Horn Timeout

Setpoint group	Basic settings	Related FW	1.0.0						
Range [units]	Disabled = 0; 1 .. 600; Horn Reset [s]								
Default value	10 s	Force value	NO						
Step	1 s								
Comm object	8264	Related applications	BTB						
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 492) is never activated</td></tr><tr><td>1 .. 600 [s]</td><td>Timeout for LBO HORN (PAGE 492). Output opens after this time elapses</td></tr><tr><td>Horn Reset</td><td>LBO HORN (PAGE 492) is active until button Horn Reset is pressed.</td></tr></table>				Disabled	Horn sound is disabled e.g. LBO HORN (PAGE 492) is never activated	1 .. 600 [s]	Timeout for LBO HORN (PAGE 492). Output opens after this time elapses	Horn Reset	LBO HORN (PAGE 492) is active until button Horn Reset is pressed.
Disabled	Horn sound is disabled e.g. LBO HORN (PAGE 492) is never activated								
1 .. 600 [s]	Timeout for LBO HORN (PAGE 492). Output opens after this time elapses								
Horn Reset	LBO HORN (PAGE 492) 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.									

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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	BTB
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.	

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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	BTB
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>			

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Subgroup: Battery Protections

Battery Undervoltage

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	8.0 V .. Battery Overvoltage (page 229) [V]		
Default value	18.0 V	Force value	NO
Step	0.1 V		
Comm object	8387	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for low battery voltage.			

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Battery Overvoltage

Setpoint group	Basic settings	Related FW	1.0.0
Range [units]	Battery Undervoltage (page 229) .. 40.0 [V]		
Default value	36.0 V	Force value	NO
Step	0.1 V		
Comm object	9587	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for high battery voltage.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for which battery voltage can be out of range given by setpoints Battery Undervoltage (page 229) and Battery Overvoltage (page 229) . After this delay elapses, appropriate alarm (Wrn Battery Undervoltage (page 538) or Wrn Battery Overvoltage (page 538)) is activated.			

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the rate of increasing of the "slow" Pulse Counter 1 (page 399) which is connected with LBI PULSE COUNTER 1 (PAGE 473) .			
Set this setpoint to OFF to turn the function off. See the chapter Pulse Counters (page 166) for more information.			

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the rate of increasing of the "slow" Pulse Counter 2 (page 400) which is connected with LBI PULSE COUNTER 2 (PAGE 473) .			
Set this setpoint to OFF to turn the function off. See the chapter Pulse Counters (page 166) for more information.			

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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	BTB
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 15)).</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>			

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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	BTB				
Config level	Standard						
Setpoint visibility	Always						
Description							
Communication protocol switch for on-board RS485.							
<table><tr><td>Direct</td><td>InteliConfig communication protocol via serial cable.</td></tr><tr><td>MODBUS</td><td>MODBUS protocol.</td></tr></table>				Direct	InteliConfig communication protocol via serial cable.	MODBUS	MODBUS protocol.
Direct	InteliConfig communication protocol via serial cable.						
MODBUS	MODBUS protocol.						

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
If the direct mode is selected on on-board RS485, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.			

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RS485 Modbus 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts communication mode of Modbus-RTU, Modbus/TCP (page 185) .			
Possible options			
8N1	8 data bits, 1 stop bit, no parity		
8N2	8 data bits, 2 stop bits, no parity		
8E1	8 data bits, 1 stop bit, even parity		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts communication speed of Modbus-RTU, Modbus/TCP (page 185).			

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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	BTB				
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 29) orTerminal Diagram (page 29) the Wrn CAN2 Empty (page 540) 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 the Terminal Diagram (page 29) or Terminal Diagram (page 29) the Wrn CAN2 Empty (page 540) 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 the Terminal Diagram (page 29) or Terminal Diagram (page 29) the Wrn CAN2 Empty (page 540) will be activated.						

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Group: Bus Left Settings

Subgroup: Overload Protection

Overload BOR

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	100 .. 200 [%] of Nominal DC Shore Power (page 219)		
Default value	120 % of Nominal DC Shore Power (page	Force value	YES

	219)		
Step	1 % of Nominal DC Shore Power (page 219)		
Comm object	8280	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		

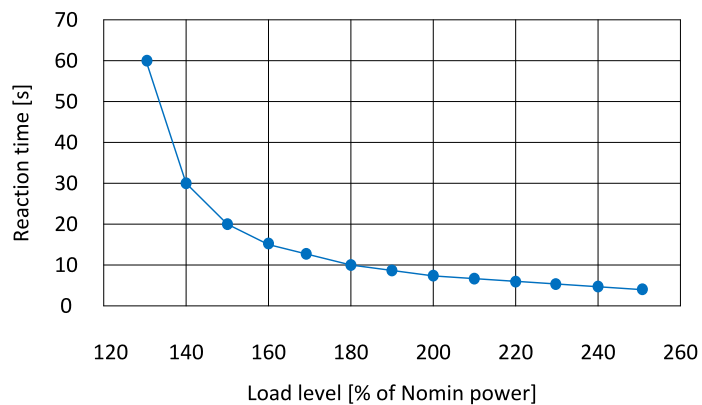
Description

This setpoint adjusts the relative power level, where the thermal overload protection starts to be evaluated. See setpoint **Overload Protection (page 244)** 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 235)**.

Note: Maximum reaction time is 3600 s after this time the protection is tripped.

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Overload Wrn

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	0 .. Overload BOR (page 233) [%]		
Default value	105 %	Force value	NO
Step	1 % of Nominal DC Shore Power (page 219)		
Comm object	9685	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of Bus (in % of Nominal DC Shore Power (page 219)) protection. This is only warning.			

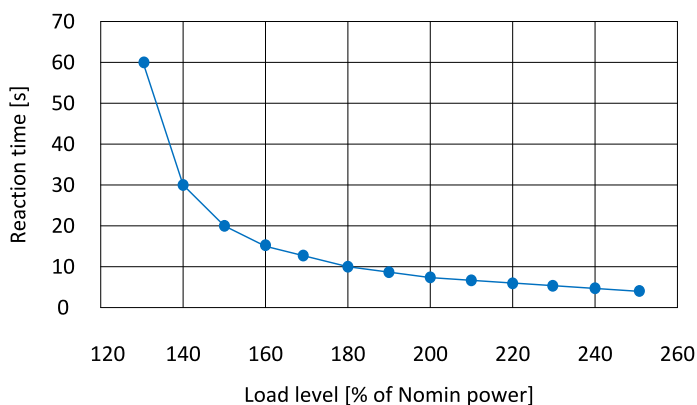
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Overload Delay

Setpoint group	Bus Left 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	BTB																										
Config level	Standard																												
Setpoint visibility	Always																												
Description																													
This setpoint adjusts the default delay for the thermal overload protection. See setpoint Overload Protection (page 244) 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 %																										

220	6
230	5.5
240	5
250	4.6

$$\text{Reaction time [s]} = \frac{2\text{POvrdStEvDel} * \text{OverldStrtEval}}{\text{MainsActivePower [\%]} - \text{OverldStrtEval}}$$



The reaction time of the thermal overload protection is not fixed; it depends on how much is the load above the limit of **Overload BOR** (page 233). The higher is the load the shorter the reaction time will be.

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Subgroup: Current Protection

Short Circuit

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	100 .. 500 [%] of Nominal Current (page 220)		
Default value	150 % of Nominal Current (page 220)	Force value	NO
Step	1 % of Nominal Current (page 220)		
Comm object	8282	Related applications	BTB
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.			

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Short Circuit Delay

Setpoint group	Bus Left 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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Short Circuit Protection.			

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IDMT Mains Overcurrent Delay

Setpoint group	Bus Left 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	BTB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint adjusts the delay for **IDMT Mains Overcurrent Protection (page 245)**.

IDMT curve shape selection. IDMT Overcurrent Delay is a reaction time of IDMT protection for 200% overcurrent $I_{Mains} = 2 \times \text{Nominal Current}$ (**page 220**)

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		
		≤ 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

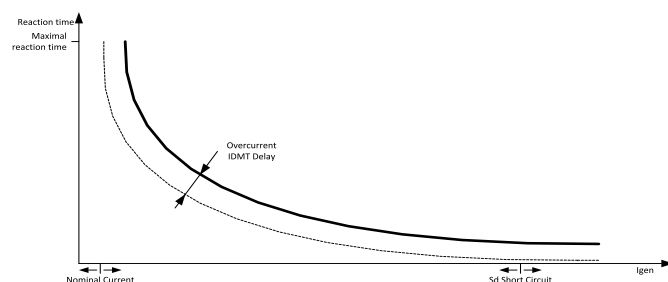


Image 7.1 IDMT Overcurrent Delay

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Current Unbalance

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	1 .. 200 [%] of Nominal DC Shore Power (page 219)		
Default value	50 % of Nominal DC Shore Power (page 219)	Force value	NO
Step	1 % of Nominal DC Shore Power (page 219)		
Comm object	8284	Related applications	BTB
Config level	Advanced		
Setpoint visibility	Only if Connection type (page 221) != MonoPhase		
Description			
This setpoint specifies the relative current threshold level for Current Unbalance Protection (page 247).			

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Current Unbalance Delay

Setpoint group	Bus Left 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	BTB
Config level	Advanced		
Setpoint visibility	Only if Connection type (page 221) != MonoPhase		
Description			
This setpoint specifies the delay for Current Unbalance Protection (page 247) .			

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Subgroup: Mains Voltage Protections

Mains Overvoltage

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	Mains Undervoltage (page 240) .. 150 [%]		
Default value	110.0 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)	Force value	YES
Step	0.1 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Comm object	8305	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Mains <>V Protection (page 248).			
Note: Mains Voltage L1-N (page 379), Mains Voltage L2-N (page 379), Mains Voltage L3-N (page 379), Mains Voltage L1-L2 (page 379), Mains Voltage L2-L3 (page 379) and Mains Voltage L3-L1 (page 380) are used for this protection.			

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Mains Overvoltage Delay

Setpoint group	Bus Left 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Mains <>V Protection (page 248) .			

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Mains Overvoltage Hys

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	0.0 .. 30.0 [%] of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Default value	0.0 [%] of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)	Force value	NO
Step	0.1 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Comm object	14132	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Mains <>V Protection (page 248).			

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Mains Undervoltage

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	50 .. Mains Overvoltage (page 239) [%]		
Default value	60 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)	Force value	YES
Step	1 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Comm object	8307	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Mains <>V Protection (page 248).			
Note: Mains Voltage L1-N (page 379), Mains Voltage L2-N (page 379), Mains Voltage L3-N (page 379), Mains Voltage L1-L2 (page 379), Mains Voltage L2-L3 (page 379) and Mains Voltage L3-L1 (page 380) are used for this protection.			

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Mains Undervoltage Delay

Setpoint group	Bus Left 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Mains <>V Protection (page 248) .			

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Mains Undervoltage Hys

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	0.0 .. 50.0 [%] of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Default value	0.0 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)	Force value	YES
Step	0.1 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Comm object	14130	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Mains <>V Protection (page 248).			

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Mains Voltage Unbalance

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	1 .. 200 [%] of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Default value	10 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)	Force value	YES
Step	1 % of MainsAC Shore Nominal Voltage Ph-N (page 223) and Mains/Bus Nominal Voltage Ph-PhMains Nominal Voltage Ph-Ph (page 223)		
Comm object	8446	Related applications	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Mains Voltage Unbalance Protection (page 250).			

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Mains Voltage Unbalance Delay

Setpoint group	Bus Left 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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Mains Voltage Unbalance Protection (page 250) .			

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Subgroup: Mains Frequency Protection

Mains Overfrequency

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	Mains Underfrequency (page 243) .. 150 [%]		
Default value	1.50 Hz	Force value	YES
Step	0.01 Hz		
Comm object	8310	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximal accepted frequency for Bus <>f Protection (page 254) .			

⬅ back to List of setpoints

Mains Overfrequency Hys

Setpoint group	Bus Left 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Bus <>f Protection (page 254) .			

⬅ back to List of setpoints

Mains Underfrequency

Setpoint group	Bus Left Settings	Related FW	1.0.0
Range [units]	50 .. Mains Overfrequency (page 243) [%]		
Default value	-1.50 Hz	Force value	YES
Step	0.01 Hz		
Comm object	14587	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts minimal accepted frequency for Bus <>f Protection (page 254) .			

⬅ back to List of setpoints

Mains Underfrequency Hys

Setpoint group	Bus Left 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the hysteresis for return from Bus <>f Protection (page 254) .			

⬅ 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Bus <>f Protection (page 254) .			

⬅ 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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Overload Protection.			
Behavior of protection is adjusted via setpoints Overload BOR (page 233) and Overload Delay (page			

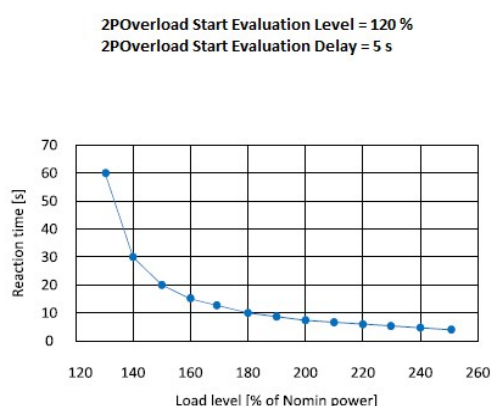
235). This protection activates alarm **Hst IDMT Overload (page 580)**.

The reaction time is calculated by this formula:

$$\text{Reaction time} = \frac{2\text{POverload Start Evaluation Level} \times 2\text{POverload Start Evaluation Delay}}{\frac{\text{Bus Left P}}{\text{Nominal Power}} \times 100 \times 2\text{POverload Start Evaluation Level}}$$

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

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:

- 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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) /
PROTECTION FORCE DISABLE 3 (PAGE 472).

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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	BTB
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 237) . This			

protection activates alarm **MPR IDMT Mains >A (page 580)**.

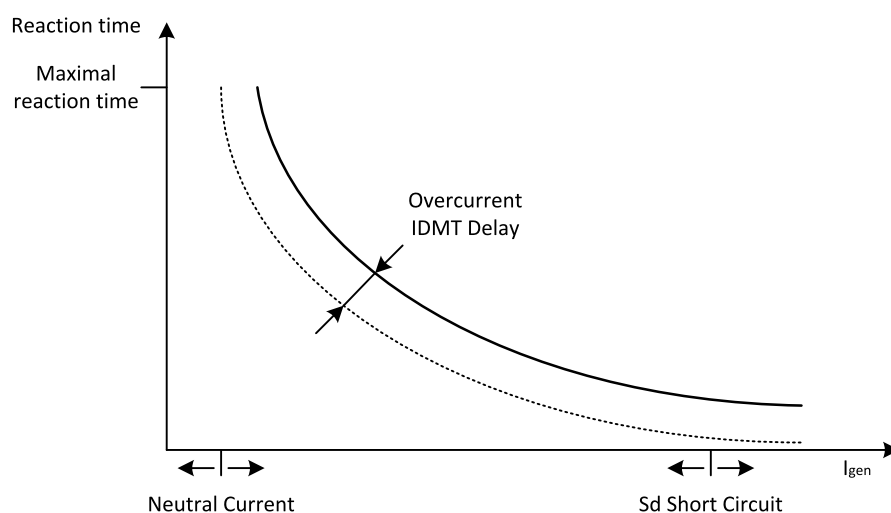
The reaction time is calculated by this formula:

$$\text{Reaction time} = \frac{\text{IDMT Bus Left } >A \text{ Delay} \times \text{Nominal Current}}{I_{\text{bus}} - \text{Nominal Current}}$$

I_{Mains} = Maximum (Mains Current L1 (page 381), Mains Current L2 (page 381) and Mains Current L3 (page 381))

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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) /
PROTECTION FORCE DISABLE 3 (PAGE 472).**

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

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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	BTB
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 238)** and **Current Unbalance Delay (page 238)**. When relative difference between Mains currents is over setpoint **Current Unbalance (page 238)** for time longer than **Current Unbalance Delay (page 238)** alarm **MPR Current Unbalance (page 580)** is activated.

IMPORTANT: Behavior of this protection is influenced by setpoint Connection type (page 221)

Connection type (page 221)	Compared values (maximum difference)
3Ph4Wire	(Mains Current L1 (page 381), Mains Current L2 (page 381), Mains Current L3 (page 381))
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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

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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	BTB
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 248) and Short Circuit Delay (page 237) . When value of Mains Current L1 (page 381) , Mains Current L2 (page 381) and Mains Current L3 (page 381) related to Nominal Current (page 220) cross over Short Circuit (page 236) for time longer than Short Circuit Delay (page 237) alarm MPR Short Circuit (page 580) 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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.			

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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	BTB
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 239) , Mains Overvoltage Delay (page 239) and Mains Overvoltage Hys (page 240) . When Mains voltage exceeds limit set by Mains Overvoltage (page 239) for period longer than Mains Overvoltage Delay (page 239) relevant history records is written to the history and MCB is opened if:			

- > **Controller mode (page 226) = OFF**
- > **Controller mode (page 226) = MAN**
and **Breaker state (page 400) = ParalOper**
- > **Controller mode (page 226) = AUTO**

Return from Mains >V can have hysteresis set by **Mains Overvoltage Hys (page 240)**.

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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) /
PROTECTION FORCE DISABLE 3 (PAGE 472).**

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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	BTB
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 242)** and **Mains Voltage Unbalance Delay (page 242)**.

IMPORTANT: Behavior of this protection is influenced by setpoint Connection type (page 221)

Connection type (page 221)	Compared values (maximum difference)
3Ph4Wire	Mains Voltage L1-N (page 379), Mains Voltage L2-N (page 379) and Mains Voltage L3-N (page 379) OR Mains Voltage L1-L2 (page 379), Mains Voltage L2-L3 (page 379) and Mains Voltage L3-L1 (page 380)
High Leg D	Mains Voltage L1-L2 (page 379), Mains Voltage L2-L3 (page 379) and Mains Voltage L3-L1 (page 380)
3Ph3Wire	Mains Voltage L1-L2 (page 379), Mains Voltage L2-L3 (page 379) and Mains Voltage L3-L1 (page 380)
SplitPhase	Mains Voltage L1-N (page 379), Mains Voltage L2-N (page 379) and Mains Voltage L3-N (page 379)
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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).

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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	BTB														
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 256) .																	
When Bus voltage exceeds limit set by Bus Undervoltage (page 256) appropriate alarm is activated.																	
<table><tr><td>Value</td><td>Alarm</td></tr><tr><td>Bus Voltage L1-N (page 389)</td><td>Hst Bus Overvoltage L1-N (page 569)</td></tr><tr><td>Bus Voltage L2-N (page 389)</td><td>Hst Bus Overvoltage L2-N (page 569)</td></tr><tr><td>Bus Voltage L3-N (page 389)</td><td>Hst Bus Overvoltage L3-N (page 569)</td></tr><tr><td>Bus Voltage L1-L2 (page 389)</td><td>Hst Bus Overvoltage L1-L2 (page 569)</td></tr><tr><td>Bus Voltage L2-L3 (page 390)</td><td>Hst Bus Overvoltage L2-L3 (page 570)</td></tr><tr><td>Bus Voltage L3-L1 (page 390)</td><td>Hst Bus Overvoltage L3-L1 (page 570)</td></tr></table>				Value	Alarm	Bus Voltage L1-N (page 389)	Hst Bus Overvoltage L1-N (page 569)	Bus Voltage L2-N (page 389)	Hst Bus Overvoltage L2-N (page 569)	Bus Voltage L3-N (page 389)	Hst Bus Overvoltage L3-N (page 569)	Bus Voltage L1-L2 (page 389)	Hst Bus Overvoltage L1-L2 (page 569)	Bus Voltage L2-L3 (page 390)	Hst Bus Overvoltage L2-L3 (page 570)	Bus Voltage L3-L1 (page 390)	Hst Bus Overvoltage L3-L1 (page 570)
Value	Alarm																
Bus Voltage L1-N (page 389)	Hst Bus Overvoltage L1-N (page 569)																
Bus Voltage L2-N (page 389)	Hst Bus Overvoltage L2-N (page 569)																
Bus Voltage L3-N (page 389)	Hst Bus Overvoltage L3-N (page 569)																
Bus Voltage L1-L2 (page 389)	Hst Bus Overvoltage L1-L2 (page 569)																
Bus Voltage L2-L3 (page 390)	Hst Bus Overvoltage L2-L3 (page 570)																
Bus Voltage L3-L1 (page 390)	Hst Bus Overvoltage L3-L1 (page 570)																
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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).																	
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.																	

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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	BTB
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 257) and **Bus V Unbalance Delay** (page 257). When relative difference between Bus voltages is over setpoint **Bus V Unbalance** (page 257) for time longer than **Bus V Unbalance Delay** (page 257) alarm **Hst Bus Voltage Unbalance Ph-N** (page 572) or **Hst Bus Voltage Unbalance Ph-Ph** (page 572) is activated.

IMPORTANT: Behavior of this protection is influenced by setpoint **Connection type** (page 221)

Connection type (page 221)	Compared values (maximum difference)
3Ph4Wire	Bus Voltage L1-N (page 389), Bus Voltage L2-N (page 389) and Bus Voltage L3-N (page 389) OR Bus Voltage L1-L2 (page 389), Bus Voltage L2-L3 (page 390) and Bus Voltage L3-L1 (page 390)
High Leg D	Bus Voltage L1-L2 (page 389), Bus Voltage L2-L3 (page 390) and Bus Voltage L3-L1 (page 390)
3Ph3Wire	Bus Voltage L1-L2 (page 389), Bus Voltage L2-L3 (page 390) and Bus Voltage L3-L1 (page 390)
SplitPhase	Bus Voltage L1-N (page 389), Bus Voltage L2-N (page 389) and Bus Voltage L3-N (page 389)
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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) /
PROTECTION FORCE DISABLE 3 (PAGE 472).

IMPORTANT: If this protection is disabled, the MGCB cannot be closed.

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts the behavior Mains >f Protection.			
<div><div>></div> Controller mode (page 226) = OFF</div>			
<div><div>></div> Controller mode (page 226) = MAN and Breaker state (page 400) = ParalOper</div>			
<div><div>></div> Controller mode (page 226) = AUTO</div>			
Return from Mains >f can have hysteresis set by Mains Overfrequency Hys (page 243) .			
Note: f_{max} = Nominal Frequency (page 225) + Mains Overfrequency (page 243)			
Setpoint options:			
<div><div>></div> Enabled / Disabled: Protection is enabled / disabled.</div>			
<div><div>></div> Protection Force Disable 1 / 2 / 3: Protection is enabled or disabled by the state of LBI PROTECTION FORCE DISABLE 1 (PAGE 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).</div>			

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Bus >f Protection.			
Behavior of protection is adjusted via setpoint Bus Right Overfrequency (page 258) . When Bus Frequency (page 389) exceeds maximal accepted frequency for period longer than Bus Right <>f Delay (page 258) alarm Hst Bus Overfrequency (page 572) is activated.			
Note: $f_{max} = \text{Nominal Frequency (page 225)} + \text{Bus Right Overfrequency (page 258)}$			
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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.			

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables or disables Bus Measurement Error protection.			
Alarm Wrn Bus Meas Error (page 538) is activated if controller detects a mismatch between the expected and currently measured voltage on the bus for period longer than 20 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 471) / PROTECTION FORCE DISABLE 2 (PAGE 472) / PROTECTION FORCE DISABLE 3 (PAGE 472).			
IMPORTANT: If this protection is disabled, the MGCB cannot be closed.			

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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	BTB
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjust the phase sequence of voltage terminals.			

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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 222) and Gen Nominal Voltage Ph-Ph (page 222) [%]		
Default value	120 % of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)	Force value	YES
Step	1 % of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)		
Comm object	8291	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Bus <>V Protection (page 251).			
<i>Note: Bus Voltage L1-N (page 389), Bus Voltage L2-N (page 389), Bus Voltage L3-N (page 389), Bus Voltage L1-L2 (page 389), Bus Voltage L2-L3 (page 390) and Bus Voltage L3-L1 (page 390) are used for this protection.</i>			

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Bus Overvoltage

Setpoint group	Generator settings	Related FW	1.0.0
Range [units]	20 .. 99 [%] of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)		
Default value	90 % of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)	Force value	YES
Step	1 % of Gen AC Bus Nominal Voltage Ph-N (page 222) and Gen Nominal Voltage Ph-Ph (page 222)		
Comm object	8293	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the relative voltage threshold level for Bus <>V Protection (page 251).			
<i>Note: Bus Voltage L1-N (page 389), Bus Voltage L2-N (page 389), Bus Voltage L3-N (page 389), Bus Voltage L1-L2 (page 389), Bus Voltage L2-L3 (page 390) and Bus Voltage L3-L1 (page 390) are used for this protection.</i>			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Bus <>V Protection (page 251) .			

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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	BTB
Config level	Advanced		
Setpoint visibility	Only if Connection type (page 221) != MonoPhase		
Description			
This setpoint specifies the relative voltage threshold level for Bus Voltage Unbalance Protection (page 251) .			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Connection type (page 221) != MonoPhase		
Description			
This setpoint specifies the delay for Bus Voltage Unbalance Protection (page 251) .			

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Subgroup: Bus Frequency Protection

Bus Right 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximal accepted frequency for Bus <>f Protection (page 254) .			
Note: $f_{max} = \text{Nominal Frequency (page 225)} + \text{Bus} > f$			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximal accepted frequency for Bus <>f Protection (page 254) .			
Note: f_{min} = Nominal Frequency (page 225) - Bus <f			

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Bus Right <>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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint specifies the delay for Bus <>f Protection (page 254) .			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects the Power Management (page 138) function mode.			
ABS [kW]	The Power Management (page 138) is based on Nominal DC Shore Power (page 219) of each unit.		
N/A Mode	Power Management mode which has been set via CAN2 (page 16) (Communication peripherals (page 15)) is not supported in this controller. Alarm Wrn Unsupported PMS Mode (page 566) is active.		
REL [%]	The Power Management (page 138) is based on relative load, i.e. ratio of Total Running P (page 393) to Nominal DC Shore Power (page 219) .		

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 29)** and/or **Terminal Diagram (page 29)** . Change of this setpoint will be reflected in all controllers.

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#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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects the optimization of Power Management (page 138) 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 278) .		
N/A Mode	Power Management mode, which has been set via CAN2 (page 16) (Communication peripherals (page 15)) , 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 29)** and/or **Terminal Diagram (page 29)** . Change of this setpoint will be reflected in all controllers.

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#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	BTB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint adjusts the delay of the system activation after the LBI Remote Start/Stop has been activated.

Note: *System Start Delay countdown is changed to 1 second for parallel operation (Bus is in parallel with Mains).*

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 29)** and/or **Terminal Diagram (page 29)** . Change of this setpoint will be reflected in all controllers.

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#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	BTB
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint adjusts the delay of the system deactivation after the LBI Remote Start/Stop has been deactivated.

Note: *System Stop Delay countdown is changed to 1 second for parallel operation (Bus is in parallel with Mains).*

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 29)** and/or **Terminal Diagram (page 29)** . Change of this setpoint will be reflected in all controllers.

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to enable/disable use of the Dynamic Spinning Reserve (page 157) functionality in power management.			

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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 263) [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	60 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8489	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 1 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
Note: <i>If the absolute power management is selected, this setpoint (or the setpoints #Starting Load Reserve 2 (page 265) 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).</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 1 (page 262) .. 32000 [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	110 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8491	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 1 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. 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 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Starting Rel Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Load Reserve 1 (page 263) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10648	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 1 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Rel Load Reserve 1

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 1 (page 264) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10652	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 1 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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 266) [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	410 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8490	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 2 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
Note: <i>If the absolute power management is selected, this setpoint (or the setpoints #Starting Load Reserve 2 (page 265) 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).</i>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 2 (page 265) .. 32000 [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	460 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8633	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 2 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. 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 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Starting Rel Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Rel Load Reserve 2 (page 267) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10649	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 2 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Rel Load Reserve 2

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 2 (page 267) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10653	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 2 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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 269) [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	410 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8831	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 3 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 3 (page 268) .. 32000 [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	460 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8833	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 3 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. 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 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Starting Rel Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Rel Load Reserve 3 (page 270) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10650	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 3 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Rel Load Reserve 3

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 3 (page 270) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10654	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 3 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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 272) [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	410 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8832	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required minimal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 4 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Load Reserve 4 (page 271) .. 32000 [kW] (depends on the selected Power Formats And Units (page 137))		
Default value	460 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	8834	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = ABS [kW]		
Description			
<p>This setpoint adjusts required maximal Actual Reserve (page 391) for Power Management (page 138) function.</p> <p>If Load Reserve Set 4 is activated and Actual Reserve (page 391) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. 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 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Starting Rel Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. #Stopping Rel Load Reserve 4 (page 273) [%]		
Default value	60 %	Force value	NO
Step	1 %		
Comm object	10651	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required minimal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 4 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#Stopping Rel Load Reserve 4

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	#Starting Rel Load Reserve 4 (page 273) .. 110 [%]		
Default value	80 %	Force value	NO
Step	1 %		
Comm object	10655	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Power Management Mode (page 259) = REL [%]		
Description			
<p>This setpoint adjusts required maximal Actual Relative Reserve (page 395) for Power Management (page 138) function.</p> <p>If Load Reserve Set 4 is activated and Actual Relative Reserve (page 395) 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, Load Res 3 Active and Load Res 4 Active in any other controller on CAN. If none of these inputs is active the Load Reserve Set 1 is selected.</p>			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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Subgroup: Minimal Running Power

#Min Run Power

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 65000 [kW] (depends on the selected Power Formats And Units (page 137)))		
Default value	210 kW (depends on the selected Power Formats And Units (page 137)))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137)))		
Comm object	9584	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts required Minimal Running Power (page 395) of Controllers if Minimal Running Power 1 is chosen.			
There are 3 Minimal Running Power options. This one is activated by LBI Min Run Power Act 1 in any other controller on CAN.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#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 137)))		
Default value	210 kW (depends on the selected Power Formats And Units (page 137)))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137)))		
Comm object	9585	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts required Minimal Running Power (page 395) 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 in any other controller on CAN.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#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 137))		
Default value	210 kW (depends on the selected Power Formats And Units (page 137))	Force value	NO
Step	1 kW (depends on the selected Power Formats And Units (page 137))		
Comm object	9586	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts required Minimal Running Power (page 395) 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 in any other controller on CAN.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay before next Controller is started after Actual Reserve (page 391) / Actual Relative Reserve (page 395) drops bellow Starting Load Reserve of currently active Load Reserve Set.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay before next Controller is stopped after Actual Reserve (page 391) / Actual Relative Reserve (page 395) rises over Stopping Load Reserve of currently active Load Reserve Set.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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	BTB
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 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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	BTB
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 277) right after the delay #Overload Next Start Delay (page 278) . #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 393) of PM Controllers related to Running Nominal Power In PM (page 394) is over #Overload Next Start Level (page 277) , another Controller is started after #Overload Next Start Delay (page 278) .	

IMPORTANT: This setpoint is shared via **Terminal Diagram (page 29)** and/or **Terminal Diagram (page 29)** . Change of this setpoint will be reflected in all controllers.

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#Overload Next Start Level

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	0 .. 100 [%] of Running Nominal Power In PM (page 394)		
Default value	80 % of Running Nominal Power In PM (page 394)	Force value	NO
Step	1 % of Running Nominal Power In PM (page 394)		
Comm object	14941	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if #Overload Next Start Protection (page 277) = Enabled		
Description			
This setpoint adjusts the minimal load for #Overload Next Start Protection (page 277).			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#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	BTB
Config level	Standard		
Setpoint visibility	Only if #Overload Next Start Protection (page 277) = Enabled		
Description			
This setpoint adjusts the delay for #Overload Next Start Protection (page 277).			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximal difference between Running hours of Controllers in Power Management (page 138) function if #Priority Auto Swap (page 260) .			
If the difference between Running hours of Controllers is over this limit, priorities are swapped.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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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	BTB
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 260) = Efficient.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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#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	BTB
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 260) = Efficient.			
IMPORTANT: This setpoint is shared via Terminal Diagram (page 29) and/or Terminal Diagram (page 29) . Change of this setpoint will be reflected in all controllers.			

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Subgroup: Group Settings

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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to select which group is located at the left side of the group link breaker. (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.			

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Group Link R

Setpoint group	Power Management	Related FW	1.0.0
Range [units]	1 .. 32 [-]		
Default value	1 [-]	Force value	YES
Step	1 [-]		
Comm object	10591	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to select which group is located at the right side of the group link breaker. (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.			

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Group: 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the type of Synchronization (page 101) .			
➤ PhaseMatch			
This type of synchronization is based on voltage and phase shift match. Limits are adjusted via setpoints Voltage Window (page 282) and Phase Window (page 283) . When voltage and phase shift match the breaker close command is sent after Dwell Time (page 283) is elapsed.			
➤ SlipSynchr			
This type of synchronization regulates the voltage to match Voltage Window (page 282) and Bus Frequency (page 389) to match the Slip Frequency (page 284) . When this frequency is reached, Dwell Time (page 283) 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 MCB Latency (page 284).			
Note: Synchronization is not allowed if there is any already synchronized Mains Controller in the control group.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximum duration of Synchronization (page 101) .			
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>			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximal voltage difference between respective phases of Mains and Bus for Synchronization (page 101). (Bus Voltage L1-N (page 389), Mains Voltage L1-N (page 379), Bus Voltage L2-N (page 389),Mains Voltage L2-N (page 379), ...)			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 281) = PhaseMatch		
Description			
This setpoint adjusts the maximal Slip Angle (page 382) for Synchronization (page 101) . In order to disable breaker close command, adjust this setpoint to 0. Synchronization procedure will be active for Synchronization Timeout (page 282) or until breaker is closed from an external device.			

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Phase window

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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to compensate phase shift which is caused by transformer.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
The period of time that the phase angle difference must be within Phase Window (page 283) and voltage difference within Voltage Window (page 282) before the breaker is closed.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 281) = SlipSynchr		
Description			
This setpoint adjusts the required Bus Frequency (page 389) during synchronization while Synchronization Type (page 281) = SlipSynchr.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 281) = SlipSynchr		
Description			
Window of slip frequency for slip synchronization (Synchronization Type (page 281) = SlipSynchr).			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Synchronization Type (page 281) = SlipSynchr		
Description			
Latency of MCB.			
IMPORTANT: This setpoint is enable, when Synchronization Type (page 281) has Split Synchro value			

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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	BTB
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 <i>Regulation Loops (page 167)</i> for more information.			

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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	BTB
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 (page 167)</i> for more information.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop.			
Note: During synchronization, first the frequency loop is started to match the System frequency with the mains or bus and after that the phase angle loop is started to match the phase angle.			
Note: See the chapter <i>Regulation Loops</i> (page 167) for more information.			

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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	BTB
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 167) for more information.			

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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	BTB
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 167)</i> for more information.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 1 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 2 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 3 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 4 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 5 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 6 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 7 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 8 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 9 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 10 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 11 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 12 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 13 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 14 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 15 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts behavior of User Button 16 which is part of User Buttons (page 171) .			
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Real time clock adjustment.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Actual date adjustment.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Time interval for periodic history records.			

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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	BTB
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>			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoints is used to enable or disable daylight saving time.			
<div><div>➤</div><div>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.</div></div>			
<div><div>➤</div><div>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 297).</div></div>			
<div><div>➤</div><div>DISABLED - Time mode is fixedly set to STD and the function does not perform any changes of RTC time.</div></div>			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if DST Switching Mode = Manual		
Description			
In manual DST Switching Mode (page 297) 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.			

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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	BTB
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.		

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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	BTB
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 300).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 1 (PAGE 489) 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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Timer 1 Function (page 299) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 1. See Exercise Timers (page 111) for step by step manual.			

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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	BTB
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 302).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 2 (PAGE 489) 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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Timer 2 Function (page 301) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 2. See Exercise Timers (page 111) for step by step manual.			

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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	BTB
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 304).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 3 (PAGE 490) 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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Timer 3 Function (page 303) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 3. See Exercise Timers (page 111) for step by step manual.			

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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	BTB
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 306).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 4 (PAGE 490) 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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Timer 4 Function (page 305) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 4. See Exercise Timers (page 111) for step by step manual.			

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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	BTB
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 308).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 5 (PAGE 490) 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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Timer 5 Function (page 307) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 5. See Exercise Timers (page 111) for step by step manual.			

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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	BTB
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 310).</p> <p>Once the Timer is activated the LBO EXERCISE TIMER 6 (PAGE 491) 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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if Timer 6 Function (page 309) != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 6. See Exercise Timers (page 111) for step by step manual.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enable or disable module in slot A.			

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Subgroup: Slot B

Slot B

Setpoint group	Plug-In Modules	Related FW	1.0.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	Force value	NO
Step	[-]		
Comm object	24279	Related applications	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enable or disable module in slot B.			

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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	BTB
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 15) .			
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if IP Address Mode (page 311) = Automatic		
Description			
This setpoint enables to enter DNS server addresses for Communication peripherals (page 15) manually, even with the IP Address Mode (page 311) 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		

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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	BTB				
Config level	Standard						
Setpoint visibility	Always						
Description							
This setpoints enables or disables the built-in Firewall (page 118) functionality for Communication peripherals (page 15) .							
<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							

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables AirGate connection (page 59) function.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This port is used to listen for an incoming TCP connection on Communication peripherals (page 15) .			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enables or disables Modbus communication via Communication peripherals (page 15) .			

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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	BTB
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.			

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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	BTB
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>			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 317) != Disabled		
Description			
IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

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SNMP Traps IP Address 2

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24094	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 317) != Disabled		
Description			
IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

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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	BTB
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>			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB						
Config level	Standard								
Setpoint visibility	Always								
Description									
This setpoint selects encryption type for SMTP session.									
<table><tr><td>NONE</td><td>Session is without of any encryption.</td></tr><tr><td>SSL/TLS</td><td>Encrypted channel is created first and only after that session is created.</td></tr><tr><td>STARTTLS</td><td>Session is created without of encryption and after command STARTTLS it is switched to encrypted session.</td></tr></table>				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.
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.								

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to set the language of Event, Warning, etc. e-mails.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Event Messages.			

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BOR 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Breaker Open Messages.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Description			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Warning Messages.			

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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	BTB
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.			

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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	BTB
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>			

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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	BTB
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>			

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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	BTB								
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										

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM1 Mode (page 325)		
Description			
If the direct mode is selected on COM1 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.			

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COM1 Modbus 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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts communication mode of Modbus-RTU.			
Possible options			
8N1	8 data bits, 1 stop bit, no parity		
8N2	8 data bits, 2 stop bits, no parity		
8E1	8 data bits, 1 stop bit, even parity		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM1 Mode (page 325)		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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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	BTB								
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										

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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	BTB
Config level	Standard		

Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM2 Mode (page 327)
Description	
If the direct mode is selected on COM2 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.	

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COM2 Modbus 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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts communication mode of Modbus-RTU.			
Possible options			
8N1	8 data bits, 1 stop bit, no parity		
8N2	8 data bits, 2 stop bits, no parity		
8E1	8 data bits, 1 stop bit, even parity		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint COM2 Mode (page 327)		
Description			
If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjust the communication mode of module.			

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Network Mode

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	2G / 3G / 4G / Automatic [-]		
Default value	Automatic	Force value	NO
Step	[-]		
Comm object	24132	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts preferred connection type of CM-4G-GPS module.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
APN (Access Point Name) of the network, provided by GSM operator.			

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Connection Check IP1

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	"empty"	Force value	NO
Step	[-]		
Comm object	23978	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
IP address of reliable server in the internet.			
To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working.			
This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection.			
If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled			

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Connection Check IP2

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	"empty"	Force value	NO
Step	[-]		
Comm object	23977	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
IP address of reliable server in the internet.			
To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working.			
This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection.			
If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled			

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Connection Check IP3

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	"empty"	Force value	NO
Step	[-]		
Comm object	23976	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
IP address of reliable server in the internet.			
To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working.			
This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection.			
If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled			

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Subgroup: TCP/IP Settings

DNS Mode

Setpoint group	CM-4G-GPS	Related FW	1.0.0				
Range [units]	Automatic / Manual [-]						
Default value	Automatic	Force value	NO				
Step	[-]						
Comm object	23988	Related applications	BTB				
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 329) 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 333) and DNS IP Address 2 (page 334) 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 333) and DNS IP Address 2 (page 334) 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 333) and DNS IP Address 2 (page 334) can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work						

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DNS IP Address 1

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	24314	Related applications	BTB
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 333) 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 333) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

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DNS IP Address 2

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	23986	Related applications	BTB
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 333) 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 333) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

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IP Firewall

Setpoint group	CM-4G-GPS	Related FW	1.0.0				
Range [units]	ENABLED / DISABLED [-]						
Default value	DISABLED	Force value	NO				
Step	[-]						
Comm object	23959	Related applications	BTB				
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)						

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
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 353) .		
IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.			

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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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
This port is used for TCP communication with the AirGate server.			
Note: Use port 54440 for standard ComAp AirGate service.			

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Subgroup: ComAp Client Settings

Direct Connection

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23961	Related applications	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

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ComAp Client Inactivity Timeout

Setpoint group	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	BTB
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.			

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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	BTB
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>			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB						
Config level	Standard								
Setpoint visibility	Always								
Description									
This setpoint selects encryption type for SMTP session.									
<table><tr><td>NONE</td><td>Session is without of any encryption.</td></tr><tr><td>SSL/TLS</td><td>Encrypted channel is created first and only after that session is created.</td></tr><tr><td>STARTTLS</td><td>Session is created without of encryption and after command STARTTLS it is switched to encrypted session.</td></tr></table>				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.
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.								

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to set the language of Event, Warning, etc. e-mails.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Event Messages.			

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BOR 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Breaker Open Messages.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Warning Messages.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
If GPS tracking is enabled the module sends position/speed data to the controller with period 10 s.			

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Subgroup: RTC Synchronization

NTP Clock Sync

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	23964	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server. The period of synchronization is 1 hour or when the cotnroller is reset or when the setpoint is reset (Enabled->Disabled->Enabled).			

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NTP Server

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	[-]		
Default value	pool.ntp.org	Force value	NO
Step	[-]		
Comm object	23963	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

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GPS Clock Sync

Setpoint group	CM-4G-GPS	Related FW	1.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	Force value	NO
Step	[-]		
Comm object	23974	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint Internet Connection (page 329)		
Description			
This setpoint is used to enable/disable synchronization of the controller's time with the exact time from GPS.			
The module sends UTC timestamp to the controller after reset/power on and then in period of 60 minutes.			

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Time Zone

Setpoint group	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	BTB
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>			

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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	BTB
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.		

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint IP Address Mode (page 348)		
Description			
<p>The setpoint is used to set the address when you are in static mode .</p> <p>If IP Address Mode (page 348) 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 348) is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.</p> <p>If IP Address Mode (page 348) is DISABLED Ethernet terminal is disabled.</p> <p>Note: Only valid IP address can be inserted.</p>			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint IP Address Mode (page 348)		
Description			
The setpoint is used to select the method how the Subnet Mask is adjusted.			
If IP Address Mode (page 348) 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 348) is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.			
If IP Address Mode (page 348) is DISABLED Ethernet terminal is disabled.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint IP Address Mode (page 348)		
Description			
<p>The setpoint is used to select the method how the Gateway IP is adjusted.</p> <p>If IP Address Mode (page 348) 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 348) is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.</p> <p>If IP Address Mode (page 348) 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>			

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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	BTB				
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 348) 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 351) and DNS IP Address 2 (page 351) 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 351) and DNS IP Address 2 (page 351) 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 351) and DNS IP Address 2 (page 351) can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work						

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DNS IP Address 1

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	23947	Related applications	BTB
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 348) 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 348) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.</p> <p>If IP Address Mode (page 348) is DISABLED Ethernet terminal is disabled.</p>			

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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	BTB
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 348) 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 348) is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			
If IP Address Mode (page 348) is DISABLED Ethernet terminal is disabled.			

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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	BTB				
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)						

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables AirGate connection (page 59) function.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

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ComAp Client Inactivity Timeout

Setpoint group	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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable Modbus communication via ethernet interface.			

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MODBUS Client Inactivity Timeout

Setpoint group	CM-Ethernet	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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time.			

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Subgroup: SNMP Settings

SNMP Agent

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	23936	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable SNMP Agent.			

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SNMP Trap Format

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	v1Trap / v2Notif / v2Inform [-]		
Default value	v1Trap	Force value	NO
Step	[-]		
Comm object	23922	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts type of SNMP traps.			

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SNMP Traps IP Address 1

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	0 .. 63 characters [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24095	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 317) != Disabled		
Description			
IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

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SNMP Traps IP Address 2

Setpoint group	CM-EthernetEthernet	Related FW	1.0.0
Range [units]	Valid IP address [-]		
Default value	-	Force value	NO
Step	[-]		
Comm object	24094	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 317) != Disabled		
Description			
IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

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SNMP RD Community String

Setpoint group	CM-Ethernet	Related FW	1.0.0
Range [units]	0..31 characters [-]		
Default value	public	Force value	NO
Step	[-]		
Comm object	24335	Related applications	BTB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 317) != Disabled		
Description			
SNMP Community String only for reading.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if SNMP Agent (page 317) = SNMP v1/v2c		
Description			
SNMP Community String for writing and reading.			

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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	BTB
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>			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB						
Config level	Standard								
Setpoint visibility	Always								
Description									
This setpoint selects encryption type for SMTP session.									
<table><tr><td>NONE</td><td>Session is without of any encryption.</td></tr><tr><td>SSL/TLS</td><td>Encrypted channel is created first and only after that session is created.</td></tr><tr><td>STARTTLS</td><td>Session is created without of encryption and after command STARTTLS it is switched to encrypted session.</td></tr></table>				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.
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.								

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Enter a valid e-mail address where event and alarm messages will be sent.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to set the language of Event, Warning, etc. e-mails.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Event Messages.			

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BOR 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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Breaker Open Messages.			

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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	BTB
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables or disables sending of Warning Messages.			

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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	BTB
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>			

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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	BTB
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.			

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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	BTB
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

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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	BTB
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>			

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8.1.3 Values

What values are:

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

For full list of values go to the chapter **List of values (page 369)**

Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- The value is not being evaluated in the scope of the current application and configuration.
- Sensor fail has been detected on an analog input.
- The configured ECU or extension module does not provide the particular value.
- The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as “####” in IntelliConfig and on the controller screen. If such a value is read out via MODBUS, it will contain the data 32768 in the case of signed values and 65535 in the case of unsigned values.

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Group: Mains

Mains Import P

Value group	Mains	Related FW	1.0.0
Units	kW		
Comm object	8703	Related applications	BTB
Description			
Imported active power [kW] from Mains.			

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Mains Import P L1

Value group	Mains	Related FW	1.0.0
Units	kW		
Comm object	8805	Related applications	BTB
Description			
Imported active power [kW] from L1 phase of the Mains.			

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Mains Import P L2

Value group	Mains	Related FW	1.0.0
Units	kW		
Comm object	8806	Related applications	BTB
Description			
Imported active power [kW] from L2 phase of the Mains.			

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Mains Import P L3

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8807	Related applications	BTB
Description			
Imported active power [kW] from L3 phase of the Mains.			

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Mains Import Q

Value group	Value Group Mains	Related FW	1.0.0
Units	kVAr		
Comm object	8704	Related applications	BTB
Description			
Imported reactive power [kVAr] from Mains.			

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Mains Import Q L1

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8808	Related applications	BTB
Description			
Imported reactive power [kVAr] from L1 phase of the Mains.			

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Mains Import Q L2

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8809	Related applications	BTB
Description			
Imported reactive power [kVAr] from L2 phase of the Mains.			

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Mains Import Q L3

Value group	Value Group Mains	Related FW	1.0.0
Units	kW		
Comm object	8810	Related applications	BTB
Description			
Imported reactive power [kVAr] from L3 phase of the Mains.			

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Bus Left Import S

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8811	Related applications	BTB
Description			
Imported apparent power [kVA] from Mains.			

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Mains Import S L1

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8812	Related applications	BTB
Description			
Imported apparent power [kVA] from L1 phase of the Mains.			

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Mains Import S L2

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8813	Related applications	BTB
Description			
Imported apparent power [kVA] from L2 phase of the Mains.			

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Mains Import S L3

Value group	Value Group Mains	Related FW	1.0.0
Units	kVA		
Comm object	8814	Related applications	BTB
Description			
Imported apparent power [kVA] from L3 phase of the Mains.			

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Mains Power Factor

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8705	Related applications	BTB
Description			
Power factor of the Mains.			

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Mains Load Character

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8709	Related applications	BTB
Description			
Character of Bus Left 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.			

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Mains Power Factor L1

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8815	Related applications	BTB
Description			
Power factor of the L1 phase of the Mains.			

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Mains Power Factor L2

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8816	Related applications	BTB
Description			
Power factor of the L2 phase of the Mains.			

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Mains Power Factor L3

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8817	Related applications	BTB
Description			
Power factor of the L3 phase of the Mains.			

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Mains Load Character L1

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8818	Related applications	BTB
Description			
Load character of the L1 phase of the Mains.			
L = inductive load, C = capacitive load, and R = resistive load.			

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Mains Load Character L2

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8819	Related applications	BTB
Description			
Load character of the L2 phase of the Mains. L = inductive load, C = capacitive load, and R = resistive load.			

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Mains Load Character L3

Value group	Value Group Mains	Related FW	1.0.0
Units	[-]		
Comm object	8820	Related applications	BTB
Description			
Load character of the L3 phase of the Mains. L = inductive load, C = capacitive load, and R = resistive load.			

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Mains Voltage THD L1

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16060	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) Mains Voltage L1-N (page 379) .			

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Mains Voltage THD L2

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16061	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Mains Voltage L2-N (page 379) .			

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Mains Voltage THD L3

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16062	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Mains Voltage L3-N (page 379) .			

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Mains Current THD L1

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16064	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Mains Current L1 (page 381) .			

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Mains Current THD L2

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16065	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Mains Current L2 (page 381) .			

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Mains Current THD L3

Value group	Value Group Mains	Related FW	1.0.0
Units	%		
Comm object	16066	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Mains Current L3 (page 381) .			

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Mains Frequency

Value group	Value Group Mains	Related FW	1.0.0
Units	Hz		
Comm object	8211	Related applications	BTB
Description			
Frequency of Mains.			

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Mains Voltage L1-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	8195	Related applications	BTB
Description			
Value of Mains voltage on phase 1.			

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Mains Voltage L2-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	8196	Related applications	BTB
Description			
Value of Mains voltage on phase 2.			

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Mains Voltage L3-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	8197	Related applications	BTB
Description			
Value of Mains voltage on phase 3.			

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Mains Voltage L1-L2

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	9631	Related applications	BTB
Description			
Value of Mains phase to phase voltage between L1 and L2 phases.			

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Mains Voltage L2-L3

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	9632	Related applications	BTB
Description			
Value of Mains phase to phase voltage between L2 and L3 phases.			

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Mains Voltage L3-L1

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	9633	Related applications	BTB
Description			
Value of Mains phase to phase voltage between L3 and L1 phases.			

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Mains Voltage

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	10666	Related applications	BTB
Description			
Average value of all Mains Voltage phases.			

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Mains V Unbalance Ph-N

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	10549	Related applications	BTB
Description			
This value contains the maximum difference of values Mains Voltage L1-N (page 379) , Mains Voltage L2-N (page 379) , Mains Voltage L3-N (page 379) at a given moment.			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 221) .			

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Mains V Unbalance Ph-Ph

Value group	Value Group Mains	Related FW	1.0.0
Units	V		
Comm object	17337	Related applications	BTB
Description			
This value contains the maximum difference of values Mains Voltage L1-L2 (page 379) , Mains Voltage L2-L3 (page 379) , Mains Voltage L3-L1 (page 380) at a given moment.			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 221) .			

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Mains Current L1

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	8801	Related applications	BTB
Description			
Current of the L1 phase of the Mains.			

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Mains Current L2

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	8802	Related applications	BTB
Description			
Current of the L2 phase of the Mains.			

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Mains Current L3

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	8803	Related applications	BTB
Description			
Current of the L3 phase of the Mains.			

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Mains Current Unbalance

Value group	Value Group Mains	Related FW	1.0.0
Units	A		
Comm object	17338	Related applications	BTB
Description			
This value contains the maximum difference of values Mains Current L1 (page 381) , Mains Current L2 (page 381) and Mains Current L3 (page 381) .			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 221).			

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Slip Frequency

Value group	Value Group Bus	Related FW	1.0.0
Units	Hz		
Comm object	8224	Related applications	BTB
Description			
Slip frequency during synchronization.			

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Slip Angle

Value group	Value Group Bus	Related FW	1.0.0
Units	°		
Comm object	8225	Related applications	BTB
Description			
Slip angle during synchronization.			

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Group: Gen-sets

Gen-set 1 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10935	Related applications	BTB
Description			
Active power of Mains 1.			

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Gen-set 2 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10936	Related applications	BTB
Description			
Active power of Mains 2.			

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Gen-set 3 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10937	Related applications	BTB
Description			
Active power of Mains 3.			

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Gen-set 4 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10938	Related applications	BTB
Description			
Active power of Mains 4.			

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Gen-set 5 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10939	Related applications	BTB
Description			
Active power of Mains 5.			

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Gen-set 6 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10940	Related applications	BTB
Description			
Active power of Mains 6.			

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Gen-set 7 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10941	Related applications	BTB
Description			
Active power of Mains 7.			

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Gen-set 8 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10942	Related applications	BTB
Description			
Active power of Mains 8.			

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Gen-set 9 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10943	Related applications	BTB
Description			
Active power of Mains 9.			

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Gen-set 10 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10944	Related applications	BTB
Description			
Active power of Mains 10.			

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Gen-set 11 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10945	Related applications	BTB
Description			
Active power of Mains 11.			

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Gen-set 12 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10946	Related applications	BTB
Description			
Active power of Mains 12.			

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Gen-set 13 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10947	Related applications	BTB
Description			
Active power of Mains 13.			

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Gen-set 14 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10948	Related applications	BTB
Description			
Active power of Mains 14.			

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Gen-set 15 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10949	Related applications	BTB
Description			
Active power of Mains 15.			

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Gen-set 16 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10950	Related applications	BTB
Description			
Active power of Mains 16.			

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Gen-set 17 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10951	Related applications	BTB
Description			
Active power of Mains 17.			

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Gen-set 18 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10952	Related applications	BTB
Description			
Active power of Mains 18.			

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Gen-set 19 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10953	Related applications	BTB
Description			
Active power of Mains 19.			

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Gen-set 20 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10954	Related applications	BTB
Description			
Active power of Mains 20.			

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Gen-set 21 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10955	Related applications	BTB
Description			
Active power of Mains 21.			

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Gen-set 22 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10956	Related applications	BTB
Description			
Active power of Mains 22.			

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Gen-set 23 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10957	Related applications	BTB
Description			
Active power of Mains 23.			

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Gen-set 24 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10958	Related applications	BTB
Description			
Active power of Mains 24.			

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Gen-set 25 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10959	Related applications	BTB
Description			
Active power of Mains 25.			

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Gen-set 26 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10960	Related applications	BTB
Description			
Active power of Mains 26.			

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Gen-set 27 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10961	Related applications	BTB
Description			
Active power of Mains 27.			

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Gen-set 28 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10962	Related applications	BTB
Description			
Active power of Mains 28.			

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Gen-set 29 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10963	Related applications	BTB
Description			
Active power of Mains 29.			

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Gen-set 30 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10964	Related applications	BTB
Description			
Active power of Mains 30.			

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Gen-set 31 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10965	Related applications	BTB
Description			
Active power of Mains 31.			

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Gen-set 32 Power

Value group	Gen-sets	Related FW	1.0.0
Units	kW		
Comm object	10966	Related applications	BTB
Description			
Active power of Mains 32.			

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Group: Bus

Bus Frequency

Value group	Value Group Bus	Related FW	1.0.0
Units	Hz		
Comm object	20799	Related applications	BTB
Description			
This is the value of Bus frequency.			

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Bus Voltage L1-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	8192	Related applications	BTB
Description			
Voltage of the L1 phase of the Bus.			

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Bus Voltage L2-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	8193	Related applications	BTB
Description			
Voltage of the L2 phase of the Bus.			

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Bus Voltage L3-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	8194	Related applications	BTB
Description			
Voltage of the L3 phase of the Bus.			

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Bus Voltage L1-L2

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	9628	Related applications	BTB
Description			
Phase to phase voltage between the L1 and L2 phases of the Bus.			

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Bus Voltage L2-L3

Value group	Bus	Related FW	1.0.0
Units	V		
Comm object	9629	Related applications	BTB
Description			
Phase to phase voltage between the L2 and L3 phases of the Bus.			

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Bus Voltage L3-L1

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	9630	Related applications	BTB
Description			
Phase to phase voltage between the L3 and L1 phases of the Bus.			

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Bus Voltage

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	10645	Related applications	BTB
Description			
Average value of all voltage phases of the Bus.			

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Bus Voltage THD L1

Value group	Value Group Bus	Related FW	1.0.0
Units	%		
Comm object	16052	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Bus Voltage L1-N (page 389) .			

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Bus Voltage THD L2

Value group	Value Group Bus	Related FW	1.0.0
Units	%		
Comm object	16053	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Bus Voltage L2-N (page 389) .			

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Bus Voltage THD L3

Value group	Value Group Bus	Related FW	1.0.0
Units	%		
Comm object	16054	Related applications	BTB
Description			
This value represents PF measurement and evaluation (page 15) of Bus Voltage L3-N (page 389) .			

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Bus V Unbalance Ph-N

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	10548	Related applications	BTB
Description			
This value contains the maximum difference of values Bus Voltage L1-N (page 389) , Bus Voltage L2-N (page 389) , Bus Voltage L3-N (page 389) at a given moment.			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 221).			

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Bus V Unbalance Ph-Ph

Value group	Value Group Bus	Related FW	1.0.0
Units	V		
Comm object	17336	Related applications	BTB
Description			
This value contains the maximum difference of values Bus Voltage L1-L2 (page 389) , Bus Voltage L2-L3 (page 390) , Bus Voltage L3-L1 (page 390) at a given moment.			
Note: Difference of the values and the evaluation of the protection is influenced by the setpoint Connection type (page 221).			

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Group: Power Management

Actual Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15805	Related applications	BTB
Description			
Actual absolute reserve in Power Management (page 138) .			

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Actual Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15806	Related applications	BTB
Description			
Required minimal Actual Reserve (page 391) for starting of next unit in the Power Management (page 138) .			

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Stop Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15807	Related applications	BTB
Description			
Required maximal Actual Reserve (page 391) for stopping of next unit in the Power Management (page 138) .			

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Dynamic Spinning Reserve

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15673	Related applications	BTB
Description			
The value Dynamic Spinning Reserve is added to required load reserve given by setpoints #Starting Load Reserve 1 (page 262) and #Stopping Load Reserve 1 (page 263) (according to actual load reserve set 1, 2, 3 or 4) to shift the actual load reserve settings in dynamic way.			

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Dynamic Spinning Reserve Offset

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	15674	Related applications	BTB
Description			
The value Dynamic Spinning Reserve Offset is added only to required stopping load reserve given by setpoints #Stopping Load Reserve 1 (page 263) (according to actual load reserve set 1, 2, 3 or 4) to create some dynamic offset between starting and stopping load reserve.			

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Total Running P

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10657	Related applications	BTB
Description			
Actual value of active power from all controllers running in Power Management (page 138) .			

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Total Running Q

Value group	Power Management	Related FW	1.0.0
Units	kVAr		
Comm object	10656	Related applications	BTB
Description			
Actual value of reactive power from all controllers running in Power Management (page 138) .			

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Total Running S

Value group	Power Management	Related FW	1.0.0
Units	kVA		
Comm object	16424	Related applications	BTB
Description			
Actual value of apparent power from all controllers running in Power Management (page 138) .			

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Total Running Power Factor

Value group	Power Management	Related FW	1.0.0
Units	[-]		
Comm object	14590	Related applications	BTB
Description			
This value represents the total power factor (Cos ϕ) of all running Controllers.			

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Total Running Load Character

Value group	Power Management	Related FW	1.0.0
Units	[-]		
Comm object	9028	Related applications	BTB
Description			
This value represents the total character of all running Controllers.			

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Total Running Samax

Value group	Power Management	Related FW	1.0.0
Units	kVA		
Comm object	16425	Related applications	BTB
Description			
This value show maximal apparent power of running Controllers within the group that are connected to the bus/mains. 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.			

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Running Nominal Power In PM

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10999	Related applications	BTB
Description			
Actual nominal power of all running controllers on inter-controller CAN in Power Management (page 138) .			

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Running Nominal Power Of All

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10658	Related applications	BTB
Description			
Actual nominal power of all running controllers on inter-controller CAN.			

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Available Nominal Power In PM

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10998	Related applications	BTB
Description			
Available nominal power of all controllers on inter-controller CAN in Power Management (page 138) .			

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Minimal Running Power

Value group	Power Management	Related FW	1.0.0
Units	kW		
Comm object	10012	Related applications	BTB
Description			
Actual minimal nominal power of all Controllers, which are running.			

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Actual Relative Reserve

Value group	Power Management	Related FW	1.0.0
Units	%		
Comm object	10788	Related applications	BTB
Description			
Actual relative reserve in Power Management (page 138).			

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Start Relative Reserve

Value group	Power Management	Related FW	1.0.0
Units	%		
Comm object	10786	Related applications	BTB
Description			
Required minimal Actual Relative Reserve (page 395) for starting of next unit in the Power Management (page 138).			

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Stop Relative Reserve

Value group	Power Management	Related FW	1.0.0
Units	%		
Comm object	10787	Related applications	BTB
Description			
Required maximal Actual Relative Reserve (page 395) for stopping of next unit in the Power Management (page 138).			

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Actual Power Band

Value group	Power Management	Related FW	1.0.0
Units	[-]		
Comm object	8974	Related applications	BTB
Description			
Required state of the Controllers with CAN address between 1 .. 32 in the actual power band of Power Management (page 138) .			
<ul style="list-style-type: none"> > Log 0: Controller should be stopped > Log 1: Controller should be running 			
Note: Actual power band = group of Controllers which should be running with actual load.			
Note: Value is taken into account only if #Priority Auto Swap (page 260) = Efficient.			

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Next Power Band

Value group	Power Management	Related FW	1.0.0
Units	-		
Comm object	8975	Related applications	BTB
Description			
Required state of the Gen-sets with CAN address between 1 .. 32 in the next power band of Power Management (page 138) .			
<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 			
Note: Next power band = group of Gen-sets which should be running after load change.			
Note: Value is taken into account only if #Priority Auto Swap (page 260) = Efficient.			

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Group: Control Loops

Loadsharing Output

Value group	Control Loops	Related FW	1.0.0
Units	%		
Comm object	10924	Related applications	BTB
Description			
Internal request of internal loadsharing regulator.			

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Varsharing Output

Value group	Control Loops	Related FW	1.0.0
Units	%		
Comm object	10925	Related applications	BTB
Description			
Internal request of internal varsharing regulator.			

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Group: Controller I/O

Battery Voltage

Value group	Controller I/O	Related FW	1.0.0
Units	V		
Comm object	8213	Related applications	BTB
Description			
Controller's supply voltage.			

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Binary Inputs

Value group	Controller I/O	Related FW	1.0.0
Units	[-]		
Comm object	8235	Related applications	BTB
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			
Note: Names are changed based on names of representative binary inputs. See Default configuration (page 54) to see default binary inputs names.			

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Binary Outputs

Value group	Controller I/O	Related FW	1.0.0
Units	[-]		
Comm object	8239	Related applications	BTB
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			
Note: Names are changed based on names of representative binary outputs. See <i>Default configuration (page 54)</i> to see default binary outputs names.			

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Group: Statistics

Bus Left kVAh

Value group	Statistics	Related FW	1.0.0
Units	kVAh		
Comm object	13665	Related applications	BTB
Description			
Total apparent energy imported/exported from/to the Bus Left through the CB.			

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Mains kWh Exported

Value group	Statistics	Related FW	1.0.0
Units	kVAh		
Comm object	11025	Related applications	BTB
Description			
Counter of Mains Import P (page 373).			
Note: This value can be also switched into one decimal see <i>Power Formats And Units (page 137)</i> .			

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Mains kVArh Exported

Value group	Statistics	Related FW	1.0.0
Units	kVArh		
Comm object	11026	Related applications	BTB
Description			
Counter of Mains Import Q (page 373).			
<i>Note: This value can be also switched into one decimal see Power Formats And Units (page 137).</i>			

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Bus Left kWh Imported

Value group	Statistics	Related FW	1.0.0
Units	kWh		
Comm object	16710	Related applications	BTB
Description			
Active energy imported from the Bus Left to the Bus Right.			

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Bus Left kVArh Imported

Value group	Statistics	Related FW	1.0.0
Units	kWh		
Comm object	16711	Related applications	BTB
Description			
Reactive energy imported from the Bus Left to the Bus Right.			

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Pulse Counter 1

Value group	Statistics	Related FW	1.0.0
Units	[-]		
Comm object	10986	Related applications	BTB
Description			
This is the Statistic value of the Pulse Counter 1 which is connected with LBI PULSE COUNTER 1 (PAGE 473). Change the conversion rate via setpoint Conversion Coefficient Pulse 1 (page 230). See the chapter Pulse Counters (page 166) for more information.			
<i>Note: The Value can be set via IntelliConfig in the interface "Set Statistics".</i>			

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Pulse Counter 2

Value group	Statistics	Related FW	1.0.0
Units	[-]		
Comm object	10987	Related applications	BTB
Description			
This is the Statistic value of Pulse the Counter 2 which is connected with LBI PULSE COUNTER 2 (PAGE 473). Change the conversion rate via setpoint Conversion Coefficient Pulse 2 (page 230) . See the chapter Pulse Counters (page 166) for more information.			
Note: The Value can be set via IntelliConfig in the interface "Set Statistics".			

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Group: Info

Controller Mode

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	9887	Related applications	BTB
Description			
Controller mode.			

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Breaker state

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	9245	Related applications	BTB
Description			
This value contains actual breaker state message.			

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Timer Text

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	10040	Related applications	BTB
Description			
This value contains actual timer text message.			

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Connection Type

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	12944	Related applications	BTB
Description			
This value contains name of currently selected connection type, which is adjusted via Connection type (page 221).			

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Timer Value

Value group	Info	Related FW	1.0.0
Units	[MM:SS]		
Comm object	14147	Related applications	BTB
Description			
This value contains time of active timer which is counted down, name of the timer is in value Timer Text (page 400).			

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ID String

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	24501	Related applications	BTB
Description			
Name of controller which is used in IntelliConfig in command bar.			

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FW Version

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	24339	Related applications	BTB
Description			
Major and minor firmware version number.			

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Application

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8480	Related applications	BTB
Description			
The value contains actual application in controller.			

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FW Branch

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8707	Related applications	BTB
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	BTB
Description			
This value contains list of all 32 LBIs for Forced Value (page 119) . 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	BTB
Description			
Description.			

[◀ back to List of values](#)

SPI Module B

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	14448	Related applications	BTB
Description			
Description.			

[◀ back to List of values](#)

CAN16

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8546	Related applications	BTB
Description			
This value contains binary information about controllers connected via CAN2 (page 16) and/or Communication peripherals (page 15) with CAN Controller Address (page 231) = <1,16>. Each bit represent controller with the same CAN address as number of the bit. <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			

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CAN32

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	8827	Related applications	BTB
Description			
This value contains binary information about controllers connected via CAN2 (page 16) and/or Communication peripherals (page 15) with CAN Controller Address (page 231) = <17,32>. Each bit represent controller with the same CAN address as number of the bit. <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	BTB
Description			
This value contains binary information about controllers connected via CAN2 (page 16) and/or Communication peripherals (page 15) with CAN Controller Address (page 231) = <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).			

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Reg32

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	11082	Related applications	BTB
Description			
This value contains binary information about controllers connected via CAN2 (page 16) and/or Communication peripherals (page 15) with CAN Controller Address (page 231) = <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	BTB
Description			
This value contains binary information about controllers connected via CAN2 (page 16) and/or Communication peripherals (page 15) with CAN Controller Address (page 231) = <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	BTB
Description			
This value contains binary information about controllers connected via CAN2 (page 16) and/or Communication peripherals (page 15) with CAN Controller Address (page 231) = <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 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	BTB
Description			
State of User Buttons (page 171).			
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	

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Group: Log Bout

Log Bout 1

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9143	Related applications	BTB
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	BTB
Description			
State of binary outputs.			

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Log Bout 3

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9145	Related applications	BTB
Description			
State of binary outputs.			

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Log Bout 4

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9146	Related applications	BTB
Description			
State of binary outputs.			

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Log Bout 5

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9147	Related applications	BTB
Description			
State of binary outputs.			

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Log Bout 6

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9148	Related applications	BTB
Description			
State of binary outputs.			

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Log Bout 7

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9149	Related applications	BTB
Description			
State of binary outputs.			

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Log Bout 8

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	9150	Related applications	BTB
Description			
State of binary outputs.			

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Log Bout 9

Value group	Log Bout	Related FW	1.0.0
Units	[-]		
Comm object	11896	Related applications	BTB
Description			
State of binary outputs.			

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Group: Plug-in

EM BIO A

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	14291	Related applications	BTB
Description			
Description.			

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EM BIO B

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	14292	Related applications	BTB
Description			
Description.			

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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	BTB
Description			
Description.			

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EM Analog Input A 2

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14294	Related applications	BTB
Description			
Description.			

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EM Analog Input A 3

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14295	Related applications	BTB
Description			
Description.			

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EM Analog Input A 4

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14296	Related applications	BTB
Description			
Description.			

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EM Analog Input A 5

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14297	Related applications	BTB
Description			
Description.			

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EM Analog Input A 6

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14298	Related applications	BTB
Description			
Description.			

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EM Analog Input A 7

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14299	Related applications	BTB
Description			
Description.			

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EM Analog Input A 8

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14300	Related applications	BTB
Description			
Description.			

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EM Analog Input A 9

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14301	Related applications	BTB
Description			
Description.			

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EM Analog Input A 10

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14302	Related applications	BTB
Description			
Description.			

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EM Analog Input A 11

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14303	Related applications	BTB
Description			
Description.			

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EM Analog Input A 12

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14303	Related applications	BTB
Description			
Description.			

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EM Analog Input A 13

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14305	Related applications	BTB
Description			
Description.			

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EM Analog Input A 14

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14306	Related applications	BTB
Description			
Description.			

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EM Analog Input A 15

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14307	Related applications	BTB
Description			
Description.			

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EM Analog Input A 16

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14308	Related applications	BTB
Description			
Description.			

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EM Analog Input B 1

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14309	Related applications	BTB
Description			
Description.			

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EM Analog Input B 2

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14310	Related applications	BTB
Description			
Description.			

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EM Analog Input B 3

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14311	Related applications	BTB
Description			
Description.			

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EM Analog Input B 4

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14312	Related applications	BTB
Description			
Description.			

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EM Analog Input B 5

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14313	Related applications	BTB
Description			
Description.			

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EM Analog Input B 6

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14314	Related applications	BTB
Description			
Description.			

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EM Analog Input B 7

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14315	Related applications	BTB
Description			
Description.			

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EM Analog Input B 8

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14316	Related applications	BTB
Description			
Description.			

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EM Analog Input B 9

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14317	Related applications	BTB
Description			
Description.			

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EM Analog Input B 10

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14318	Related applications	BTB
Description			
Description.			

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EM Analog Input B 11

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14319	Related applications	BTB
Description			
Description.			

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EM Analog Input B 12

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14320	Related applications	BTB
Description			
Description.			

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EM Analog Input B 13

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14321	Related applications	BTB
Description			
Description.			

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EM Analog Input B 14

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14322	Related applications	BTB
Description			
Description.			

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EM Analog Input B 15

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14323	Related applications	BTB
Description			
Description.			

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EM Analog Input B 16

Value group	CM-Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	14324	Related applications	BTB
Description			
Description.			

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Group: CM-4G-GPS

Modem Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24288	Related applications	BTB
Description			
Description.			

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AirGate Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23967	Related applications	BTB
Description			
Description.			

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Network Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23972	Related applications	BTB
Description			
Description.			

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GPS Status

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23973	Related applications	BTB
Description			
Description.			

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Signal Strength

Value group	CM-4G-GPS	Related FW	1.0.0
Units	[%]		
Comm object	24302	Related applications	BTB
Description			
This value represents signal strenght in the percentage.			

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IP Address

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23971	Related applications	BTB
Description			
Description.			

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Secondary DNS

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23983	Related applications	BTB
Description			
Description.			

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Primary DNS

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23984	Related applications	BTB
Description			
Description.			

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AirGate Servicing Node

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	23991	Related applications	BTB
Description			
Description.			

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Network Mode

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24146	Related applications	BTB
Description			
Description.			

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Network Name

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24147	Related applications	BTB
Description			
Description.			

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Modem FW Version

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24149	Related applications	BTB
Description			
Description.			

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Speed

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24264	Related applications	BTB
Description			
Description.			

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Active Satellites

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24265	Related applications	BTB
Description			
Description.			

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Longitude

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24267	Related applications	BTB
Description			
Description.			

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Latitude

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24268	Related applications	BTB
Description			
Description.			

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Last E-mail Result

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24307	Related applications	BTB
Description			
Description.			

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AirGate ID

Value group	CM-4G-GPS	Related FW	1.0.0
Units			
Comm object	24309	Related applications	BTB
Description			
Description.			

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Group: CM-Ethernet

AirGate Status

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23910	Related applications	BTB
Description			
Description.			

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Ethernet PHY mode

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23916	Related applications	BTB
Description			
Description.			

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ETH Interface Status

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23924	Related applications	BTB
Description			
Description.			

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AirGate Servicing Node

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23915	Related applications	BTB
Description			
Description.			

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Last E-mail Result

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23925	Related applications	BTB
Description			
Description.			

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AirGate ID

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23926	Related applications	BTB
Description			
Description.			

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Secondary DNS

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23927	Related applications	BTB
Description			
Description.			

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Primary DNS

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23928	Related applications	BTB
Description			
Description.			

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Current Gateway

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23929	Related applications	BTB
Description			
Description.			

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Current Subnet Mask

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23930	Related applications	BTB
Description			
Description.			

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Current IP Address

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23931	Related applications	BTB
Description			
Description.			

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MAC Address

Value group	CM-Ethernet	Related FW	1.0.0
Units			
Comm object	23932	Related applications	BTB
Description			
Description.			

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Group: Ethernet

MAC Address

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24333	Related applications	BTB
Description			
Current MAC address of the controller's ethernet interface.			

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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 15) 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										

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Current IP Address

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24184	Related applications	BTB
Description			
Current IP address of the Communication peripherals (page 15) interface.			

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Current Subnet Mask

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24183	Related applications	BTB
Description			
Current subnet mask of the Communication peripherals (page 15) interface.			

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Current Gateway

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24182	Related applications	BTB
Description			
Current IP gateway address of the Communication peripherals (page 15) communications.			

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Primary DNS

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24181	Related applications	BTB
Description			
Current domain name server of the Communication peripherals (page 15) interface.			

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Secondary DNS

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24100	Related applications	BTB
Description			
Backup domain name server of the Communication peripherals (page 15) interface.			

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ETH Interface Status

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24180	Related applications	BTB
Description			
Current status of the Communication peripherals (page 15) communication.			

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AirGate Status

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24007	Related applications	BTB
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	AiGate 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.	

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AirGate ID

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24345	Related applications	BTB
Description			
Identification string generated by AirGate server for the purpose of establishing communication via IntelliConfig or any other supported PC tool.			

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AirGate Servicing Node

Value group	Info	Related FW	1.0.0
Units	[-]		
Comm object	24010	Related applications	BTB
Description			
This value displays the IP address to Servicing node to which is controller connected in order to use AirGate connection.			

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Last E-mail Result

Value group	Ethernet	Related FW	1.0.0
Units	[-]		
Comm object	24332	Related applications	BTB
Description			
Result of last email, which was sent by controller.			
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.

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Group: Date/Time

Date

Value group	Date/Time	Related FW	1.0.0
Units	DD.MM.YYYY		
Comm object	24553	Related applications	BTB
Description			
Shows setup date.			

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Time

Value group	Date/Time	Related FW	1.0.0
Units	HH:MM:SS		
Comm object	24554	Related applications	BTB
Description			
Shows setup time.			

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Time Mode

Value group	Date/Time	Related FW	1.0.0
Units	[-]		
Comm object	20252	Related applications	BTB
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)			

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Group: PLC

PLC-AOUT 1

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21248	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 2

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21249	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 3

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21250	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 4

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21251	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 5

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21252	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 6

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21253	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 7

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21254	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 8

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21255	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 9

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21256	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 10

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21257	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 11

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21258	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 12

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21259	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 13

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21260	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 14

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21261	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 15

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21262	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 16

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21263	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 17

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21264	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 18

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21265	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 19

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21266	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 20

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21267	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 21

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21268	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 22

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21269	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 23

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21270	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 24

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21271	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 25

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21272	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 26

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21273	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 27

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21274	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 28

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21275	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 29

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21276	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 30

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21277	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 31

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21278	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 32

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21279	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 33

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21280	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 34

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21281	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 35

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21282	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 36

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21283	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 37

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21284	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 38

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21285	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 39

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21286	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 40

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21287	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 41

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21288	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 42

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21289	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 43

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21290	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 44

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21291	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 45

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21292	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 46

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21293	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 47

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21294	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 48

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21295	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 49

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21296	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 50

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21297	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 51

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21298	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 52

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21299	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 53

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21300	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 54

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21301	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 55

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21302	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 56

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21303	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 57

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21304	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 58

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21305	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 59

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21306	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 60

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21307	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 61

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21308	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 62

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21309	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 63

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21310	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-AOUT 64

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21311	Related applications	BTB
Description			
State of analog output of PLC.			

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PLC-BOUT 1

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10424	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 2

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10425	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 3

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10426	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 4

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10427	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 5

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10428	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 6

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10429	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 7

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10430	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 8

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10431	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 9

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10432	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 10

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10433	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 11

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10434	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 12

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10435	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 13

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10436	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 14

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10437	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 15

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10438	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 16

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	10439	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 17

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14570	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 18

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14571	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 19

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14572	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 20

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14573	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 21

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14574	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 22

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14575	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 23

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14576	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 24

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14577	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 25

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14578	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 26

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14579	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 27

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14580	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 28

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14581	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 29

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14582	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 30

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14583	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 31

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14584	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 32

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	14585	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 33

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16914	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 34

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16915	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 35

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16916	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 36

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16917	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 37

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16918	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 38

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16919	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 39

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16920	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 40

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16921	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 41

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16922	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 42

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16923	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 43

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16924	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 44

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16925	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 45

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	16926	Related applications	BTB
Description			
State of binary outputs of PLC.			

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PLC Resource 1

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21216	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 2

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21217	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 3

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21218	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 4

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21219	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 5

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21220	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 6

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21221	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 7

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21222	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 8

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21223	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 9

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21224	Related applications	BTB
Description			
Internal value of PLC block.			

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PLC Resource 10

Value group	PLC	Related FW	1.0.0
Units	[-]		
Comm object	21225	Related applications	BTB
Description			
Internal value of PLC block.			

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Group: SH Modules

SHBIN-1

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10572	Related applications	BTB
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			

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SHBIN-2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10573	Related applications	BTB
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			

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SHBIN-3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10574	Related applications	BTB
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			

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SHBIN-4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10575	Related applications	BTB
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			

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SHBIN-5

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11341	Related applications	BTB
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			

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SHBIN-6

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11342	Related applications	BTB
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	BTB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 1. 1. SHBOUT-1 1 2. SHBOUT-1 2 3. SHBOUT-1 3 4. SHBOUT-1 4 5. SHBOUT-1 5 6. SHBOUT-1 6 7. SHBOUT-1 7 8. SHBOUT-1 8			

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SHBOUT-2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10577	Related applications	BTB
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 2. 1. SHBOUT-2 1 2. SHBOUT-2 2 3. SHBOUT-2 3 4. SHBOUT-2 4 5. SHBOUT-2 5 6. SHBOUT-2 6 7. SHBOUT-2 7 8. SHBOUT-2 8			

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SHBOUT-3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10578	Related applications	BTB
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			

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SHBOUT-4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10579	Related applications	BTB
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	BTB
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			

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SHBOUT-6

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11344	Related applications	BTB
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	BTB
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".			

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SHAIN-1 2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10585	Related applications	BTB
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".			

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SHAIN-1 3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10586	Related applications	BTB
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".			

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SHAIN-1 4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	10587	Related applications	BTB
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".			

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SHAIN-2 1

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11390	Related applications	BTB
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".			

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SHAIN-2 2

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11391	Related applications	BTB
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".			

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SHAIN-2 3

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11392	Related applications	BTB
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".			

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SHAIN-2 4

Value group	SH Modules	Related FW	1.0.0
Units	[-]		
Comm object	11393	Related applications	BTB
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".			

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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	463
LBI: B	463
LBI: E	466
LBI: F	467
LBI: H	471
LBI: N	471
LBI: P	471
LBI: R	473
LBI: S	475
LBI: T	476

For full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 462)**.

Logical binary inputs alphabetically

LBI: A	463	Pulse Counter 1	473
Access Lock	463	Pulse Counter 2	473
LBI: B	463	LBI: R	473
MCB Button	463	Remote AUTO	473
MCB Disable	463	Remote MAN	474
MCB Feedback	464	Remote OFF	474
MCB Feedback Negative	465	LBI: S	475
LBI: E	466	Synchronization Disabled	476
Emergency MAN	466	LBI: T	476
LBI: F	467	Time Stamp Act	476
Fault Reset Button	467		
Force BTB Close	467	▲ back to Controller objects	
Force Protection Disable	467		
Forced Value Input 01	467		
Forced Value Input 02	468		
Forced Value Input 03	468		
Forced Value Input 04	468		
Forced Value Input 05	468		
Forced Value Input 06	468		
Forced Value Input 07	469		
Forced Value Input 08	469		
Forced Value Input 09	469		
Forced Value Input 10	469		
Forced Value Input 11	469		
Forced Value Input 12	470		
Forced Value Input 13	470		
Forced Value Input 14	470		
Forced Value Input 15	470		
Forced Value Input 16	470		
LBI: H	471		
Horn Reset Button	471		
LBI: N	471		
Not Used	471		
LBI: P	471		
Protection Force Disable 1	471		
Protection Force Disable 2	472		
Protection Force Disable 3	472		

LBI: A


Access Lock

Related FW	1.0.0	Related applications	BTB
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

LBI: B

MCB Button

Related FW	1.0.0	Related applications	BTB
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	BTB
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	BTB
LBI ID	65		

Description

Use this input to indicate whether the bus tie breaker is opened or closed.

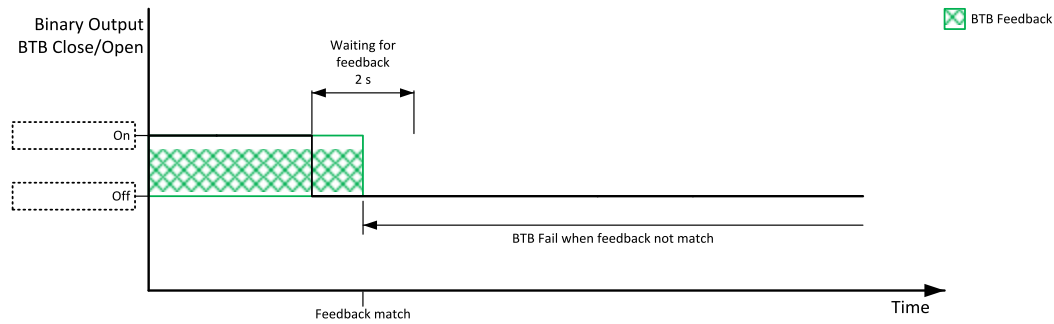


Image 7.2 MCB Feedback 1

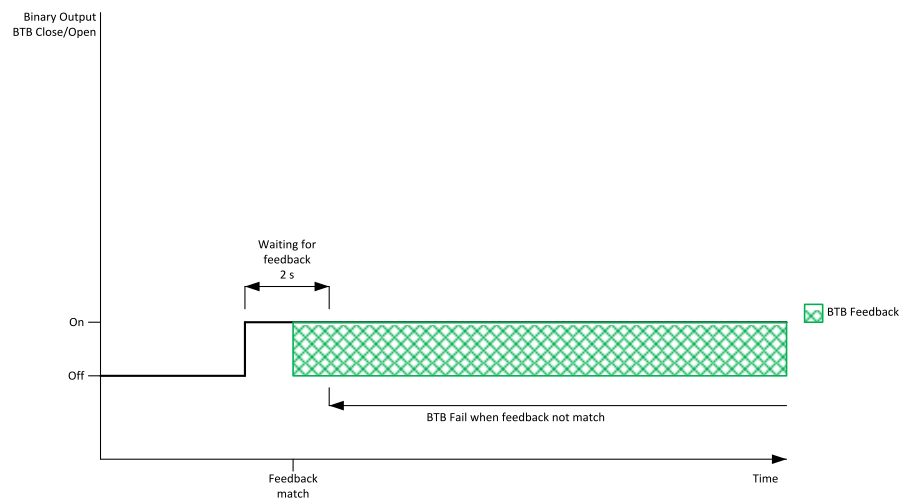


Image 7.3 MCB Feedback 2

⬅ back to Logical binary inputs alphabetically

MCB Feedback Negative

Related FW	1.0.0	Related applications	BTB
LBI ID	66		

Description

Use this input to indicate whether the bus tie breaker is opened or closed.
This input is logically inverted against LBI **MCB FEEDBACK** (PAGE 464).

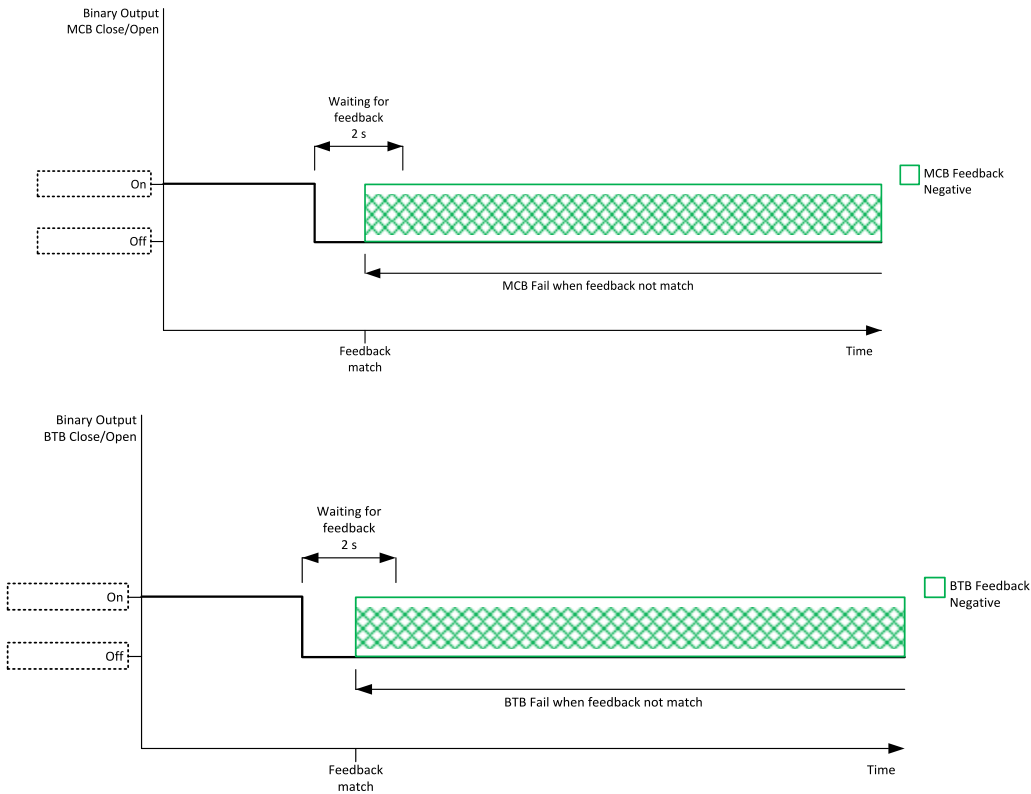
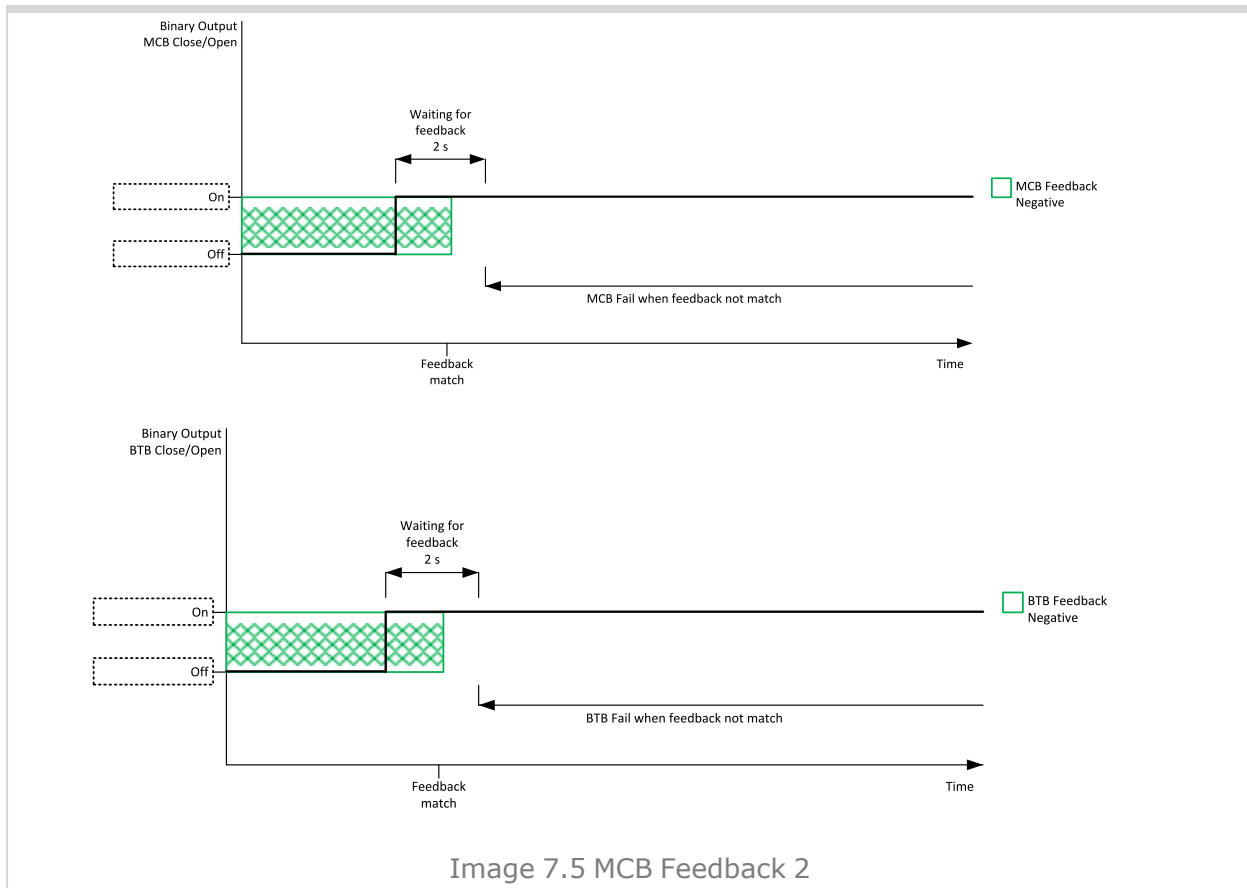


Image 7.4 MCB Feedback 1



⬅ back to Logical binary inputs alphabetically

LBI: E


Emergency MAN

Related FW	1.0.0	Related applications	BTB
LBI ID	45		
Description			
<p>This input is designed to allow the breaker to be controlled externally (not by the controller). This feature can be useful in case of some failure, which disables the breaker to be controlled by the controller.</p> <p>The controller behaves in the following way:</p> <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	BTB
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 BTB Close

Related FW	1.0.0	Related applications	BTB
LBI ID	952		
Description			
This binary input force to close bus tie breaker..			

⬆ back to Logical binary inputs alphabetically

Force Protection Disable

Related FW	1.0.0	Related applications	BTB
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:			
> Force Protection Disable active			
> Force Protection Disable inactive			
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	BTB
LBI ID	19		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬆ back to Logical binary inputs alphabetically

Forced Value Input 02

Related FW	1.0.0	Related applications	BTB
LBI ID	20		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

Forced Value Input 03

Related FW	1.0.0	Related applications	BTB
LBI ID	21		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	22		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	23		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	24		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	25		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	26		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	27		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	28		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	29		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	30		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	31		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	32		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	33		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) 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	BTB
LBI ID	34		
Description			
This LBI is used for activation of preconfigured Forced Value (page 119) to setpoint.			
Note: This LBI can be renamed during configuration.			

⬅ back to Logical binary inputs alphabetically

LBI: H

Horn Reset Button

Related FW	1.0.0	Related applications	BTB
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: N

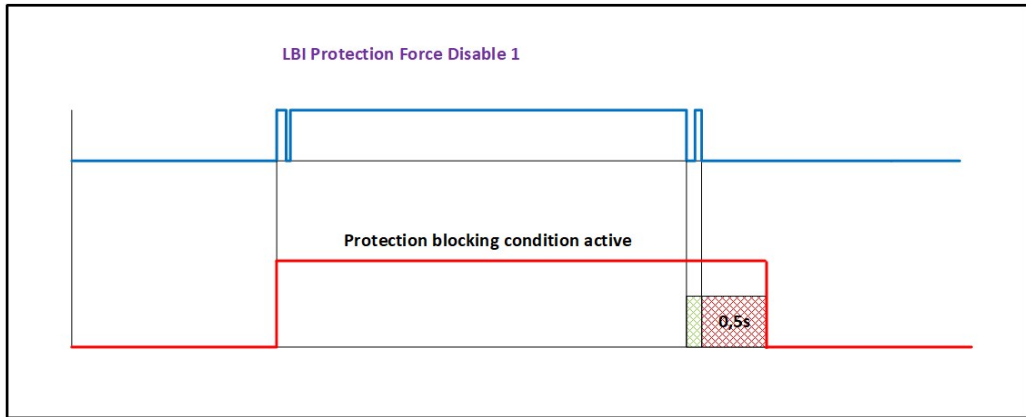
Not Used

Related FW	1.0.0	Related applications	BTB
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	BTB
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>LBI Protection Force Disable 1</div></div>			

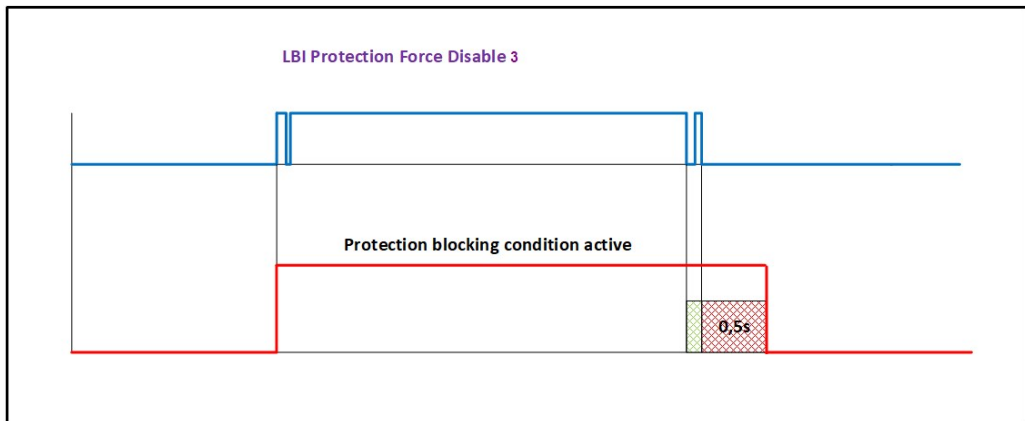
⬅ back to Logical binary inputs alphabetically

Protection Force Disable 2

Related FW	1.0.0	Related applications	BTB
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><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><di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Protection Force Disable 3

Related FW	1.0.0	Related applications	BTB
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	BTB
LBI ID	87		
Description			
This is the input of the "slow" Pulse Counters (page 166) function which is connected with LBI PULSE COUNTER 1 (PAGE 473).			

⬅ back to Logical binary inputs alphabetically

Pulse Counter 2

Related FW	1.0.0	Related applications	BTB
LBI ID	88		
Description			
This is the input of the "slow" Pulse Counters (page 166) function which is connected with LBI PULSE COUNTER 2 (PAGE 473).			

⬅ back to Logical binary inputs alphabetically

LBI: R

Remote AUTO

Related FW	1.0.0	Related applications	BTB
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	BTB
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	BTB
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	BTB
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

LBI: S

Switch To AUT

Related FW	1.0.0	Related applications	BTB								
Comm object	1112										
Description											
When the first rising edge appears on the binary input, the MODE is changed to AUTO. Falling edge has no effect and controller stays in AUTO MODE.											
There is no blocking between these "Switch To" LBIs.											
Example: CU is in OFF mode. LBI Switch To AUTO is activated – CU goes to AUTO Mode (LBI stays active). Then LBI SWITCH To MAN (PAGE 475) is activated – CU goes to MAN Mode (at this moment, LBIs Switch To OFF and Switch To AUTO are active – CU reacts only on rising edges).											
When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.											
<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	BTB								
Comm object	1111										
Description											
When the first rising edge appears on the binary input, the MODE is changed to MAN. Falling edge has no effect and controller stays in MAN MODE.											
There is no blocking between these "Switch To" LBIs.											
Example: CU is in OFF mode. LBI Switch To MAN is activated – CU goes to MAN Mode (LBI stays active). Then LBI SWITCH To AUT (PAGE 475) is activated – CU goes to AUTO Mode (at this moment, LBIs Switch To MAN and Switch To AUTO are active – CU reacts only on rising edges).											
When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.											
<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	BTB								
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 475) 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	BTB
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	BTB
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	479
LBO: B	481
LBO: C	487
LBO: E	489
LBO: F	491
LBO: H	491
LBO: I	493
LBO: L	493
LBO: M	494
LBO: N	494
LBO: P	495
LBO: R	495
LBO: S	495

For full list of Logical binary outputs go to the chapter **Logical binary outputs alphabetically (page 478)**.

Logical binary outputs alphabetically

LBO: A	479	Detect		System Reserve OK	495
AL Common Breaker Open		LBO: E	489	 back to Controller objects	
and Cooldown	479	Electrical Alarm	489		
AI Common Fls	479	Engines Swapped	489		
Alarm	479	Exercise Timer 1	489		
Alarm Bus Frequency	479	Exercise Timer 2	489		
Alarm Bus Voltage	479	Exercise Timer 3	490		
AL Common Shutdown		Exercise Timer 4	490		
Override	480	Exercise Timer 5	490		
Alarm Flashing	480	Exercise Timer 6	491		
Alarm Bus	480	LBO: F	491		
Alarm Bus Frequency	480	FltRes Button Echo	491		
Alarm Bus Voltage	480	LBO: H	491		
Alarm Overcurrent	481	Heartbeat	491		
All Available Gen-sets Run	481	History Record Indication	491		
LBO: B	481	Horn	492		
Bus Healthy	481	Horn Flashing	492		
Mains Healthy	481	HornRes Button Echo	492		
MCB Button Echo	481	LBO: I	493		
MCB Close/Open	482	In Synchronism	493		
MCB OFF Coil	483	Initialized	493		
MCB ON Coil	484	LBO: L	493		
MCB Status	485	Logical 0	493		
MCB UV Coil	486	Logical 1	493		
LBO: C	487	LBO: M	494		
Common Alarm Active		Mode AUTO	494		
Level 1	487	Mode MAN	494		
Common Alarm Active		Mode OFF	494		
Level 2	487	LBO: N	494		
Common Alarm Level 1	487	Not In Auto	494		
Common Alarm Level 2	487	Not Used	494		
Common Alarm Only	487	LBO: P	495		
Common History Record	488	Peripheral Module Comm			
Common	488	Fail	495		
Common Mains Protection		LBO: R	495		
+ FltRes	488	Synchronization	495		
Common Warning	488	LBO: S	495		
Controller HeartBeat Fail	488	System Ready	495		

LBO: A

AL Common Breaker Open and Cooldown

Related FW	1.0.0	Related applications	BTB
LBO ID	9		
Description			
This output is closed when there is at least one alarm of type BOC present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

AI Common FIs

Related FW	1.0.0	Related applications	BTB
LBO ID	6		
Description			
description.			

⬅ back to Logical binary outputs alphabetically

Alarm

Related FW	1.0.0	Related applications	BTB
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	BTB
LBO ID	1266		
Description			
This output is active when at least 1 protection caused by Bus <>f Protection (page 254) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Bus Voltage

Related FW	1.0.0	Related applications	BTB
LBO ID	1263		
Description			
This output is active when at least 1 alarm caused by Bus <>V Protection (page 251) is present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

AL Common Shutdown Override

Related FW	1.0.0	Related applications	BTB
LBO ID	251		
Description			
This output is closed 2 seconds after there is at least one alarm of type Protection types (page 159) present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Alarm Flashing

Related FW	1.0.0	Related applications	BTB
LBO ID	28		
Description			
This is the flashing alternative of the output ALARM (PAGE 479) , 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	BTB
LBO ID	197		
Description			
This output is active when at least 1 protection caused by , Mains <>V Protection (page 248) , Mains <>f Protection (page 253) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Bus Frequency

Related FW	1.0.0	Related applications	BTB
LBO ID	1271		
Description			
This output is closed when at least 1 protection caused by Mains <>f Protection (page 253) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Bus Voltage

Related FW	1.0.0	Related applications	BTB
LBO ID	1270		
Description			
This output is closed when at least 1 protection caused by Mains <>V Protection (page 248) is active.			

⬅ back to Logical binary outputs alphabetically

Alarm Overcurrent

Related FW	1.0.0	Related applications	BTB
LBO ID	109		
Description			
This output is active while at least one of the following overcurrent protection is active IDMT Mains Overcurrent Protection (page 245) .			

⬆ back to Logical binary outputs alphabetically

All Available Gen-sets Run

Related FW	1.0.0	Related applications	BTB
LBO ID	122		
Description			
This output is closed when all available Gen-sets are loaded.			
Note: Gen-set is available if Power Management = Enabled, Controller Mode (page 400) = AUTO and there is not present Alarms level 2 (page 579) in the alarmlist.			

⬆ back to Logical binary outputs alphabetically

LBO: B

Bus Healthy

Related FW	1.0.0	Related applications	BTB
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

Mains Healthy

Related FW	1.0.0	Related applications	BTB
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	BTB
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	BTB
LBO ID	45		

Description

The output controls the bus tie 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.

Image 7.6 MCB Close command

Image 7.7 Repeated MCB Close command

Image 7.8 MCB Open command

◀ back to Logical binary outputs alphabetically

MCB OFF Coil

Related FW	1.0.0	Related applications	BTB
LBO ID	47		

Description

The output is intended for control of open coil of bus tie 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.

The diagram illustrates the timing of the MCB 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 line), 'UV Coil open' (solid line), 'OFF Coil close' (dashed line), and 'OFF Coil open' (solid line). A red hatched area represents the 'BTB Feedback' signal. The sequence of events is as follows: 1. The 'UV Coil open' signal transitions from high to low. 2. The 'OFF Coil open' signal transitions from low to high, initiating a pulse. 3. A 'Feedback match' occurs, indicated by a vertical line. 4. A 'Waiting for feedback 2 s' period is shown. 5. The 'BTB Feedback' signal (red hatched area) becomes active. 6. The 'OFF Coil open' signal returns to low. 7. The 'UV Coil close' signal transitions from low to high. 8. A note states 'Further behavior of UV output depends on the system status'. 9. A note indicates 'BTB Fail when feedback not match'.

Image 7.9 MCB OFF Coil command

◀ back to Logical binary outputs alphabetically

MCB ON Coil

Related FW	1.0.0	Related applications	BTB
LBO ID	46		

Description

The output is intended for control of close coil of bus tie breaker. The output gives at least 2 second pulse in the moment the breaker has to be closed.

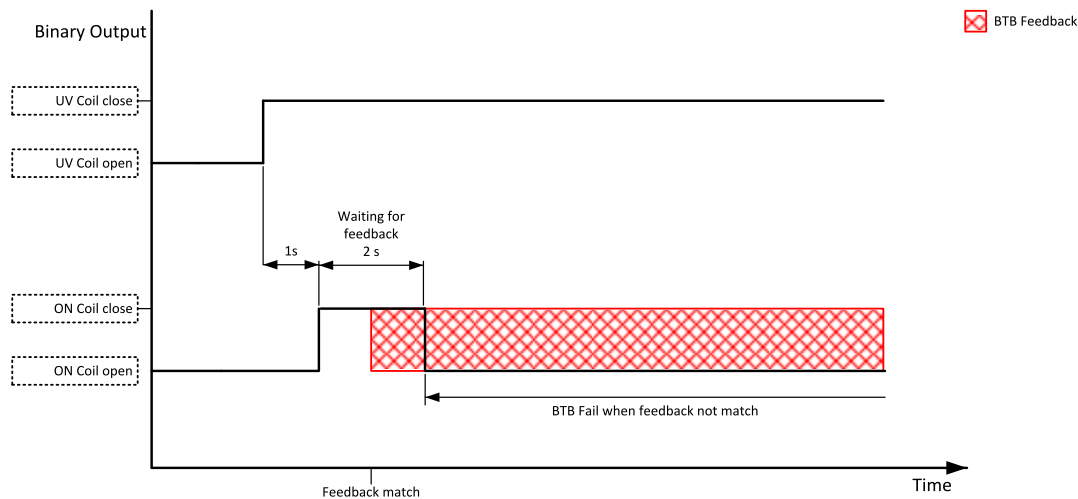


Image 7.10 MCB ON Coil close command

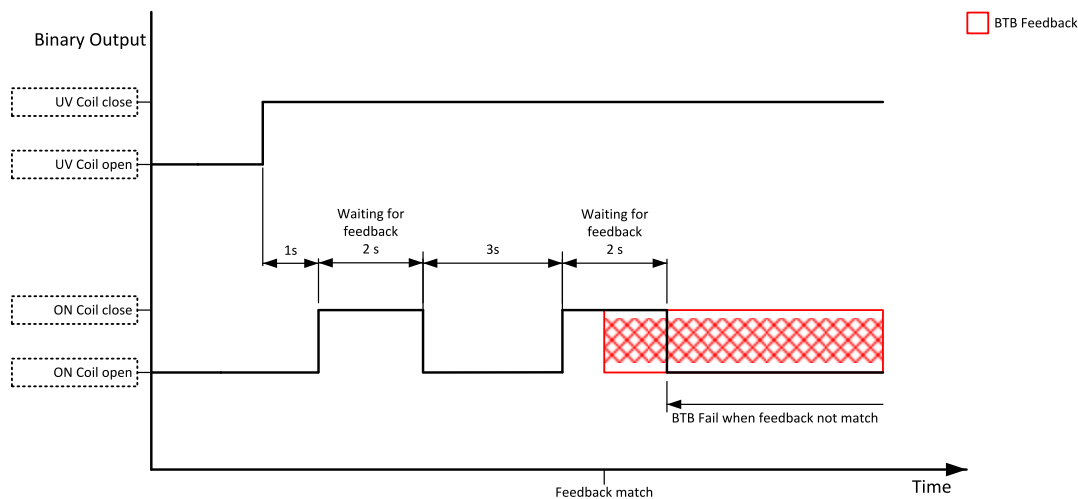


Image 7.11 Repeated MCB ON coil close command

◀ back to Logical binary outputs alphabetically

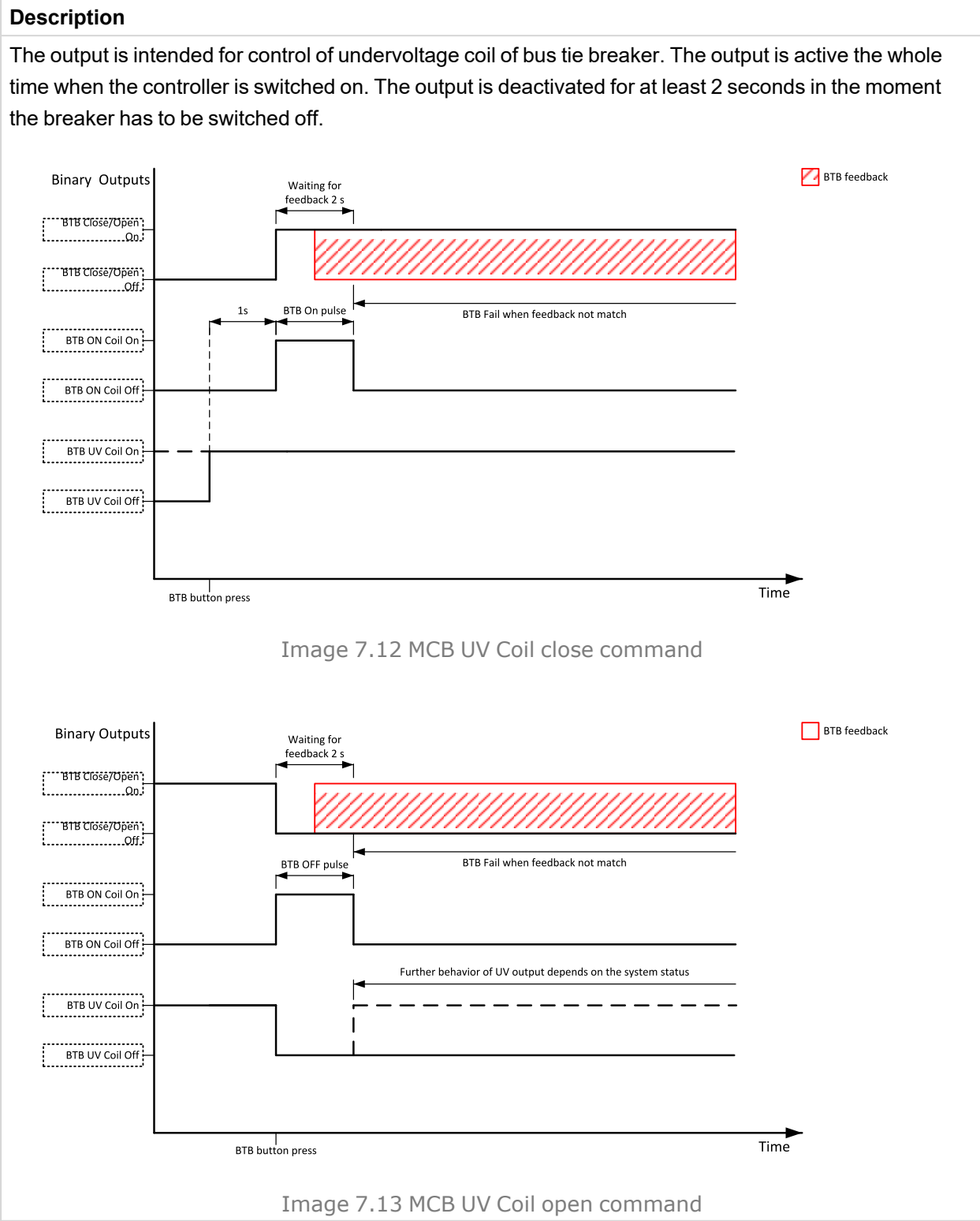
MCB Status

Related FW	1.0.0	Related applications	BTB
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 464) and MCB FEEDBACK NEGATIVE (PAGE 465).</p> <ul style="list-style-type: none">➤ In case that only MCB FEEDBACK (PAGE 464) is used, this output mirrors the input.➤ In case that both MCB FEEDBACK (PAGE 464) and MCB FEEDBACK NEGATIVE (PAGE 465) 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	BTB
LBO ID	48		



⬅ back to Logical binary outputs alphabetically

LBO: C

Common Alarm Active Level 1

Related FW	1.0.0	Related applications	BTB
LBO ID	13		
Description			
This output is closed when there is at least one Alarms level 1 (page 533) in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common Alarm Active Level 2

Related FW	1.0.0	Related applications	BTB
LBO ID	15		
Description			
This output is closed when there is at least one Alarms level 2 (page 579) in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common Alarm Level 1

Related FW	1.0.0	Related applications	BTB
LBO ID	14		
Description			
This output is closed when there is at least one unconfirmed Alarms level 1 (page 533) in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common Alarm Level 2

Related FW	1.0.0	Related applications	BTB
LBO ID	16		
Description			
This output is closed when there is at least one unconfirmed Alarms level 2 (page 579) in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common Alarm Only

Related FW	1.0.0	Related applications	BTB
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	BTB
LBO ID	12		
Description			
This output is closed for 1 second every time alarm of type History Record Only (page 569) occurs.			
Note: When any History Record alarm is activated the history record is logged into history.			

⬅ back to Logical binary outputs alphabetically

Common

Related FW	1.0.0	Related applications	BTB
LBO ID	10		
Description			
This output is closed when there is at least one active alarm of type Protection types (page 159) .			

⬅ back to Logical binary outputs alphabetically

Common Mains Protection + FltRes

Related FW	1.0.0	Related applications	BTB
LBO ID	4		
Description			
This output is closed when there is at least one active alarm of type Protection types (page 159) present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Common Warning

Related FW	1.0.0	Related applications	BTB
LBO ID	3		
Description			
This output is closed when there is at least one alarm of type Warning (page 537) present in the alarmlist.			

⬅ back to Logical binary outputs alphabetically

Controller HeartBeat Fail Detect

Related FW	1.0.0	Related applications	BTB
LBO ID	1177		
Description			
description.			

⬅ back to Logical binary outputs alphabetically

LBO: E

Electrical Alarm

Related FW	1.0.0	Related applications	BTB
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	BTB
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 260) if it is setup to Run Hours Equal.			

⬅ back to Logical binary outputs alphabetically

Exercise Timer 1

Related FW	1.0.0	Related applications	BTB
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 breaker, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 1 (page 299) 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 2

Related FW	1.0.0	Related applications	BTB
LBO ID	1251		
Description			
This output is closed when the Exercise timer 2 is activated. The output can be used to make periodic tests of breaker, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 2 (page 301) 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 3

Related FW	1.0.0	Related applications	BTB
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 breaker, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 3 (page 303) 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	BTB
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 breaker, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 4 (page 305) 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	BTB
LBO ID	1948		
Description			
<p>This output is closed when the Exercise timer 5 is activated. The output can be used to make periodic tests of breaker, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 5 (page 307) 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 6

Related FW	1.0.0	Related applications	BTB
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 breaker, any external logic etc. and its activation depends on the setpoints in the Subgroup: Timer 6 (page 309) 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	BTB
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 467) is activated.</div></div>			

⬅ back to Logical binary outputs alphabetically

LBO: H

Heartbeat

Related FW	1.0.0	Related applications	BTB
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	BTB
LBO ID	2762		
Description			
description.			

⬅ back to Logical binary outputs alphabetically

Horn

Related FW	1.0.0	Related applications	BTB
LBO ID	1		
Description			
This output is closed when any Alarms (page 533) is activated and stays closed until:			
<div>> Fault reset  is pressed</div> <div>> Horn reset  is pressed</div> <div>> Horn Timeout (page 227) elapses</div>			

⬅ back to Logical binary outputs alphabetically

Horn Flashing

Related FW	1.0.0	Related applications	BTB
LBO ID	29		
Description			
This is the flashing alternative of the output HORN (PAGE 492) , 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	BTB
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 Synchronism

Related FW	1.0.0	Related applications	BTB
LBO ID	80		
Description			
<p>This output is closed during synchronization when Slip Angle, Slip Frequency and Voltages are inside required windows.</p> <p>Required windows are:</p> <ul style="list-style-type: none">➤ Slip Angle (page 382) between Mains and Bus Voltage is within range given by Phase Window (page 283) for time longer than Dwell Time (page 283). Required if Synchronization Type (page 281) = PhaseMatch.➤ Slip Frequency (page 382) between between Mains and Bus Frequency is withing range given by Slip Frequency Window (page 284) for time longer than Dwell Time (page 283). Required if Synchronization Type (page 281) = SlipSynchr.➤ Voltage difference between Mains and Bus voltage in all phases must be lower or equal to Voltage Window (page 282) for time longer than Dwell Time (page 283). Required always.			

⬅ back to Logical binary outputs alphabetically

Initialized

Related FW	1.0.0	Related applications	BTB
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

Logical 0

Related FW	1.0.0	Related applications	BTB
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	BTB
LBO ID	27		
Description			
Logical binary output which is still in logical 1.			

⬅ back to Logical binary outputs alphabetically

LBO: M

Mode AUTO

Related FW	1.0.0	Related applications	BTB
LBO ID	19		
Description			
This output is active whenever Controller Mode (page 400) = AUTO, i.e. when LBO NOT IN AUTO (PAGE 494) is opened.			

⬆ back to Logical binary outputs alphabetically

Mode MAN

Related FW	1.0.0	Related applications	BTB
LBO ID	18		
Description			
This output is active whenever Controller Mode (page 400) = MAN.			

⬆ back to Logical binary outputs alphabetically

Mode OFF

Related FW	1.0.0	Related applications	BTB
LBO ID	17		
Description			
This output is active whenever Controller Mode (page 400) = OFF.			

⬆ back to Logical binary outputs alphabetically

LBO: N

Not In Auto

Related FW	1.0.0	Related applications	BTB
LBO ID	1248		
Description			
This output is closed whenever Controller Mode (page 400) != AUTO, i.e. when LBO Mode AUTO (PAGE 494) is opened.			

⬆ back to Logical binary outputs alphabetically

Not Used

Related FW	1.0.0	Related applications	BTB
LBO ID	286		
Description			
Output has no function.			

⬆ back to Logical binary outputs alphabetically

LBO: P

Peripheral Module Comm Fail

Related FW	1.0.0	Related applications	BTB
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

LBO: R

Synchronization

Related FW	1.0.0	Related applications	BTB
LBO ID	69		
Description			
The output is closed when synchronization is active (synchronization via MCB breaker) and opens when LBO MCB STATUS (PAGE 485) closes.			

🔍 back to Logical binary outputs alphabetically

LBO: S

System Ready

Related FW	1.0.0	Related applications	BTB
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: <i>Fulfilled reserve means that Available Nominal Power In PM (page 394) is above the Minimal Running Power (page 395)</i>			

🔍 back to Logical binary outputs alphabetically

System Reserve OK

Related FW	1.0.0	Related applications	BTB
LBO ID	87		
Description			
This output is closed when Actual Reserve (page 391) is higher than the Actual Reserve (page 392) .			

🔍 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 498

For full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 497)**.

Logical analog inputs alphabetically

LAI: C 498

 Cold Temp 1 498

 Cold Temp 2 498

 Cold Temp 3 498

 Cold Temp 4 499

 Cold Temp 5 499

 **back to Controller objects**

LAI: C

Cold Temp 1

Related FW	1.0.0	Related applications	BTB
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 Intel 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	BTB
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 Intel 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	BTB
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 Intel 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	BTB
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	BTB
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: The compensation is only for thermocouples without internal compensation "Thermo (nc) ..." (not cold junction compensation).</p>			

◀ back to Logical analog inputs alphabetically

8.1.7 Fixed Protection States

List of Fixed Protection States

Fixed Protections States 1	501
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Fixed Protections States 3	503

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Fixed Protections States 1

Related FW	1.0.0	Related applications	BTB
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 558)12. Wrn MCB Fail To Open (page 560)13. Wrn MCB Fail To Close (page 559)14. Not Used15. Not Used16. Not Used17. Hst Bus Overvoltage L1-N (page 569)18. Hst Bus Overvoltage L2-N (page 569)19. Hst Bus Overvoltage L3-N (page 569)20. Hst Bus Overvoltage L1-L2 (page 569)21. Hst Bus Overvoltage L2-L3 (page 570)22. Hst Bus Overvoltage L3-L1 (page 570)23. Hst Bus Undervoltage L1-N (page 570)24. Hst Bus Undervoltage L2-N (page 570)25. Hst Bus Undervoltage L3-N (page 571)26. Hst Bus Undervoltage L1-L2 (page 571)27. Hst Bus Undervoltage L2-L3 (page 571)28. Hst Bus Undervoltage L3-L1 (page 571)29. Hst Bus Voltage Unbalance Ph-Ph (page 572)30. Hst Bus Voltage Unbalance Ph-N (page 572)31. Hst Bus Overfrequency (page 572)32. Hst Bus Underfrequency (page 572)			

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Fixed Protections States 2

Related FW	1.0.0	Related applications	BTB
Comm object	20745		
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. MP Mains Overvoltage L1-N (page 573)2. MP Mains Overvoltage L2-N (page 573)3. MP Mains Overvoltage L3-N (page 573)4. MP Mains Undervoltage L1-N (page 575)5. MP Mains Undervoltage L2-N (page 575)6. MP Mains Undervoltage L3-N (page 575)7. MP Mains Overvoltage L1-L2 (page 574)8. MP Mains Overvoltage L2-L3 (page 574)9. MP Mains Overvoltage L3-L1 (page 574)10. MP Mains Undervoltage L1-L2 (page 575)11. MP Mains Undervoltage L2-L3 (page 576)12. MP Mains Undervoltage L3-L1 (page 576)13. MP Mains Voltage Unbalance Ph-Ph (page 576)14. MP Mains Voltage Unbalance Ph-N (page 577)15. MP Mains Overfrequency (page 577)16. MP Mains Underfrequency (page 577)17. Not used18. Not used19. Not used20. Not used21. ALI Bus Ph Rotation Opposite (page 567)22. ALI Mains Ph Rotation Opposite (page 568)23. ALI Bus Ph Rotation Opposite (page 567)24. MP Mains Overload (page 573)25. Hst IDMT Overload (page 580)			

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Fixed Protections States 3

Related FW	1.0.0	Related applications	BTB
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. MPR Current Unbalance (page 580)2. MPR Short Circuit (page 580)3. MPR IDMT Mains >A (page 580)4. Wrn Bus Meas Error (page 538)5. BOR Battery Flat (page 581)6. Wrn Parallel Work (page 560)7. Wrn Synchronization Fail (page 562)8. Wrn Synchronisation Fail (page 1)9. Not used10. ALI Manual Restore (page 568)11. Wrn Total Running PQS Value Overflow (page 565)12. Wrn Load IMP/EXP Fail (page 558)13. Not used14. Not used15. Wrn PasswEnterBlock (page 561)16. Wrn Default Password (page 540)17. Wrn Brute Force Protection Active (page 539)18. Wrn Battery Overvoltage (page 538)19. Wrn Battery Undervoltage (page 538)20. Wrn Battery Voltage (page 538)21. Wrn CAN2 Empty (page 540)22. Wrn Alarm e-mail 1 Fail (page 537)23. Wrn Alarm e-mail 2 Fail (page 537)24. Wrn Alarm e-mail 3 Fail (page 537)25. Wrn Alarm e-mail 4 Fail (page 537)26. Wrn SNMP TRAP 1 Fail (page 565)27. Wrn SNMP TRAP 2 Fail (page 565)28. Wrn SHBIN Collision (page 564)29. Wrn SHAIN Collision (page 563)			

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8.1.8 User Protection States

List of User Protection States

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User Protections States 7	506
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User Protections States 9	506
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User Protections States 1

Related FW	1.0.0	Related applications	BTB
Comm object	20759		
Description			
This is a group of user protection states.			

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User Protections States 2

Related FW	1.0.0	Related applications	BTB
Comm object	20760		
Description			
This is a group of user protection states.			

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User Protections States 3

Related FW	1.0.0	5Related applications	BTB
Comm object	20761		
Description			
This is a group of user protection states.			

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User Protections States 4

Related FW	1.0.0	Related applications	BTB
Comm object	20762		
Description			
This is a group of user protection states.			

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User Protections States 5

Related FW	1.0.0	Related applications	BTB
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	BTB
Comm object	20764		
Description			
This is a group of user protection states.			

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User Protections States 7

Related FW	1.0.0	Related applications	BTB
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	BTB
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	BTB
Comm object	20767		
Description			
This is a group of user protection states.			

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User Protections States 10

Related FW	1.0.0	Related applications	BTB
Comm object	20768		
Description			
This is a group of user protection states.			

[◀ back to User Protection States](#)

8.1.9 PLC

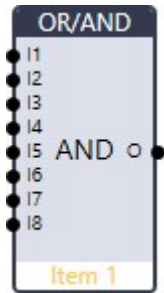
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Group: Logical functions

OR/AND

PLC group	Basic logical functions	
Related FW	1.0.0	
Related applications	BTB	
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

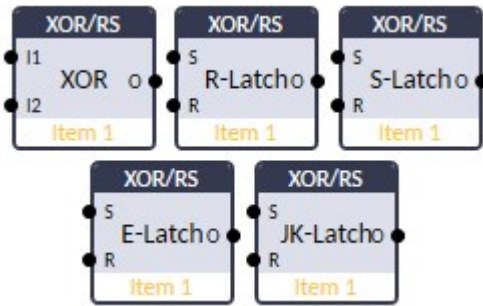
OK

Cancel

Image 7.14 Configuration of OR/AND block

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XOR/RS

PLC group	Basic logical functions				
Related FW	1.0.0				
Related applications	BTB				
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).

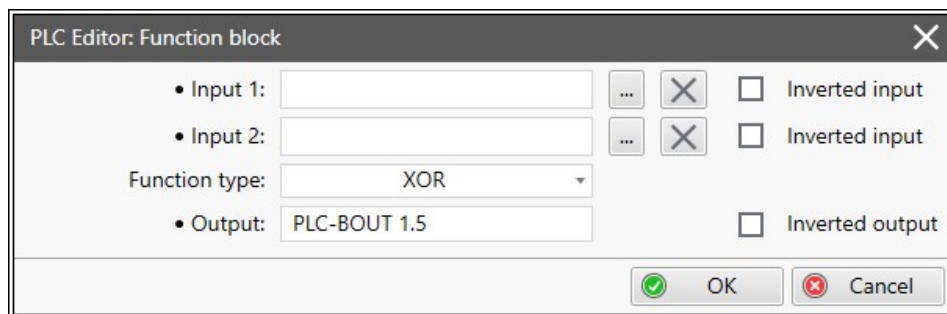



Image 7.15 Configuration of XOR/RS block

⬆ back to List of PLC blocks

Group: Comparators

Comp Hyst

PLC group	Comparison of analog inputs			
Related FW	1.0.0			
Related applications	BTB			
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.				

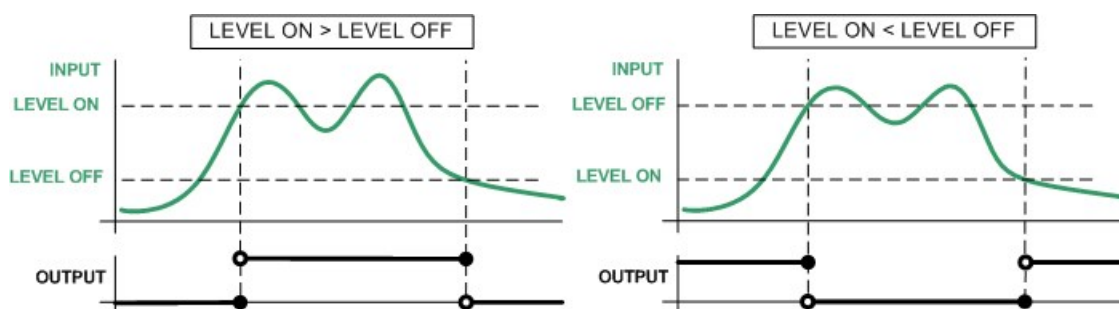


Image 7.16 Different On and Off levels

PLC Editor: Function block

• Input: ...

• Input ON: ...


• Input OFF: ...

• Output: ☐ Inverted output

Image 7.17 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	BTB			
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.				

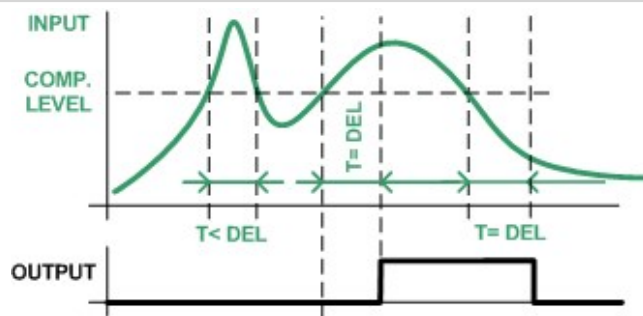


Image 7.18 Principle of delay

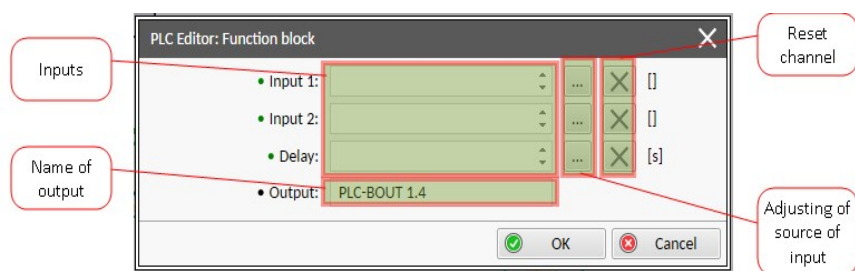



Image 7.19 Configuration of Comp Time block

Note: Input 2 and Delay can be constants or values from controller.

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Comp Win

PLC group	Comparison of analog inputs			
Related FW	1.0.0			
Related applications	BTB			
PLC Block ID	18			
Inputs				
Input	Type	Negation	Range	Function
Input	Analog	No	$-2^{32} .. 2^{32}$	Compared value
Input HIGH	Analog	No	$-2^{32} .. 2^{32}$	Upper window limit
Input LOW	Analog	No	$-2^{32} .. 2^{32}$	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.				

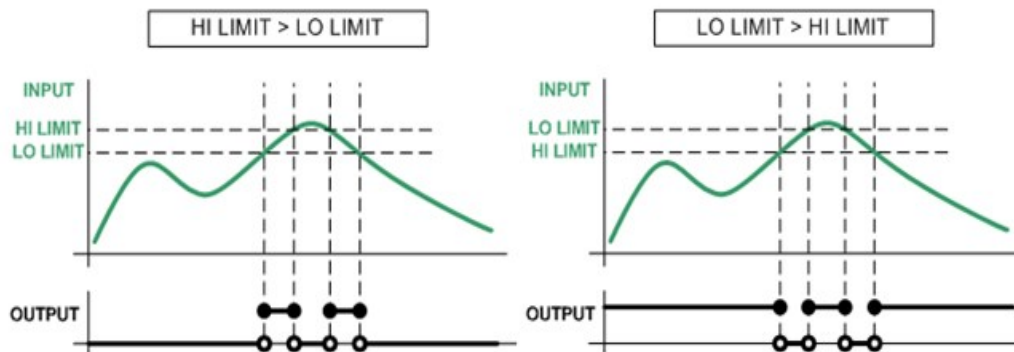


Image 7.20 Principle of delay



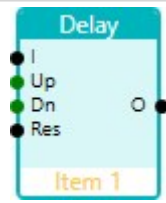
Image 7.21 Configuration of Comp Time block

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	BTB			
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.				

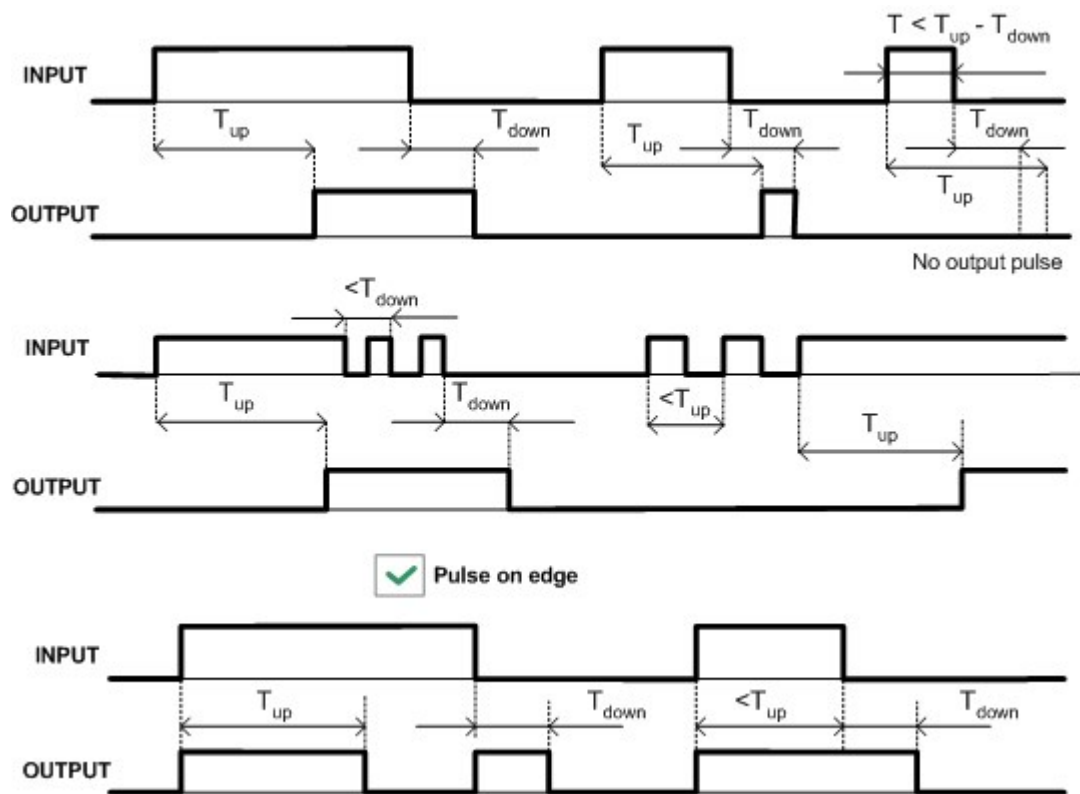


Image 7.22 Delay modes principles

PLC Editor: Function block

• Input: [] [X] [] Inverted input

• Input time up: [] [X] [s]

• Input time down: [] [X] [s]

• Input reset: [] [X]

• Output: PLC-BOUT 1.5 [] Inverted input

[] Pulse on edge [] Inverted output


Time unit: s

OK Cancel

Image 7.23 Configuration of Delay block

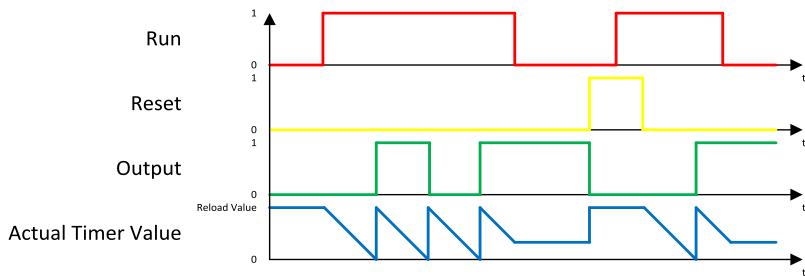
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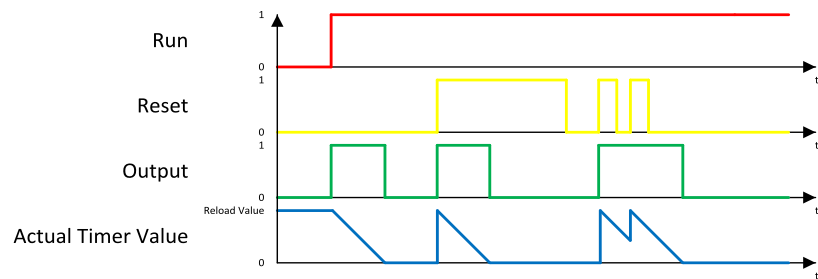
Timer

PLC group	Time functions	
Related FW	1.0.0	
Related applications	BTB	
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

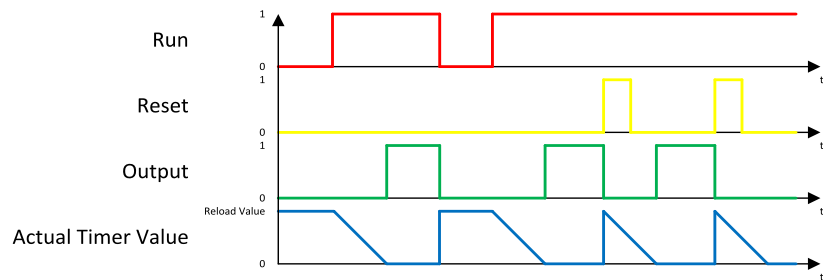
Outputs				
Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Timer output
Actual Timer Value	Analog	No	N/A	Analog value that shows Actual Timer Value Lowest available value from: <PLC Resource 1 (page 450) to PLC Resource 10 (page 452)>

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 horizontal line) when Run becomes high. It counts down linearly to zero. When it reaches zero, it immediately reloads to the Reload Value. This cycle repeats as long as Run is high and Reset is not active. When Reset is active, the timer value jumps back to the Reload Value. When Run becomes low, the timer value remains at zero.</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).

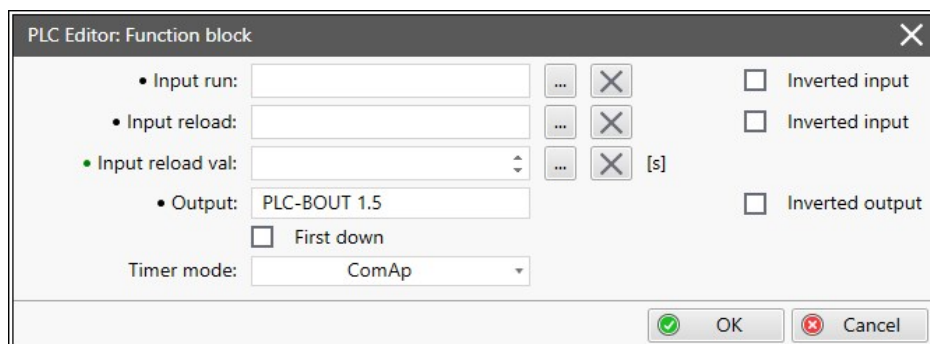
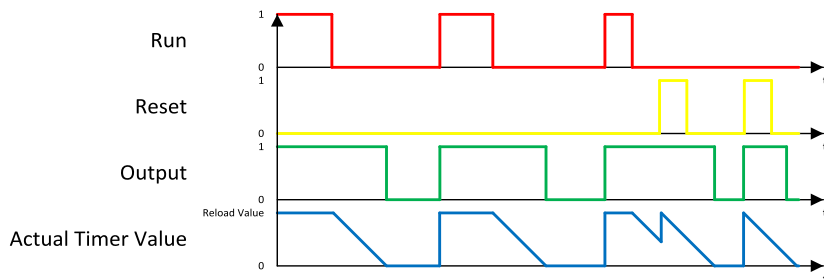


Image 7.24 Configuration of Timer block

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.

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Group: Math operations

Interpolation

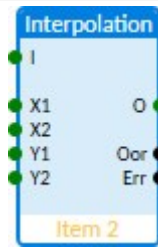
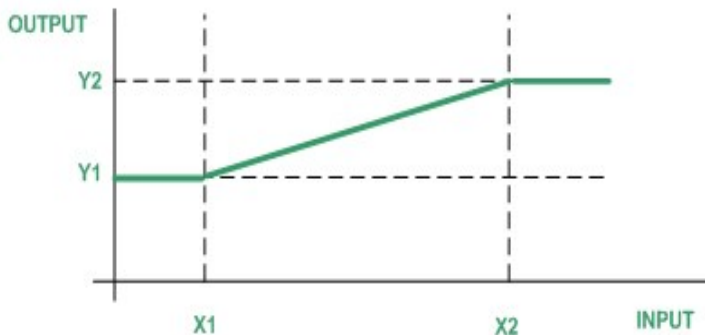
PLC group			
Related FW	1.0.0		
Related applications	BTB		
PLC Block ID	34		
Inputs			
Input	Analog	$-2^{32} .. 2^{32}$	Input value
X1	Analog	$-2^{32} .. 2^{32}$	Low X limit of definition
X2	Analog	$-2^{32} .. 2^{32}$	High X limit of definition
Y1	Analog	$-2^{32} .. 2^{32}$	Low Y limit of definition
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 7.25 Principle of Interpolation

Image 7.25 Principle of Interpolation

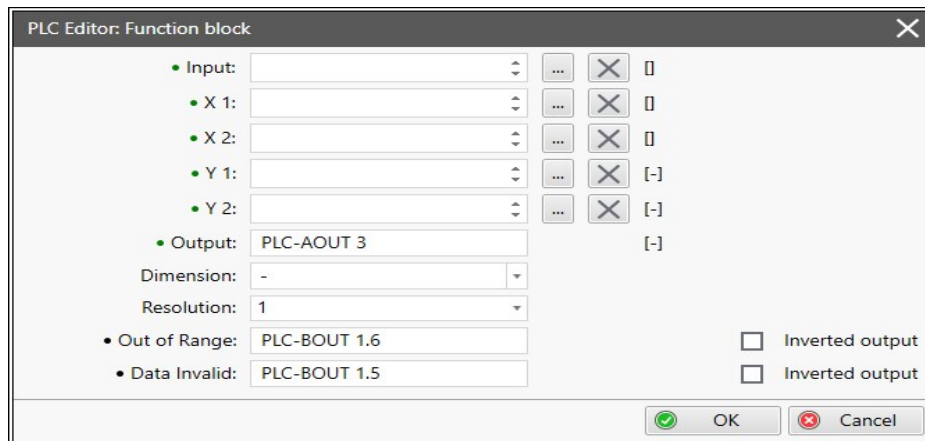
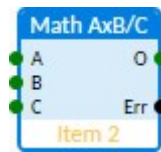


Image 7.26 Configuration of Interpolation block

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Math AxB/C

PLC group				
Related FW	1.0.0			
Related applications	BTB			
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.				

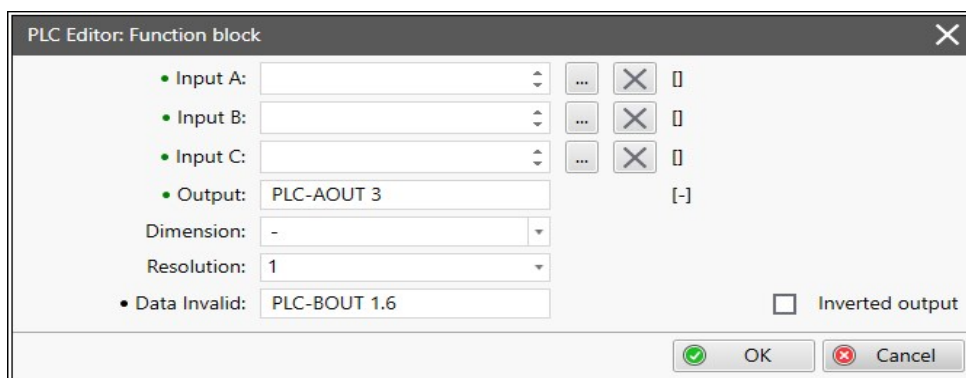
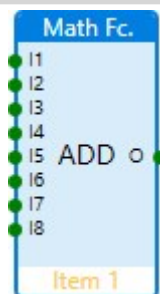


Image 7.27 Configuration of Math AxB/C block

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Math Fc.

PLC group				
Related FW	1.0.0			
Related applications	BTB			
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.

PLC Editor: Function block

No.	Input	Unit
1		[-]
2		[-]
3		[-]
4		[-]
5		[-]
6		[-]
7		[-]
8		[-]

Output: PLC-AOUT 6 [-]

Dimension: -

Resolution: 1

Function type: ADD

ADD
SUB
|SUB|
AVG
MAX
MIN

OK Cancel

Image 7.28 Configuration of Math Fc. block

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Group: Ramp functions

Inc/Dec

PLC group		
Related FW	1.0.0	
Related applications	BTB	
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.

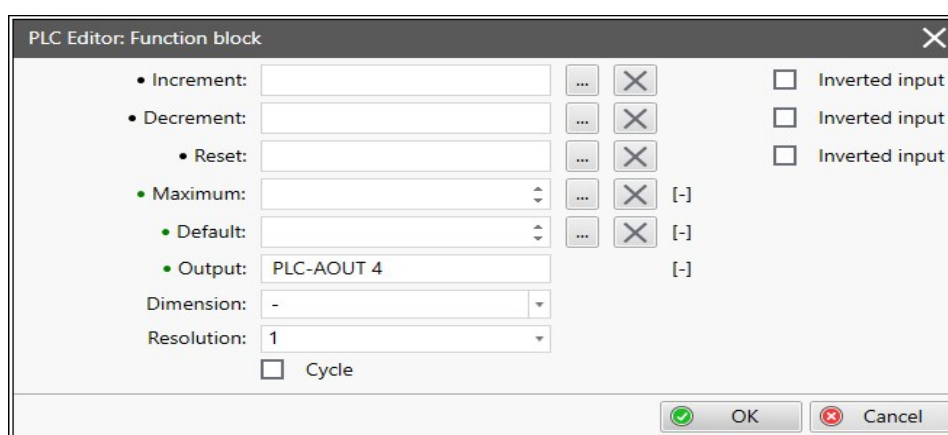


Image 7.29 Configuration of Inc/Dec block

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LowPassFit


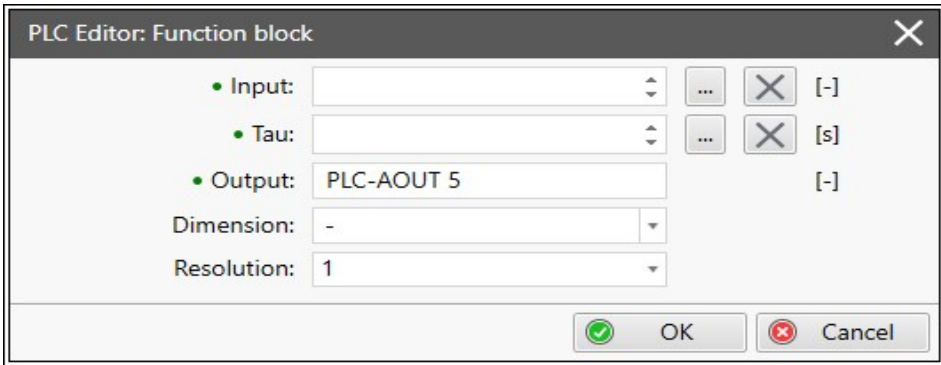

PLC group					
Related FW	1.0.0				
Related applications	BTB				
PLC Block ID	40				
Inputs					
Input	Type	Negation	Range	Function	
Input	Analog	No	$-2^{32} .. 2^{32}$	Input Value	
Tau	Analog	No	0,0 .. 60,0 [s]	Time Constant of the filter	
Outputs					
Output	Type	Negation	Range	Function	
Output	Analog	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 7.30 Configuration of LowPassFit block

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Ramp

PLC group					
Related FW	1.0.0				
Related applications	BTB				
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.

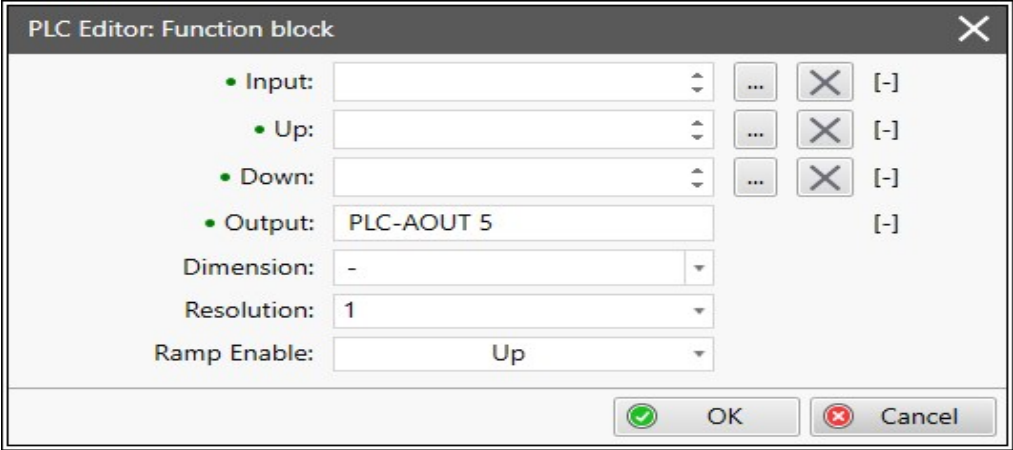



Image 7.31 Configuration of Ramp block

⬅ back to List of PLC blocks

Up/Down

PLC group		
Related FW	1.0.0	
Related applications	BTB	
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	$-2^{32} .. 2^{32}$	Rising rate of Output per second
Speed Down	Analog	No	$-2^{32} .. 2^{32}$	Lowering rate of Output per second
Up	Binary	No	0/1	Activates rising of Output
Down	Binary	No	0/1	Activates lowering of Output
Default Output Value	Analog	No	$-2^{32} .. 2^{32}$	Initial value of Output

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	Limit 1 .. Limit 2	Output value

Description

This block works as an analog ramp controlled by binary inputs **Up** and **Down** with a defined 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**.

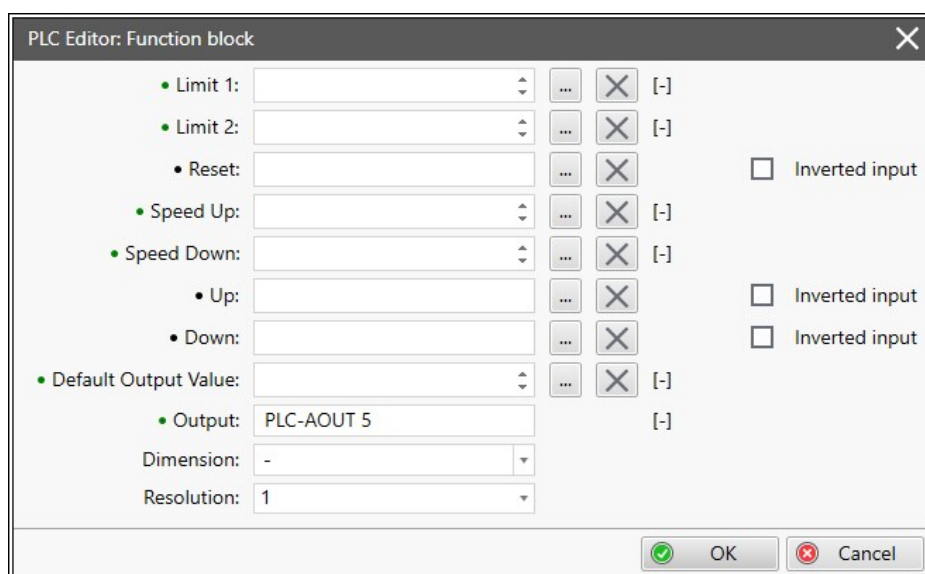
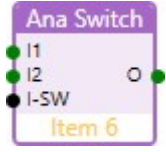


Image 7.32 Configuration of Up/Down block

🔍 back to List of PLC blocks

Group: Other functions

Analog Switch

PLC group	Other functions	
Related FW	1.0.0	
Related applications	BTB	
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.

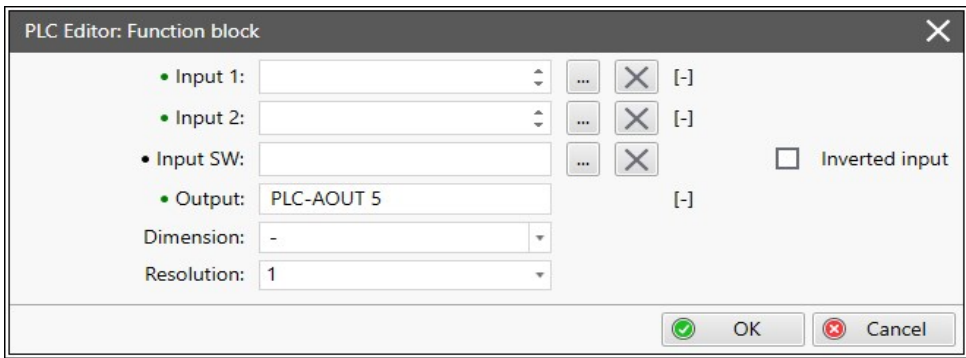
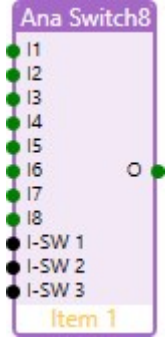


Image 7.33 Configuration of Analog Switch block

◀ back to List of PLC blocks

Analog Switch 8

PLC group	Other functions	
Related FW	1.0.0	
Related applications	BTB	
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:

...

×

☐

Inverted input

• Input SW 2:

...

×

☐

Inverted input

• Input SW 3:

...

×

☐

Inverted input

• Output:

PLC-AOUT 6

[-]

Dimension:

-

Resolution:

1

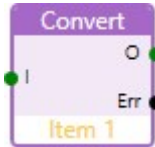
OK

Cancel

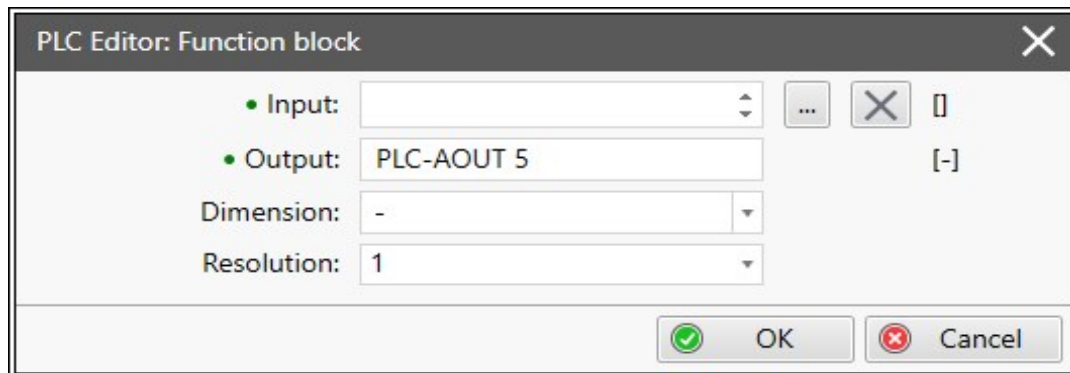
Image 7.34 Configuration of Analog Switch 8 block

⬅ back to List of PLC blocks

Convert

PLC group	Other functions			
Related FW	1.0.0			
Related applications	BTB			
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.



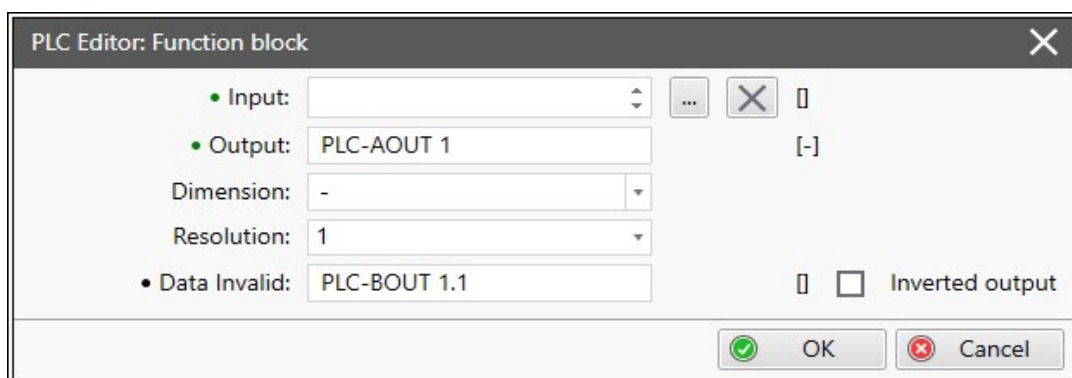
PLC Editor: Function block

• Input: ... ☐

• Output: [-]

Dimension:

Resolution:



PLC Editor: Function block

• Input: ... ☐

• Output: [-]

Dimension:

Resolution:

• Data Invalid: ☐ ☐ Inverted output

Image 7.35 Configuration of Convert block

[back to List of PLC blocks](#)

Counter


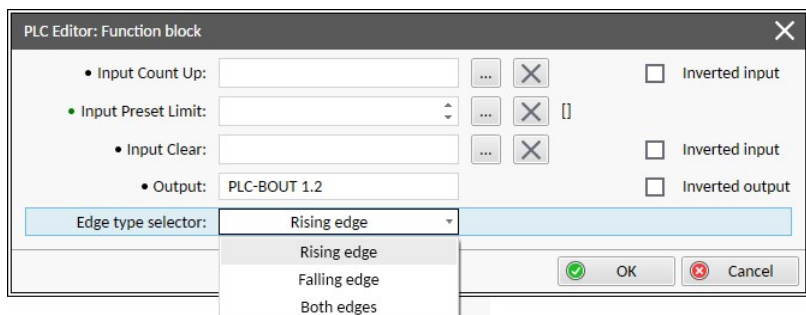
PLC group	Other functions			
Related FW	1.0.0			
Related applications	BTB			
PLC Block ID	13			
Inputs				
Input	Type	Negation	Range	Function
Input Count Up	Binary	No	0/1	Input at which the edges are counted
Input Preset Limit	Analog	No	0 .. 2 ³²	Counter value limit for activation of the output
Input 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 450) to PLC Resource 10 (page 452)>
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 7.36 Configuration of the Counter block

Image 7.36 Configuration of the Counter block

◀ back to List of PLC blocks

Decomp. 4

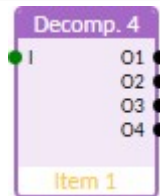
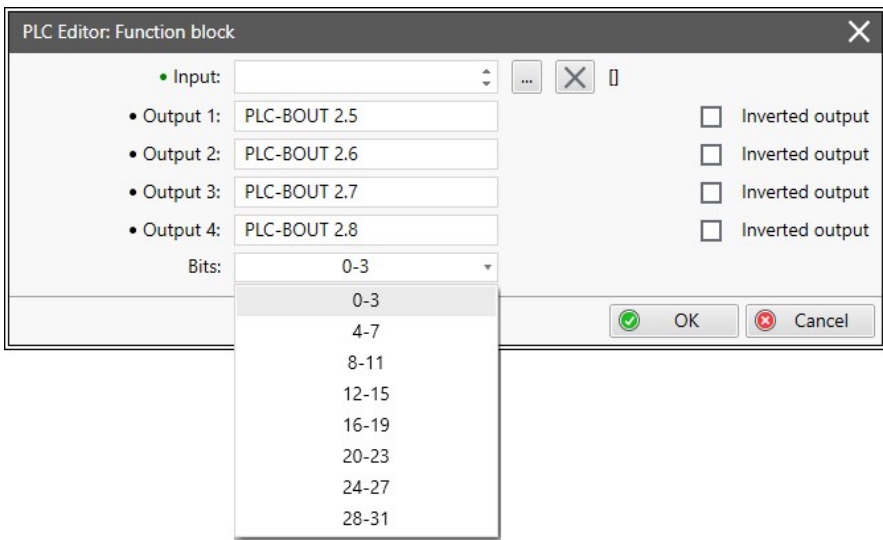
PLC group	Other functions			
Related FW	1.0.0			
Related applications	BTB			
PLC Block ID	24			
Inputs				
Input	Type	Negation	Range	Function
Input	Analog	No	-2 ³² .. 2 ³²	Value to be "decomposed" to bits
Outputs				
Output	Type	Negation	Range	Function
Output 1	Binary	Yes	0/1	Bit 0,4,8,12,16,20,24,28 - 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 7.37 Configuration of Decomp. 4 block

Image 7.37 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 96.**

8.2.1 Alarm levels in the controller

8.2.2 Alarms level 1	533
8.2.3 Alarms level 2	579

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	537	Wrn DISTIN 23	546
Wrn Alarm e-mail 1 Fail	537	Wrn DISTIN 24	546
Wrn Alarm e-mail 2 Fail	537	Wrn DISTIN 25	547
Wrn Alarm e-mail 3 Fail	537	Wrn DISTIN 26	547
Wrn Alarm e-mail 4 Fail	537	Wrn DISTIN 27	547
Wrn Battery Overvoltage	538	Wrn DISTIN 28	547
Wrn Battery Undervoltage	538	Wrn DISTIN 29	548
Wrn Battery Voltage	538	Wrn DISTIN 30	548
Wrn Bus Meas Error	538	Wrn DISTIN 31	548
Wrn Default Password	539	Wrn DISTIN 32	548
Wrn Brute Force Protection Active	539	Wrn DISTIN 33	549
Wrn RTC Battery Flat	540	Wrn DISTIN 34	549
Wrn CAN2 Empty	540	Wrn DISTIN 35	549
Wrn Default Password	540	Wrn DISTIN 36	549
Wrn DISTIN 01	541	Wrn DISTIN 37	550
Wrn DISTIN 02	541	Wrn DISTIN 38	550
Wrn DISTIN 03	541	Wrn DISTIN 39	550
Wrn DISTIN 04	541	Wrn DISTIN 40	550
Wrn DISTIN 05	542	Wrn DISTIN 41	551
Wrn DISTIN 06	542	Wrn DISTIN 42	551
Wrn DISTIN 07	542	Wrn DISTIN 43	551
Wrn DISTIN 08	542	Wrn DISTIN 44	551
Wrn DISTIN 09	543	Wrn DISTIN 45	552
Wrn DISTIN 10	543	Wrn DISTIN 46	552
Wrn DISTIN 11	543	Wrn DISTIN 47	552
Wrn DISTIN 12	543	Wrn DISTIN 48	552
Wrn DISTIN 13	544	Wrn DISTIN 49	553
Wrn DISTIN 14	544	Wrn DISTIN 50	553
Wrn DISTIN 15	544	Wrn DISTIN 51	553
Wrn DISTIN 16	544	Wrn DISTIN 52	553
Wrn DISTIN 17	545	Wrn DISTIN 53	554
Wrn DISTIN 18	545	Wrn DISTIN 54	554
Wrn DISTIN 19	545	Wrn DISTIN 55	554
Wrn DISTIN 20	545	Wrn DISTIN 56	554
Wrn DISTIN 21	546	Wrn DISTIN 57	555
Wrn DISTIN 22	546	Wrn DISTIN 58	555

Wrn DISTIN 59	555	ALI Bus Ph Rotation Opposite	567
Wrn DISTIN 60	555	ALI Mains Ph L1 Inverted	567
Wrn DISTIN 61	556	ALI Mains Ph L2 Inverted	567
Wrn DISTIN 62	556	ALI Mains Ph L3 Inverted	568
Wrn DISTIN 63	556	ALI Mains Ph Rotation Opposite	568
Wrn DISTIN 64	556	ALI Manual Restore	568
Wrn DISTOUT	557	ALI Wrong Power Format	568
Wrn Event e-mail 1 Fail	557	History Record Only	569
Wrn Event e-mail 2 Fail	557	Hst Bus Overvoltage L1-N	569
Wrn Event e-mail 3 Fail	557	Hst Bus Overvoltage L2-N	569
Wrn Event e-mail 4 Fail	558	Hst Bus Overvoltage L3-N	569
Wrn Load IMP/EXP Fail	558	Hst Bus Overvoltage L1-L2	569
Wrn MCB Fail	558	Hst Bus Overvoltage L2-L3	570
Wrn MCB Fail To Close	559	Hst Bus Overvoltage L3-L1	570
Wrn MCB Fail To Open	560	Hst Bus Undervoltage L1-N	570
Wrn Password reset e-mail addr is not set	560	Hst Bus Undervoltage L2-N	570
Wrn PF/Q IMP/EXP Fail	561	Hst Bus Undervoltage L3-N	571
Wrn Synchronization Fail	562	Hst Bus Undervoltage L1-L2	571
Wrn RTC Battery Flat	562	Hst Bus Undervoltage L2-L3	571
Wrn SHAIN 1	562	Hst Bus Undervoltage L3-L1	571
Wrn SHAIN 2	562	Hst Bus Overfrequency	572
Wrn SHAIN Collision	563	Hst Bus Underfrequency	572
Wrn SHBIN 1	563	Hst Bus Voltage Unbalance Ph-N	572
Wrn SHBIN 2	563	Hst Bus Voltage Unbalance Ph-Ph	572
Wrn SHBIN 3	563	MP Mains Overload	573
Wrn SHBIN 4	564	MP Mains Overvoltage L1-N	573
Wrn SHBIN 5	564	MP Mains Overvoltage L2-N	573
Wrn SHBIN 6	564	MP Mains Overvoltage L3-N	573
Wrn SHBIN Collision	564	MP Mains Overvoltage L1-L2	574
Wrn SNMP TRAP 1 Fail	565	MP Mains Overvoltage L2-L3	574
Wrn SNMP TRAP 2 Fail	565	MP Mains Overvoltage L3-L1	574
Wrn Synchronization Fail	565	MP Mains Undervoltage L1-N	575
Wrn Total Running PQS Value Overflow	565	MP Mains Undervoltage L2-N	575
Wrn Unsupported PMS Mode	566	MP Mains Undervoltage L3-N	575
Wrong PLC Configuration	566	MP Mains Undervoltage L1-L2	575
Alarm List Indication	566	MP Mains Undervoltage L2-L3	576
ALI Bus Ph L1 Inverted	566	MP Mains Undervoltage L3-L1	576
ALI Bus Ph L2 Inverted	566	MP Mains Voltage Unbalance Ph-Ph	576
ALI Bus Ph L3 Inverted	567	MP Mains Voltage Unbalance Ph-N	577

MP Mains Overfrequency 577

MP Mains Underfrequency 577

 **back to Alarms**

Warning

Wrn Alarm e-mail 1 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Alarm e-mail 1 Fail
Alarm evaluated	All the time
Related applications	BTB
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 361) and email wasn't send.

◀ back to List of alarms level 1

Wrn Alarm e-mail 2 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Alarm e-mail 2 Fail
Alarm evaluated	All the time
Related applications	BTB
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 361) and email wasn't send.

◀ back to List of alarms level 1

Wrn Alarm e-mail 3 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Alarm e-mail 3 Fail
Alarm evaluated	All the time
Related applications	BTB
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 361) and email wasn't send.

◀ back to List of alarms level 1

Wrn Alarm e-mail 4 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Alarm e-mail 4 Fail
Alarm evaluated	All the time
Related applications	BTB
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 362) and email wasn't send.
--	---

🔍 back to List of alarms level 1

Wrn Battery Overvoltage

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Battery Overvoltage
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	941
Description	<p>This alarm is activated when Battery Voltage (page 397) is over Battery Overvoltage (page 229) for period longer than Battery Under And Overvoltage Delay (page 229).</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 501)</p>

🔍 back to List of alarms level 1

Wrn Battery Undervoltage

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Battery Undervoltage
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	940
Description	<p>This alarm is activated when Battery Voltage (page 397) is bellow Battery Undervoltage (page 229) for period longer than Battery Under And Overvoltage Delay (page 229).</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 501)</p>

🔍 back to List of alarms level 1

Wrn Battery Voltage

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Battery Voltage
Alarm evaluated	All the time
Related applications	BTB
Description	<p>This alarm is activated when Battery Voltage (page 397) is out of range given by Battery Undervoltage (page 229) and Battery Overvoltage (page 229) for period longer than Battery Under And Overvoltage Delay (page 229)</p>

🔍 back to List of alarms level 1

Wrn Bus Meas Error

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Bus Meas Error
Alarm evaluated	Bus Meas Error Protection (page 255) != Disabled

Related applications	BTB
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 BTB was closed and LBO Mains Healthy (page 481) is active → mismatch detected on Bus Left ➤ Own BTB was closed and LBO Bus Healthy (page 481) is active → mismatch detected on Bus Right ➤ Any other controller in Group Link L closed MGCB → mismatch detected on Bus Left ➤ Any other controller in Group Link R closed MGCB → mismatch detected on Bus Right ➤ BTB connected another Control Group with MCB Feedback or controller with closed MGCB <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).</p>

🔍 back to List of alarms level 1

Wrn Default Password

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Default Credentials
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	Wrn Brute Force Protection Active
Alarm evaluated	All the time
Related applications	BTB
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 501).</p>

Note: In case that the alarm stays active even that it should already be inactive, do the following to get rid of it:

1. Disconnect all peripherals (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 159)
Alarmlist message	Wrn RTC Battery Flat
Alarm evaluated	Only during power-on of the controller
Related applications	BTB
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 52) .

🔍 back to List of alarms level 1

Wrn CAN2 Empty

Alarm Type	Warning (page 159)
Alarmlist message	Wrn CAN Intercontroller Empty
Alarm evaluated	Only if CAN Intercontroller Empty Check (page 233) = Enabled
Related applications	BTB
Alarm ID	46
Description	This alarm is activated when controller is alone on Intercontroller CAN (Terminal Diagram (page 29) and/or Terminal Diagram (page 29)) and setpoint CAN Intercontroller Empty Check (page 233) = Enabled. This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 501).

🔍 back to List of alarms level 1

Wrn Default Password

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Default Credentials
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	Wrn DISTIN 01
Alarm evaluated	Only if DIST-IN 01 is configured
Related applications	BTB
Alarm ID	1156
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 1.

⬅ back to List of other alarms

Wrn DISTIN 02

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 02
Alarm evaluated	Only if DIST-IN 02 is configured
Related applications	BTB
Alarm ID	1157
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 2.

⬅ back to List of other alarms

Wrn DISTIN 03

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 03
Alarm evaluated	Only if DIST-IN 03 is configured
Related applications	BTB
Alarm ID	1158
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 3.

⬅ back to List of other alarms

Wrn DISTIN 04

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 04
Alarm evaluated	Only if DIST-IN 04 is configured
Related applications	BTB
Alarm ID	1159
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 4.

⬅ back to List of other alarms

Wrn DISTIN 05

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 05
Alarm evaluated	Only if DIST-IN 05 is configured
Related applications	BTB
Alarm ID	1160
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 5.

⬅ back to List of other alarms

Wrn DISTIN 06

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 06
Alarm evaluated	Only if DIST-IN 06 is configured
Related applications	BTB
Alarm ID	1161
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 6.

⬅ back to List of other alarms

Wrn DISTIN 07

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 07
Alarm evaluated	Only if DIST-IN 07 is configured
Related applications	BTB
Alarm ID	1162
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 7.

⬅ back to List of other alarms

Wrn DISTIN 08

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 08
Alarm evaluated	Only if DIST-IN 08 is configured
Related applications	BTB
Alarm ID	1163
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 8.

⬅ back to List of other alarms

Wrn DISTIN 09

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 09
Alarm evaluated	Only if DIST-IN 09 is configured
Related applications	BTB
Alarm ID	1164
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 9.

⬅ back to List of other alarms

Wrn DISTIN 10

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 10
Alarm evaluated	Only if DIST-IN 10 is configured
Related applications	BTB
Alarm ID	1165
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 10.

⬅ back to List of other alarms

Wrn DISTIN 11

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 11
Alarm evaluated	Only if DIST-IN 11 is configured
Related applications	BTB
Alarm ID	1166
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 11.

⬅ back to List of other alarms

Wrn DISTIN 12

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 12
Alarm evaluated	Only if DIST-IN 12 is configured
Related applications	BTB
Alarm ID	1167
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 12.

⬅ back to List of other alarms

Wrn DISTIN 13

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 13
Alarm evaluated	Only if DIST-IN 13 is configured
Related applications	BTB
Alarm ID	1168
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 13.

◀ back to List of other alarms

Wrn DISTIN 14

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 14
Alarm evaluated	Only if DIST-IN 14 is configured
Related applications	BTB
Alarm ID	1169
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 14.

◀ back to List of other alarms

Wrn DISTIN 15

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 15
Alarm evaluated	Only if DIST-IN 15 is configured
Related applications	BTB
Alarm ID	1170
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 15.

◀ back to List of other alarms

Wrn DISTIN 16

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 16
Alarm evaluated	Only if DIST-IN 16 is configured
Related applications	BTB
Alarm ID	1171
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 16.

◀ back to List of other alarms

Wrn DISTIN 17

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 17
Alarm evaluated	Only if DIST-IN 17 is configured
Related applications	BTB
Alarm ID	1172
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 17.

◀ back to List of other alarms

Wrn DISTIN 18

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 18
Alarm evaluated	Only if DIST-IN 18 is configured
Related applications	BTB
Alarm ID	1173
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 18.

◀ back to List of other alarms

Wrn DISTIN 19

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 19
Alarm evaluated	Only if DIST-IN 19 is configured
Related applications	BTB
Alarm ID	1174
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 19.

◀ back to List of other alarms

Wrn DISTIN 20

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 20
Alarm evaluated	Only if DIST-IN 20 is configured
Related applications	BTB
Alarm ID	1175
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 20.

◀ back to List of other alarms

Wrn DISTIN 21

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 21
Alarm evaluated	Only if DIST-IN 21 is configured
Related applications	BTB
Alarm ID	1176
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 21.

⬅ back to List of other alarms

Wrn DISTIN 22

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 22
Alarm evaluated	Only if DIST-IN 22 is configured
Related applications	BTB
Alarm ID	1177
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 22.

⬅ back to List of other alarms

Wrn DISTIN 23

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 23
Alarm evaluated	Only if DIST-IN 23 is configured
Related applications	BTB
Alarm ID	1178
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 23.

⬅ back to List of other alarms

Wrn DISTIN 24

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 24
Alarm evaluated	Only if DIST-IN 24 is configured
Related applications	BTB
Alarm ID	1179
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 24.

⬅ back to List of other alarms

Wrn DISTIN 25

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 25
Alarm evaluated	Only if DIST-IN 25 is configured
Related applications	BTB
Alarm ID	1180
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 25.

⬅ back to List of other alarms

Wrn DISTIN 26

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 26
Alarm evaluated	Only if DIST-IN 26 is configured
Related applications	BTB
Alarm ID	1181
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 26.

⬅ back to List of other alarms

Wrn DISTIN 27

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 27
Alarm evaluated	Only if DIST-IN 27 is configured
Related applications	BTB
Alarm ID	1182
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 27.

⬅ back to List of other alarms

Wrn DISTIN 28

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 28
Alarm evaluated	Only if DIST-IN 28 is configured
Related applications	BTB
Alarm ID	1183
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 28.

⬅ back to List of other alarms

Wrn DISTIN 29

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 29
Alarm evaluated	Only if DIST-IN 29 is configured
Related applications	BTB
Alarm ID	1184
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 29.

⬅ back to List of other alarms

Wrn DISTIN 30

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 30
Alarm evaluated	Only if DIST-IN 30 is configured
Related applications	BTB
Alarm ID	1185
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 30.

⬅ back to List of other alarms

Wrn DISTIN 31

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 31
Alarm evaluated	Only if DIST-IN 31 is configured
Related applications	BTB
Alarm ID	1186
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 31.

⬅ back to List of other alarms

Wrn DISTIN 32

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 32
Alarm evaluated	Only if DIST-IN 32 is configured
Related applications	BTB
Alarm ID	1187
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 32.

⬅ back to List of other alarms

Wrn DISTIN 33

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 33
Alarm evaluated	Only if DIST-IN 33 is configured
Related applications	BTB
Alarm ID	1344
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 33.

⬅ back to List of other alarms

Wrn DISTIN 34

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 34
Alarm evaluated	Only if DIST-IN 34 is configured
Related applications	BTB
Alarm ID	1345
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 34.

⬅ back to List of other alarms

Wrn DISTIN 35

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 35
Alarm evaluated	Only if DIST-IN 35 is configured
Related applications	BTB
Alarm ID	1346
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 35.

⬅ back to List of other alarms

Wrn DISTIN 36

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 36
Alarm evaluated	Only if DIST-IN 36 is configured
Related applications	BTB
Alarm ID	1347
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 36.

⬅ back to List of other alarms

Wrn DISTIN 37

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 37
Alarm evaluated	Only if DIST-IN 37 is configured
Related applications	BTB
Alarm ID	1348
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 37.

◀ back to List of other alarms

Wrn DISTIN 38

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 38
Alarm evaluated	Only if DIST-IN 38 is configured
Related applications	BTB
Alarm ID	1349
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 38.

◀ back to List of other alarms

Wrn DISTIN 39

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 39
Alarm evaluated	Only if DIST-IN 39 is configured
Related applications	BTB
Alarm ID	1350
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 39.

◀ back to List of other alarms

Wrn DISTIN 40

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 40
Alarm evaluated	Only if DIST-IN 40 is configured
Related applications	BTB
Alarm ID	1351
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 40.

◀ back to List of other alarms

Wrn DISTIN 41

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 41
Alarm evaluated	Only if DIST-IN 41 is configured
Related applications	BTB
Alarm ID	1352
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 41.

⬅ back to List of other alarms

Wrn DISTIN 42

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 42
Alarm evaluated	Only if DIST-IN 42 is configured
Related applications	BTB
Alarm ID	1353
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 42.

⬅ back to List of other alarms

Wrn DISTIN 43

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 43
Alarm evaluated	Only if DIST-IN 43 is configured
Related applications	BTB
Alarm ID	1354
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 43.

⬅ back to List of other alarms

Wrn DISTIN 44

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 44
Alarm evaluated	Only if DIST-IN 44 is configured
Related applications	BTB
Alarm ID	1355
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 44.

⬅ back to List of other alarms

Wrn DISTIN 45

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 45
Alarm evaluated	Only if DIST-IN 45 is configured
Related applications	BTB
Alarm ID	1356
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 45.

⬅ back to List of other alarms

Wrn DISTIN 46

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 46
Alarm evaluated	Only if DIST-IN 46 is configured
Related applications	BTB
Alarm ID	1357
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 46.

⬅ back to List of other alarms

Wrn DISTIN 47

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 47
Alarm evaluated	Only if DIST-IN 47 is configured
Related applications	BTB
Alarm ID	1358
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 47.

⬅ back to List of other alarms

Wrn DISTIN 48

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 48
Alarm evaluated	Only if DIST-IN 48 is configured
Related applications	BTB
Alarm ID	1359
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 48.

⬅ back to List of other alarms

Wrn DISTIN 49

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 49
Alarm evaluated	Only if DIST-IN 49 is configured
Related applications	BTB
Alarm ID	1360
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 49.

⬅ back to List of other alarms

Wrn DISTIN 50

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 50
Alarm evaluated	Only if DIST-IN 50 is configured
Related applications	BTB
Alarm ID	1361
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 50.

⬅ back to List of other alarms

Wrn DISTIN 51

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 51
Alarm evaluated	Only if DIST-IN 51 is configured
Related applications	BTB
Alarm ID	1362
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 51.

⬅ back to List of other alarms

Wrn DISTIN 52

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 52
Alarm evaluated	Only if DIST-IN 52 is configured
Related applications	BTB
Alarm ID	1363
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 52.

⬅ back to List of other alarms

Wrn DISTIN 53

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 53
Alarm evaluated	Only if DIST-IN 53 is configured
Related applications	BTB
Alarm ID	1364
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 53.

⬅ back to List of other alarms

Wrn DISTIN 54

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 54
Alarm evaluated	Only if DIST-IN 54 is configured
Related applications	BTB
Alarm ID	1365
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 54.

⬅ back to List of other alarms

Wrn DISTIN 55

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 55
Alarm evaluated	Only if DIST-IN 55 is configured
Related applications	BTB
Alarm ID	1366
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 55.

⬅ back to List of other alarms

Wrn DISTIN 56

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 56
Alarm evaluated	Only if DIST-IN 56 is configured
Related applications	BTB
Alarm ID	1367
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 56.

⬅ back to List of other alarms

Wrn DISTIN 57

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 57
Alarm evaluated	Only if DIST-IN 57 is configured
Related applications	BTB
Alarm ID	1368
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 57.

◀ back to List of other alarms

Wrn DISTIN 58

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 58
Alarm evaluated	Only if DIST-IN 58 is configured
Related applications	BTB
Alarm ID	1369
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 58.

◀ back to List of other alarms

Wrn DISTIN 59

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 59
Alarm evaluated	Only if DIST-IN 59 is configured
Related applications	BTB
Alarm ID	1370
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 59.

◀ back to List of other alarms

Wrn DISTIN 60

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 60
Alarm evaluated	Only if DIST-IN 60 is configured
Related applications	BTB
Alarm ID	1371
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 60.

◀ back to List of other alarms

Wrn DISTIN 61

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 61
Alarm evaluated	Only if DIST-IN 61 is configured
Related applications	BTB
Alarm ID	1372
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 61.

⬅ back to List of other alarms

Wrn DISTIN 62

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 62
Alarm evaluated	Only if DIST-IN 62 is configured
Related applications	BTB
Alarm ID	1373
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 62.

⬅ back to List of other alarms

Wrn DISTIN 63

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 63
Alarm evaluated	Only if DIST-IN 63 is configured
Related applications	BTB
Alarm ID	1374
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 63.

⬅ back to List of other alarms

Wrn DISTIN 64

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTIN 64
Alarm evaluated	Only if DIST-IN 64 is configured
Related applications	BTB
Alarm ID	1375
Description	This alarm is activated when DIST-IN data are not received from controller with CAN Controller Address (page 231) = 64.

⬅ back to List of other alarms

Wrn DISTOUT

Alarm Type	Warning (page 159)
Alarmlist message	Wrn DISTOUT
Alarm evaluated	Only if DIST-OUT is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn Event e-mail 1 Fail
Alarm evaluated	All the time
Related applications	BTB
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 361) and email wasn't send.

⬅ back to List of alarms level 1

Wrn Event e-mail 2 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Event e-mail 2 Fail
Alarm evaluated	All the time
Related applications	BTB
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 361) and email wasn't send.

⬅ back to List of alarms level 1

Wrn Event e-mail 3 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Event e-mail 3 Fail
Alarm evaluated	All the time
Related applications	BTB
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 361) and email wasn't send.

⬅ back to List of alarms level 1

Wrn Event e-mail 4 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Event e-mail 4 Fail
Alarm evaluated	All the time
Related applications	BTB
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 362) and email wasn't send.

🔍 back to List of alarms level 1

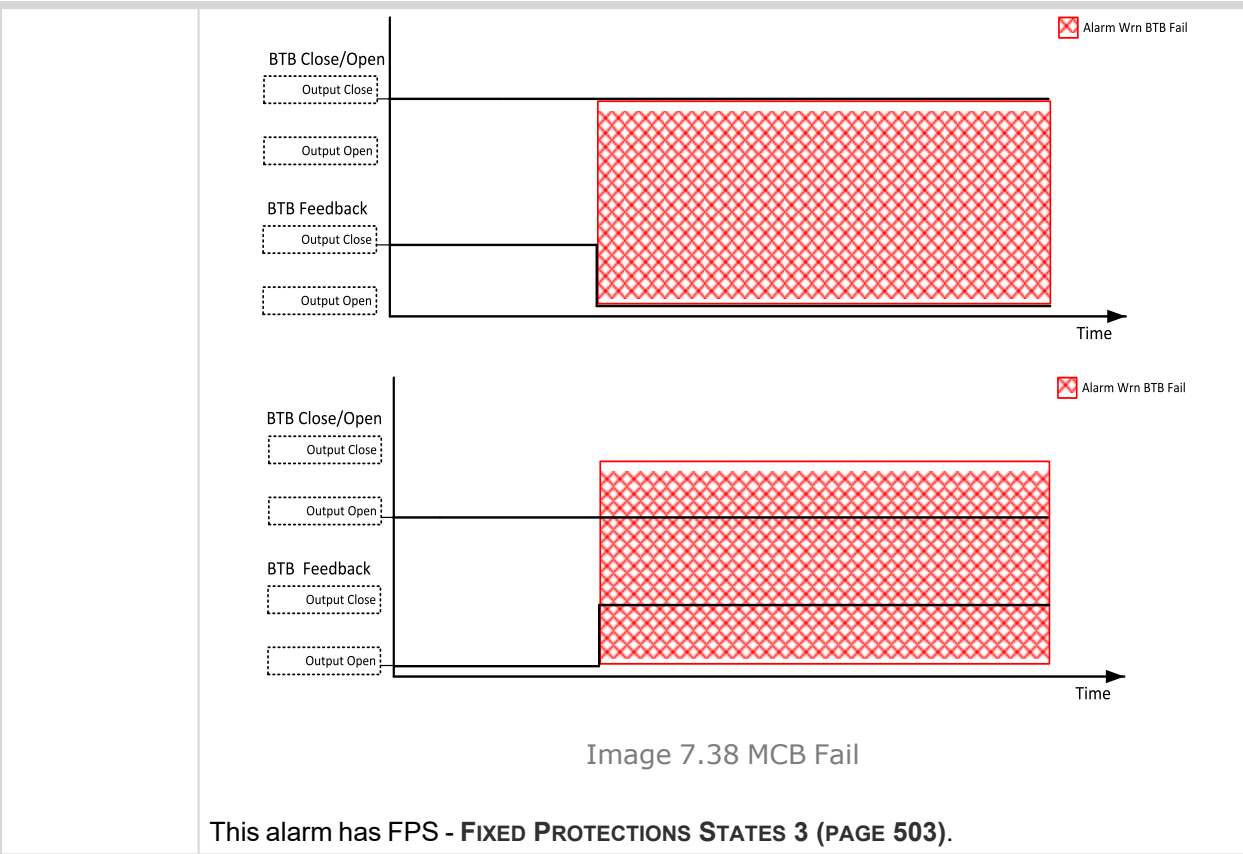
Wrn Load IMP/EXP Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Load IMP/EXP Fail
Alarm evaluated	Always
Related applications	BTB
Alarm ID	1448
Description	<p>This alarm is active when and #System Load Control PTM (page 208) = Load Shar but Mains Measurement P is unavailable.</p> <p>Alarm is caused by:</p> <ul style="list-style-type: none"> ➤ Mains Measurement P (page 211) = None ➤ Mains Measurement P (page 211) = Analog Input and <ul style="list-style-type: none"> ➤➤ Value from LAI Mains Measurement P (page 211) has Invalid flag (page 368) <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 501)</p>

🔍 back to List of alarms level 1

Wrn MCB Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn MCB Fail
Alarm evaluated	Only if MCB Control Mode (page 213) = Internal
Related applications	BTB
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 464) does not match expected position given by LBO MCB CLOSE/OPEN (PAGE 482). ➤ There is a mismatch between LBI MCB FEEDBACK (PAGE 464) and MCB FEEDBACK NEGATIVE (PAGE 465).



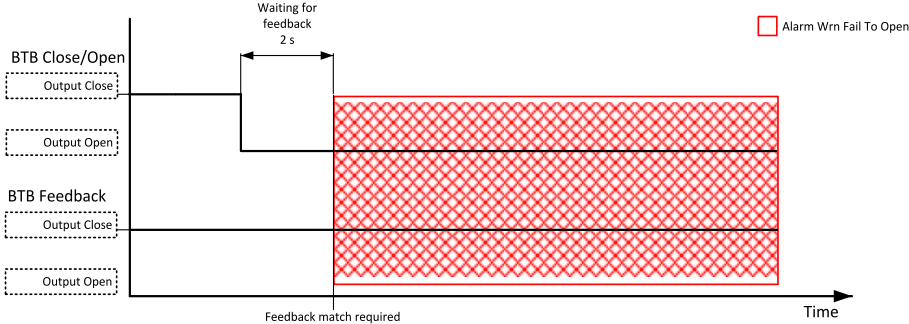
⬅ back to List of alarms level 1

Wrn MCB Fail To Close

Alarm Type	Warning (page 159)
Alarmlist message	Wrn MCB Fail To Close
Alarm evaluated	Only if MCB Control Mode (page 213) = Internal
Related applications	BTB
Alarm ID	1553
Description	<p>This alarm is activated when there is a problem with circuit breaker position while closing.</p> <p>➤ LBO MCB CLOSE/OPEN (PAGE 482) closed but LBI MCB FEEDBACK (PAGE 464) did not closed in 2 seconds.</p> <p>Image 7.39 MCB Fail To Close</p>

🔍 back to List of alarms level 1

Wrn MCB Fail To Open

Alarm Type	Warning (page 159)
Alarmlist message	Wrn MCB Fail To Open
Alarm evaluated	Only if MCB Control Mode (page 213) = Internal
Related applications	BTB
Alarm ID	1552
Description	<p>This alarm is activated when there is a problem with circuit breaker position while opening.</p> <p>➤ LBO MCB CLOSE/OPEN (PAGE 482) opened but LBI MCB FEEDBACK (PAGE 464) did not opened in 2 seconds.</p>  <p style="text-align: center;">Image 7.40 MCB Fail To Open</p>

🔍 back to List of alarms level 1

Wrn Password reset e-mail addr is not set

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Password reset e-mail addr is not set
Alarm evaluated	All the time
Related applications	BTB
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	BTB
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	BTB
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/Q IMP/EXP Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn PF/Q IMP/EXP Fail
Alarm evaluated	Always
Related applications	BTB
Alarm ID	1054
Description	<p>This alarm is active when #System PF Control PTM (page 209) = Var Shar but Mains Measurement P or Q is unavailable.</p> <p>When this alarm is active, PF/Q is controlled as if #System PF Control PTM (page 209) = Base PF.</p> <p>Alarm is caused by:</p> <ul style="list-style-type: none"> ➤ Mains Measurement P (page 211) = None ➤ Mains Measurement P (page 211) = Analog Input and <ul style="list-style-type: none"> ➤➤ Value from LAI Mains Measurement P (page 211) has Invalid flag (page 368) ➤ Mains Measurement Q (page 212) = None ➤ Mains Measurement Q (page 212) = Analog Input and <ul style="list-style-type: none"> ➤➤ Value from LAI Mains Measurement Q (page 212) has Invalid flag (page 368) <p>This alarm has FPS - FIXED PROTECTIONS STATES 1 (PAGE 501)</p>

🔍 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	BTB
Description	<p>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.</p>

🔍 back to List of alarms level 1

Wrn Synchronization Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Reverse Synchro Fail
Alarm evaluated	Only if LBO SYNCHRONIZATION (PAGE 495) is closed
Related applications	BTB
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 503).

◀ back to List of alarms level 1

Wrn RTC Battery Flat

Alarm Type	Warning (page 159)
Alarmlist message	Wrn RTC Battery Flat
Alarm evaluated	Only during power-on of the controller
Related applications	BTB
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 52) .

◀ back to List of alarms level 1

Wrn SHAIN 1

Alarm Type	Warning (page 159)
Alarmlist message	Wrn SHAIN 1
Alarm evaluated	Only if SHAIN 1 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHAIN 2
Alarm evaluated	Only if SHAIN 2 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHAIN Collision
Alarm evaluated	Only if SHIN 1 or SHAIN 2 module is configured
Related applications	BTB
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 501)

◀ back to List of alarms level 1

Wrn SHBIN 1

Alarm Type	Warning (page 159)
Alarmlist message	Wrn SHBIN 1
Alarm evaluated	Only if SHBIN 1 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHBIN 2
Alarm evaluated	Only if SHBIN 2 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHBIN 3
Alarm evaluated	Only if SHBIN 3 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHBIN 4
Alarm evaluated	Only if SHBIN 4 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHBIN 5
Alarm evaluated	Only if SHBIN 5 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHBIN 6
Alarm evaluated	Only if SHBIN 6 is configured
Related applications	BTB
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 159)
Alarmlist message	Wrn SHBIN Collision
Alarm evaluated	Only if at least one of SHBIN 1 to SHBIN 6 modules is configured
Related applications	BTB
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 501)

◀ back to List of alarms level 1

Wrn SNMP TRAP 1 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn SNMP TRAP 1 Fail
Alarm evaluated	Only when SNMP Agent (page 317) = Enabled and SNMP Traps IP Address 1 (page 357) is set.
Related applications	BTB
Alarm ID	823
Description	This alarm is activated if sending of SNMP trap to IP address set by SNMP Traps IP Address 1 (page 357) failed.

⬅ back to List of alarms level 1

Wrn SNMP TRAP 2 Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn SNMP TRAP 2 Fail
Alarm evaluated	Only when SNMP Agent (page 317) = Enabled and SNMP Traps IP Address 2 (page 357) is set.
Related applications	BTB
Alarm ID	824
Description	This alarm is activated if sending of SNMP trap to IP address set by SNMP Traps IP Address 2 (page 357) failed.

⬅ back to List of alarms level 1

Wrn Synchronization Fail

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Synchronization Fail
Alarm evaluated	During synchronization
Related applications	BTB
Alarm ID	94
Description	<p>This alarm is activated if the synchronization fails, e.g. Synchronization Timeout (page 282) elapses.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).</p>

⬅ back to List of alarms level 2

Wrn Total Running PQS Value Overflow

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Total Running PQS Value Overflow
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	1077
Description	<p>This alarm is activated in case the sum of all Controllers' apparent power is above range of value Total Running Samax (page 394).</p> <p>Changing of the power format should be considered if this alarm appears.</p>

⬅ back to List of alarms level 1

Wrn Unsupported PMS Mode

Alarm Type	Warning (page 159)
Alarmlist message	Wrn Unsupported PMS Mode
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	1044
Description	This alarm is active if setpoint #Power Management Mode (page 259) = N/A Mode.

⬅ back to List of alarms level 1

Wrong PLC Configuration

Alarm Type	Warning (page 159)
Alarmlist message	Wrong PLC Configuration
Alarm evaluated	Always
Related applications	BTB
Alarm ID	41
Description	This alarm is activated when the PLC - Programmable Logic Controller (page 125) 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 159)
Alarmlist message	ALI Bus Ph L1 Inverted
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	ALI Bus Ph L2 Inverted
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	ALI Bus Ph L3 Inverted
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	ALI Bus Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	847
Description	This alarm is activated when controller detects wrong phase rotation, e.g. Phase Rotation (page 225) 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 159)
Alarmlist message	ALI Mains Ph L1 Inverted
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	ALI Mains Ph L2 Inverted
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	ALI Mains Ph L3 Inverted
Alarm evaluated	All the time
Related applications	BTB
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 159)
Alarmlist message	ALI Mains Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	158
Description	<p>This alarm is activated when controller detects wrong phase rotation, e.g. Phase Rotation (page 225) is set to Clockwise and actual rotation is Counterclockwise, on the Mains side.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).</p>

⬅ back to List of alarms level 1

ALI Manual Restore

Alarm Type	Alarm List Indication (page 159)
Alarmlist message	ALI Manual Restore
Alarm evaluated	Only if Controller mode (page 226) = AUTO
Related applications	BTB
Alarm ID	783
Description	<p>This alarm is activated after MAINS HEALTHY (PAGE 481) is closed and Gen-sets are loaded.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).</p>

⬅ back to List of alarms level 1

ALI Wrong Power Format

Alarm Type	Alarm List Indication (page 159)
Alarmlist message	ALI Wrong Power Format
Alarm evaluated	All the time
Related applications	BTB
Alarm ID	149
Description	<p>This alarm is activated when there is inconsistency of Power Formats And Units (page 137) on any controller which is connected via CAN2 (page 16) or Communication peripherals (page 15).</p>

[back to List of alarms level 1](#)

History Record Only

Hst Bus Overvoltage L1-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >V L1-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	98
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

[back to List of alarms level 1](#)

Hst Bus Overvoltage L2-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >V L2-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	99
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

[back to List of alarms level 1](#)

Hst Bus Overvoltage L3-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >V L3-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	100
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

[back to List of alarms level 1](#)

Hst Bus Overvoltage L1-L2

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >V L1-L2
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	107
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Overvoltage L2-L3

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >V L2-L3
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	108
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Overvoltage L3-L1

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >V L3-L1
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	109
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L1-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <V L1-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	95
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L2-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <V L2-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	96
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L3-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <V L3-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	97
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L1-L2

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <V L1-L2
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	104
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L2-L3

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <V L2-L3
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	105
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Undervoltage L3-L1

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <V L3-L1
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	106
Description	This alarm is activated by Bus <>V Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Overfrequency

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus >f
Alarm evaluated	Only if Bus <>f Protection (page 254) != Disabled
Related applications	BTB
Alarm ID	121
Description	This alarm is activated by Bus <>f Protection (page 254). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Underfrequency

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus <f
Alarm evaluated	Only if Bus <>f Protection (page 254) != Disabled
Related applications	BTB
Alarm ID	120
Description	This alarm is activated by Bus <>f Protection (page 254). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Voltage Unbalance Ph-N

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus V Unbalance Ph-N
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	589
Description	This alarm is activated by Bus Voltage Unbalance Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ back to List of alarms level 1

Hst Bus Voltage Unbalance Ph-Ph

Alarm Type	History Record Only (page 159)
Alarmlist message	Hst Bus V Unbalance Ph-Ph
Alarm evaluated	Only if Bus <>V Protection (page 251) != Disabled
Related applications	BTB
Alarm ID	588
Description	This alarm is activated by Bus Voltage Unbalance Protection (page 251). This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

⬅ 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	BTB
Alarm ID	23
Description	This alarm is activated by overload on Mains.

⬅ back to List of alarms level 2

MP Mains Overvoltage L1-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >V L1-N
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	125
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L1-N (page 379) rises over preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Overvoltage L2-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >V L2-N
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	126
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L2-N (page 379) rises above preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Overvoltage L3-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >V L3-N
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB

Alarm ID	127
Description	This alarm is activated by Mains <>V Protection (page 248) . This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).

⬅ back to List of alarms level 1

MP Mains Overvoltage L1-L2

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >V L1-L2
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	131
Description	This alarm is activated by Mains <>V Protection (page 248) . This alarm is activated when Mains Voltage L1-L2 (page 379) rises over preset value. This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).

⬅ back to List of alarms level 1

MP Mains Overvoltage L2-L3

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >V L2-L3
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	132
Description	This alarm is activated by Mains <>V Protection (page 248) . This alarm is activated when Mains Voltage L2-L3 (page 379) rises over preset value. This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).

⬅ back to List of alarms level 1

MP Mains Overvoltage L3-L1

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >V L3-L1
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	133
Description	This alarm is activated by Mains <>V Protection (page 248) . This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).

⬅ back to List of alarms level 1

MP Mains Undervoltage L1-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains <V L1-N
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	122
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L1-N (page 379) drops below preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Undervoltage L2-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains <V L2-N
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	123
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L2-N (page 379) drops below preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Undervoltage L3-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains <V L3-N
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	124
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L3-N (page 379) drops below preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Undervoltage L1-L2

Alarm Type	History Record Only (page 159)
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Alarmlist message	MP Mains <V L1-L2
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	128
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L1-L2 (page 379) drops below preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Undervoltage L2-L3

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains <V L2-L3
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	129
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L2-L3 (page 379) drops below preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Undervoltage L3-L1

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains <V L3-L1
Alarm evaluated	Only if Mains <>V Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	130
Description	<p>This alarm is activated by Mains <>V Protection (page 248).</p> <p>This alarm is activated when Mains Voltage L3-L1 (page 380) drops below preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Voltage Unbalance Ph-Ph

Alarm Type	History Record Only (page 159)
Alarmlist message	MPMains V Unbalance Ph-Ph
Alarm evaluated	Only if Mains Voltage Unbalance Protection (page 250) != Disabled

Related applications	BTB
Alarm ID	592
Description	<p>This alarm is activated by Mains Voltage Unbalance Protection (page 250)</p> <p>This alarm is activated when relative difference between Mains Voltage L1-L2 (page 379), Mains Voltage L2-L3 (page 379) or Mains Voltage L3-L1 (page 380) rises over preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Voltage Unbalance Ph-N

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains V Unbalance Ph-N
Alarm evaluated	Only if Mains Voltage Unbalance Protection (page 250) != Disabled
Related applications	BTB
Alarm ID	593
Description	<p>This alarm is activated by Mains Voltage Unbalance Protection (page 250)</p> <p>This alarm is activated when relative difference between Mains Voltage L1-N (page 379), Mains Voltage L2-N (page 379) or Mains Voltage L3-N (page 379) rises over preset value.</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 2 (PAGE 502).</p>

⬅ back to List of alarms level 1

MP Mains Overfrequency

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains >f
Alarm evaluated	Only if Bus <>f Protection (page 254) != Disabled
Related applications	BTB
Alarm ID	135
Description	<p>This alarm is activated by Bus <>f Protection (page 254).</p> <p>This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).</p>

⬅ back to List of alarms level 1

MP Mains Underfrequency

Alarm Type	History Record Only (page 159)
Alarmlist message	MP Mains <f
Alarm evaluated	Only if Bus <>f Protection (page 254) != Disabled
Related applications	BTB
Alarm ID	134
Description	This alarm is activated by Bus <>f Protection (page 254) .

	This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).
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 [back to List of alarms level 1](#)

8.2.3 Alarms level 2

What alarms level 2 are:

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

List of alarms level 2

Bus Protection + FltRes	580
MPR Current Unbalance	580
Hst IDMT Overload	580
MPR IDMT Mains >A	580
MPR Short Circuit	580
BOR Battery Flat	581

 **back to Alarms**

Bus Protection + FltRes

MPR Current Unbalance

Alarm Type	Protection types (page 159)
Alarmlist message	MPR Current Unbalance
Alarm evaluated	Only if Current Unbalance Protection (page 247) != Disabled
Related applications	BTB
Alarm ID	1064
Description	This alarm is activated by Current Unbalance Protection (page 247) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

🔍 back to List of alarms level 2

Hst IDMT Overload

Alarm Type	Protection types (page 159)Protection types (page 159)
Alarmlist message	Hst IDMT Overload
Alarm evaluated	Only if Overload Protection (page 244) != Disabled
Related applications	BTB
Alarm ID	147
Description	This alarm is activated by Overload Protection (page 244) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

🔍 back to List of alarms level 2

MPR IDMT Mains >A

Alarm Type	Protection types (page 159)
Alarmlist message	MPR IDMT Mains >A
Alarm evaluated	Only if IDMT Mains Overcurrent Protection (page 245) != Disabled
Related applications	BTB
Alarm ID	1063
Description	This alarm is activated by IDMT Mains Overcurrent Protection (page 245) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503).

🔍 back to List of alarms level 2

MPR Short Circuit

Alarm Type	Protection types (page 159)
Alarmlist message	MPR Short Circuit

Alarm evaluated	Only if Short Circuit Protection (page 248) != Disabled
Related applications	BTB
Alarm ID	1066
Description	This alarm is activated by Short Circuit Protection (page 248) . This alarm has FPS - FIXED PROTECTIONS STATES 3 (PAGE 503) .

🔍 back to List of alarms level 2

BOR Battery Flat

Alarm Type	BOR
Alarmlist message	BOR Battery Flat
Alarm evaluated	During cranking
Related applications	BTB
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 501) .

🔍 back to List of alarms level 2

8.3 Modules

8.3.1 CAN modules

Supported combinations of modules	581
Module's protections	582
Theory of binary inputs and outputs	583
Extension modules	587

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 IntelliMains 510 BTB 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 IntelliMains 510 BTB.

CAN Module	Max number of indexes	AI generic	AO generic	BI generic	BO generic
Inteli AIN8	10	1	0	0	0
Inteli IO 8/8	12	0	1	1	1
Inteli IO 16/0	8	0	1	2	0
IGL-RA15	4	0	0	0	2
IGS-PTM	4	1	1	1	1
Inteli AIO9/1	5	2	1	0	0
Inteli AIN8TC	10	1	0	0	0
I-AOUT8	4	0	1	0	0
IS-BIN16/8	7	0	0	2	1

Note: When configuring modules do not forget to let first 4 indexes free for modules which can't use high addresses such as IGL-RA15, IGS-PTM, AIO9/1, I-AOUT8.

Note: Module Inteli IO8/8 has available AOUT only if it is configured with index number below 9 and Inteli AIO9/1 has available AOUT only if it is configured with index number below 5.

Note: Module Inteli IO8/8 with older FW than 1.3.1.2 has available AOUT only if it is configured with index number below 5.

Module's protections

Each configured CAN module can has it's 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	583
Binary outputs	585

Type of the binary inputs/outputs of some configured modules using BINs or BOUTs can be changed via Intel Config. For setup: connect the controller via IntelConfig → Control → Controller Configuration → Modules → Module Settings → **Binary Inputs Type / Binary Outputs Type**.

See the following chapters for more details.

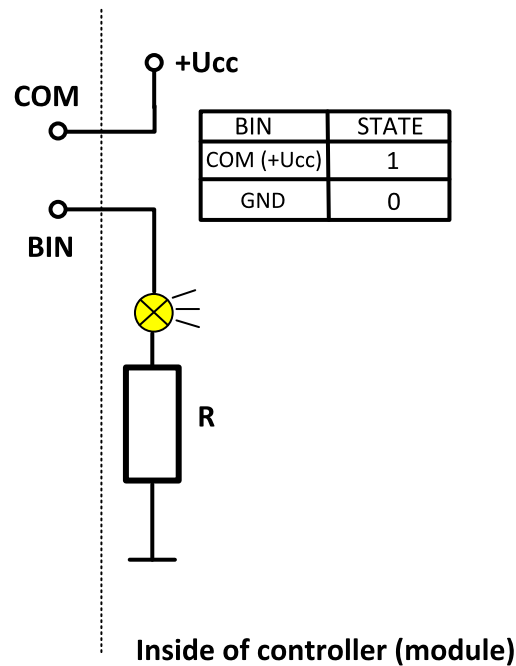
Binary inputs

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



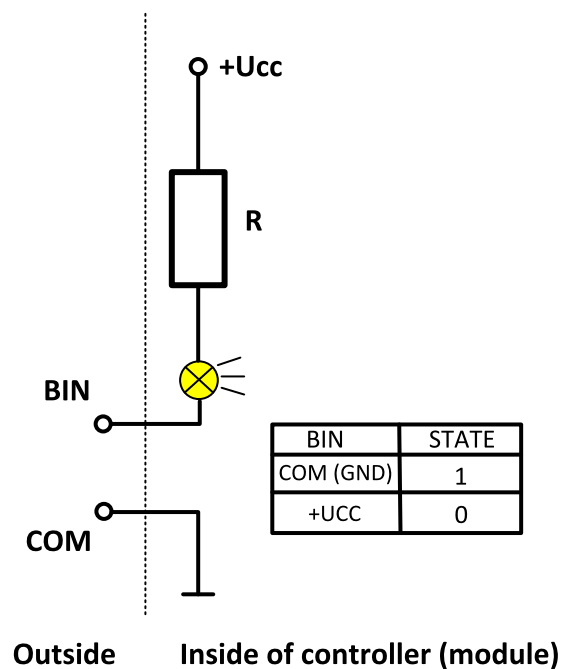
Note: There is not any COM terminal on the controller, the wire is directly connected to the input terminal "BIN", so if input signal is log 1 the +Ucc is directly connected to the "BIN".

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".

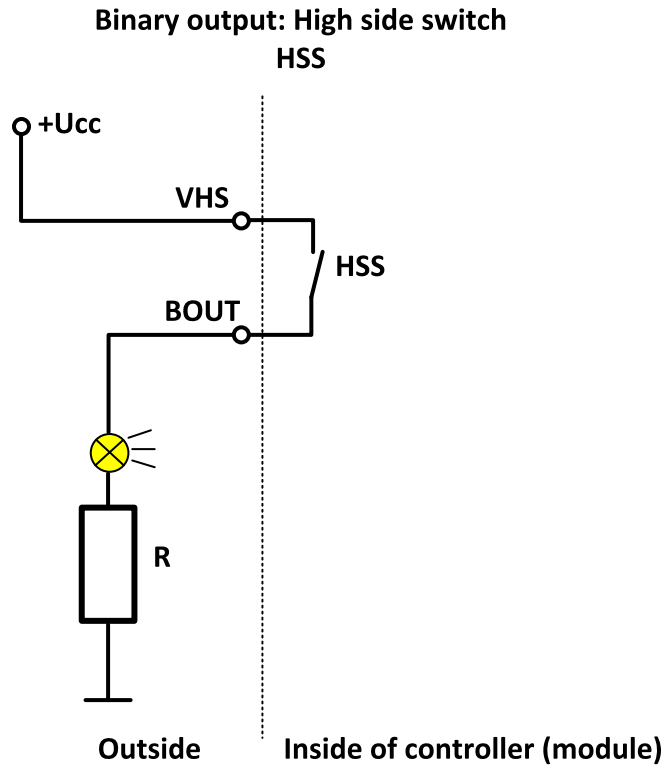
🔍 back to Theory of binary inputs and outputs

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.



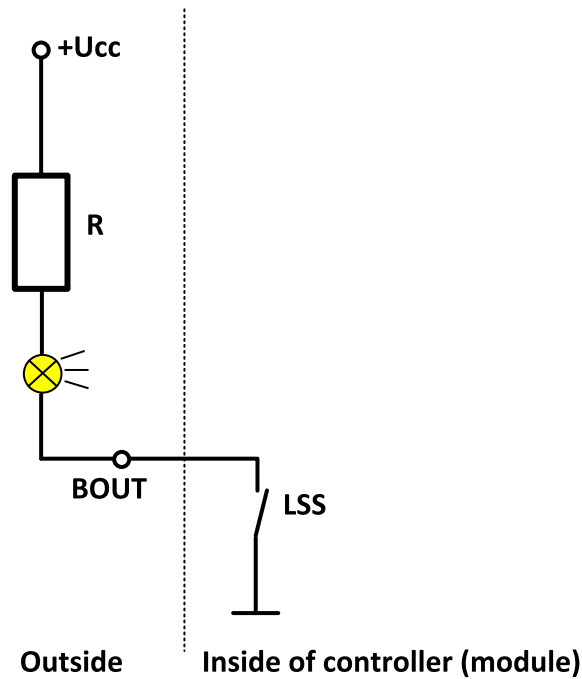
Low side switch - LSS

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 BTB 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	587
Inteli IO8/8	594
IGL-RA15	602
IGS-PTM	607
Inteli AIO9/1	614
Inteli AIN8TC	620
I-AOUT8	624
IS-BIN16/8	629

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 16)** 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 7.41 Intel AIN8

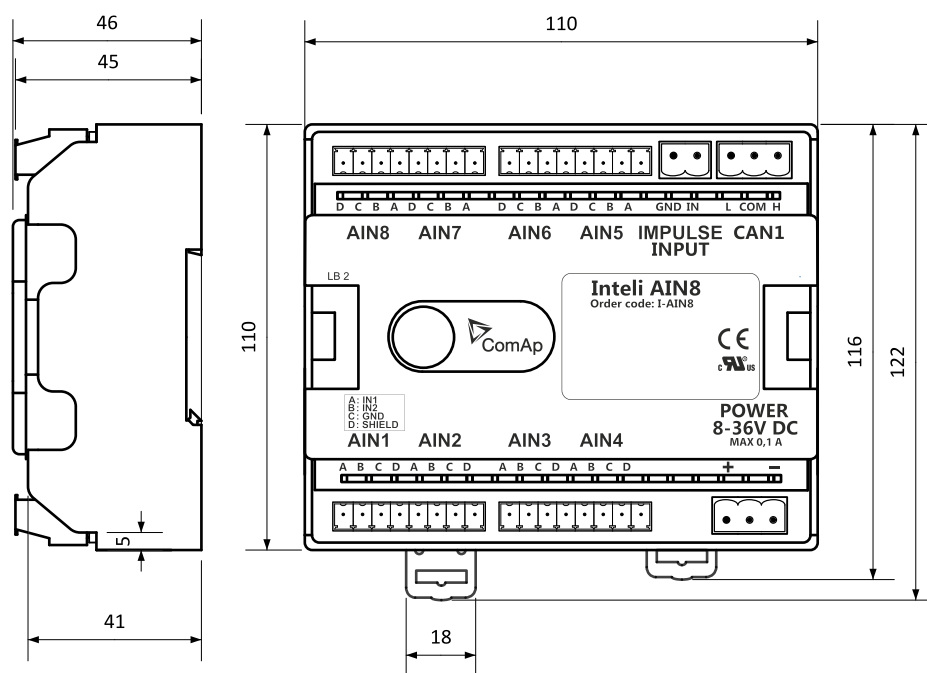
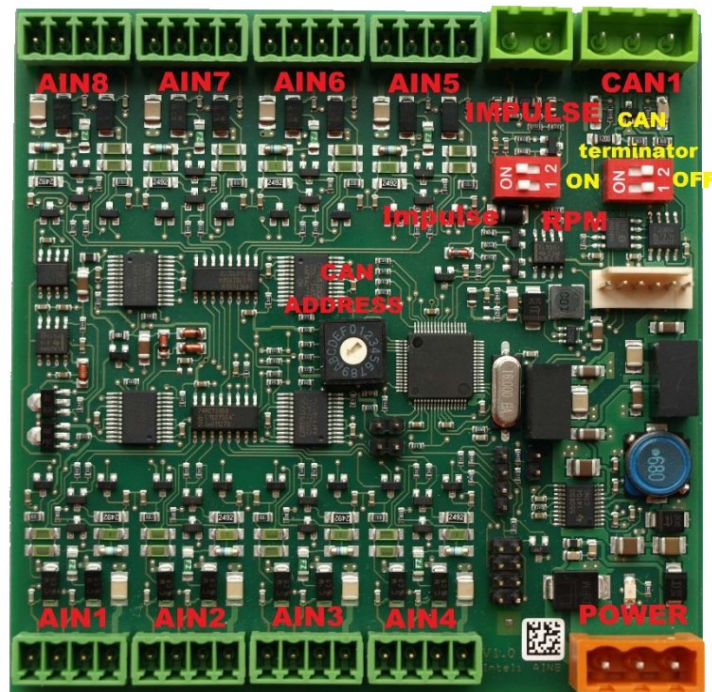


Image 7.42 Intel AIN8 dimensions

Note: All dimensions are in mm.

Terminals



Analog input	8 analog Inputs
CAN1	CAN1 (page 16) 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.



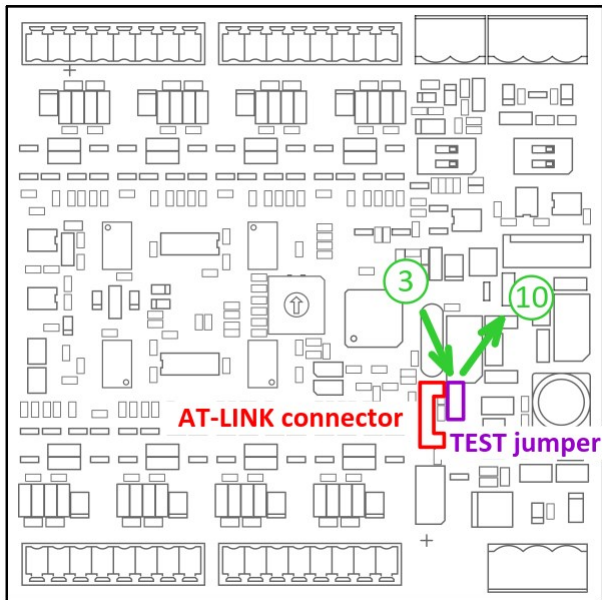
Note: In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

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

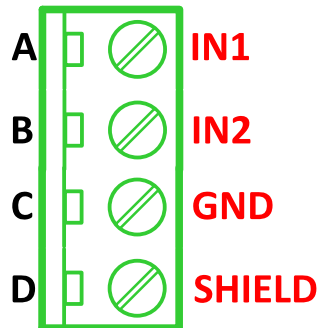
LED indication

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).

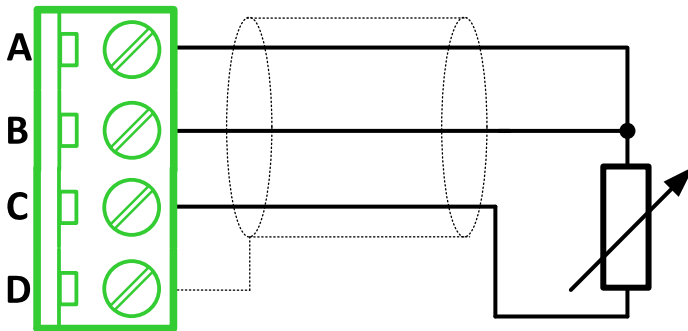
Wiring

The following diagrams show the correct connection of sensors.

Terminator

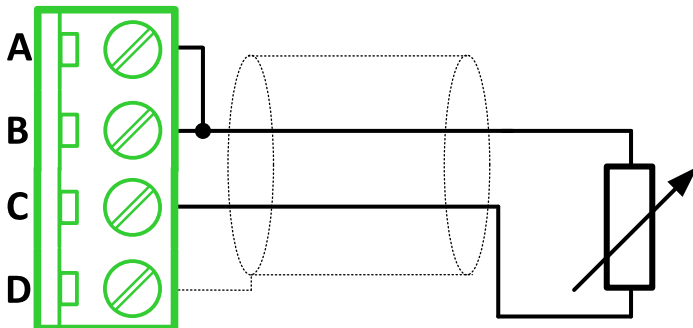


Resistance sensor - 3 wires



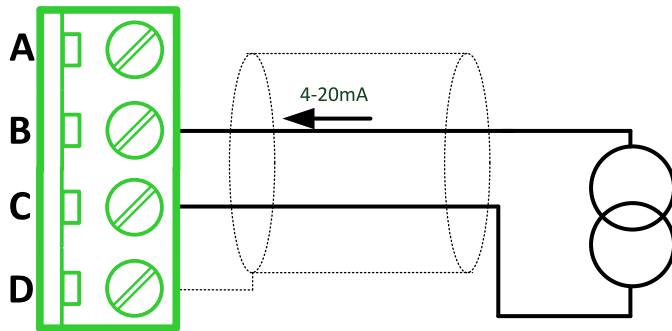
Note: Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω , 0 – 10 k Ω

Resistance sensor - 2 wires



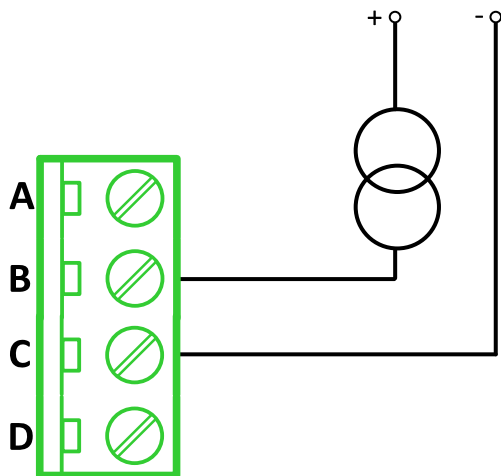
Note: Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω , 0 – 10 k Ω

Current sensor - active



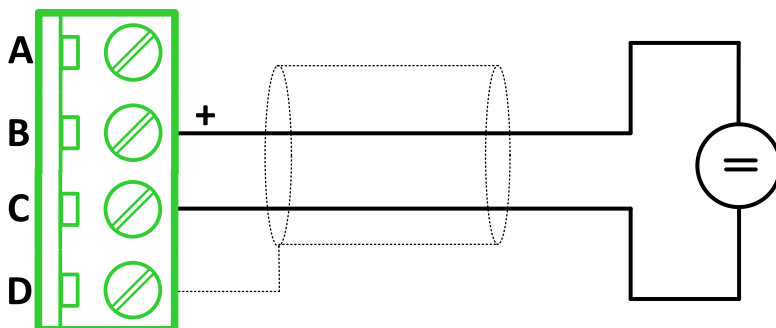
Note: Ranges: $\pm 20\text{ mA}$, $4 - 20\text{ mA}$

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 16)
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 16)** 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 7.43 Intel I/O8/8

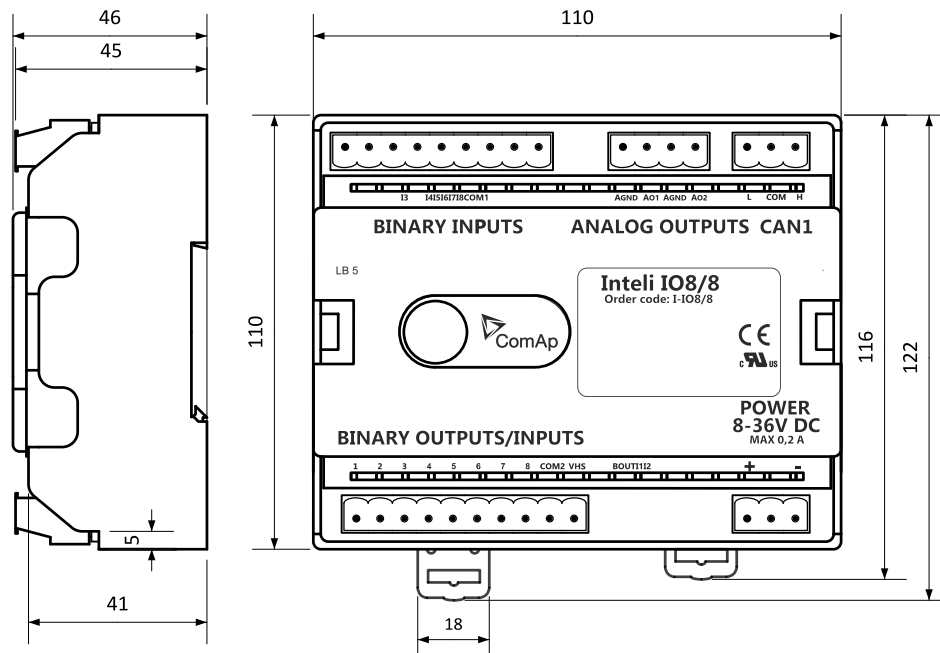
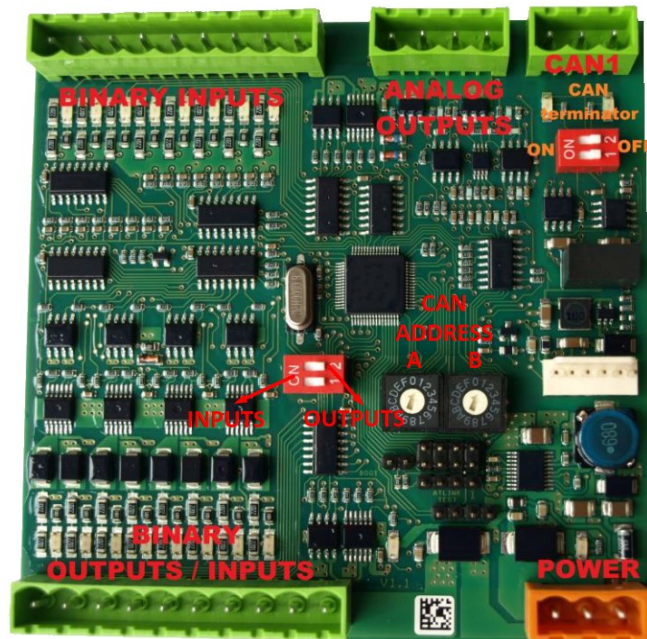


Image 7.44 Intel I/O8/8 dimensions

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 16) 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.

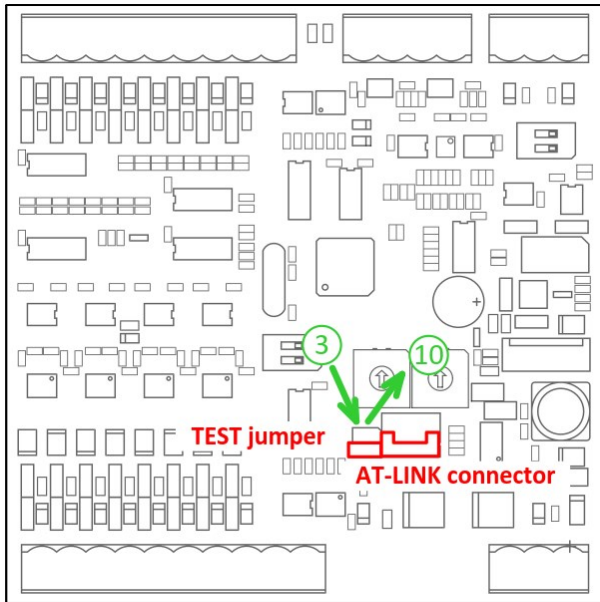


Note: In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

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.

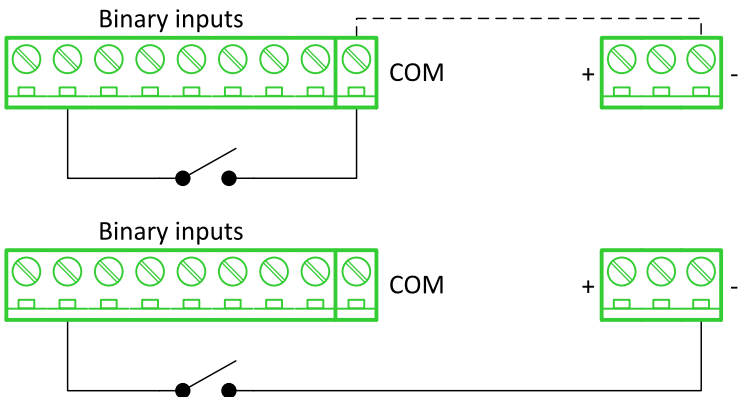
LED at power connector - status LED

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.

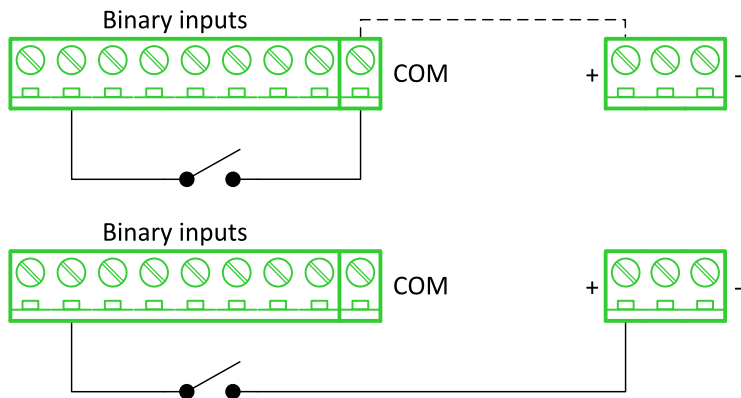
Binary inputs - pull up



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.

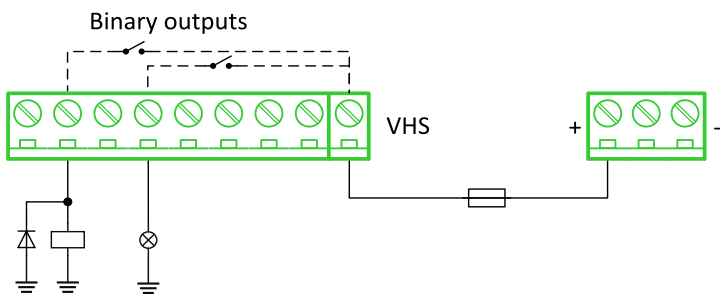
Binary inputs - pull down



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).

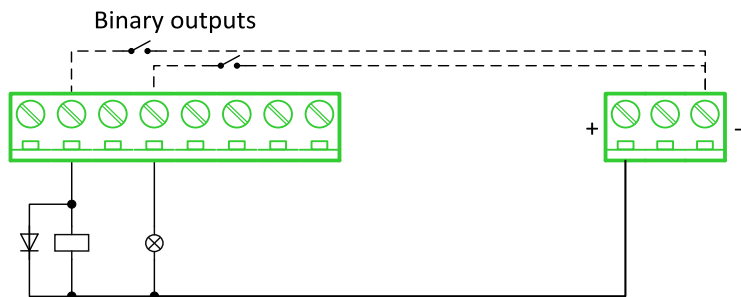
On lower picture is case of wiring between BIN2 and Ucc (+). Both ways are correct.

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.

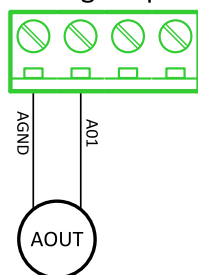
Binary outputs - low side



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 16)
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 16)** 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.

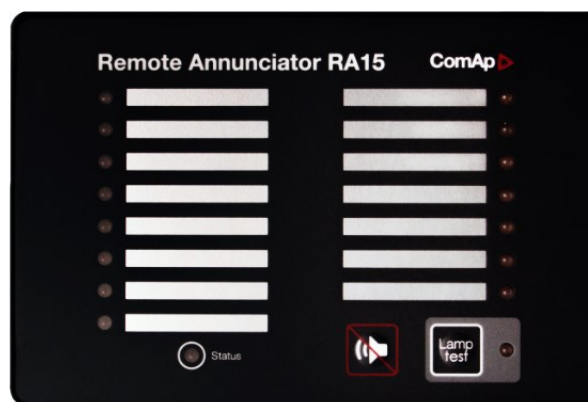
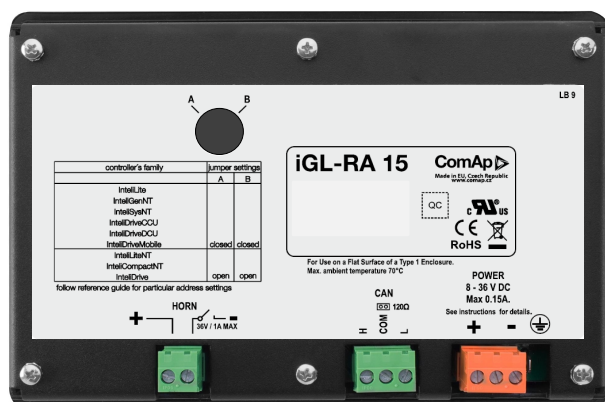


Image 7.45 IGL-RA15

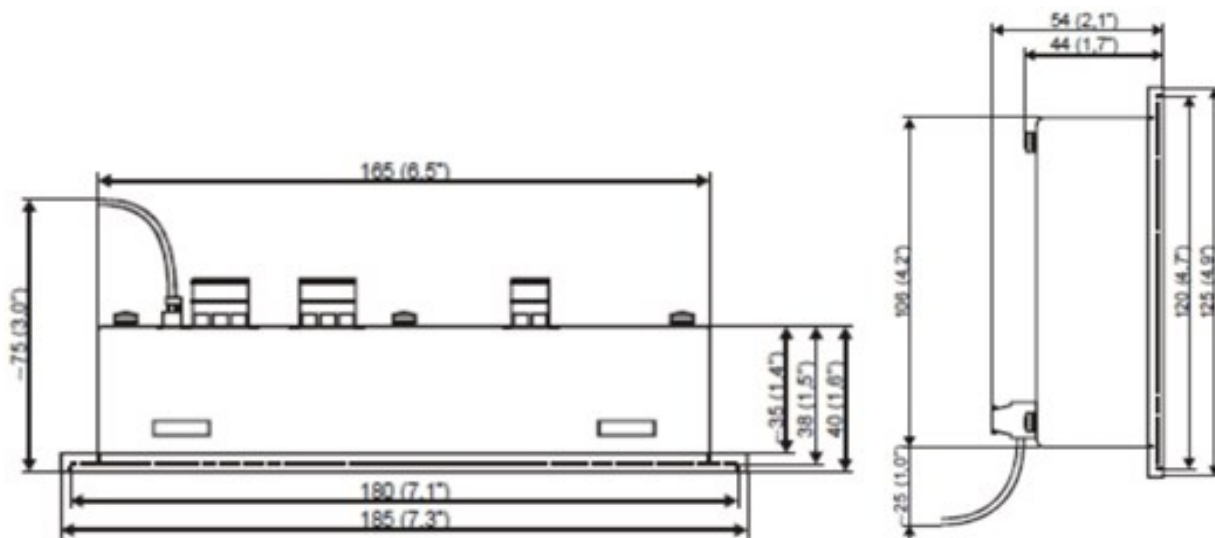


Image 7.46 IGL-RA15 dimensions

Terminals

Horn	Horn
CAN	CAN1 (page 16) 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 16)** 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 16)** 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 605)**

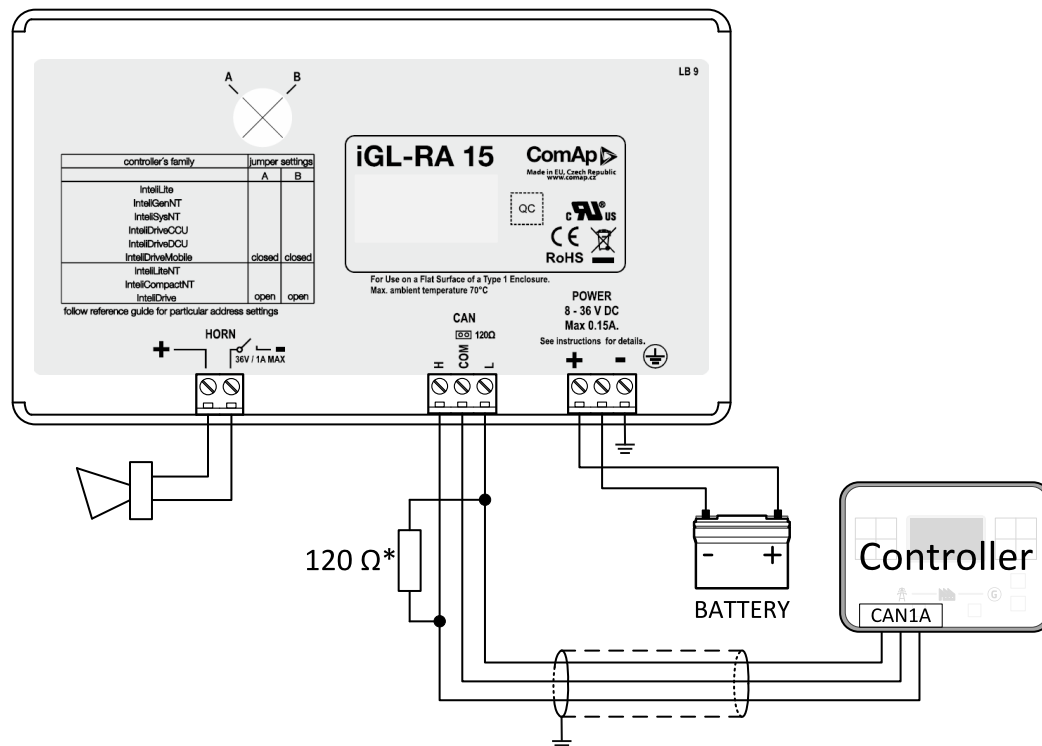
The horn can be silenced:

- 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 606) 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 16)
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 16)** bus. It is possible to connect up to 4 IGS-PTM external units to one controller.



Image 7.47 IGS-PTM

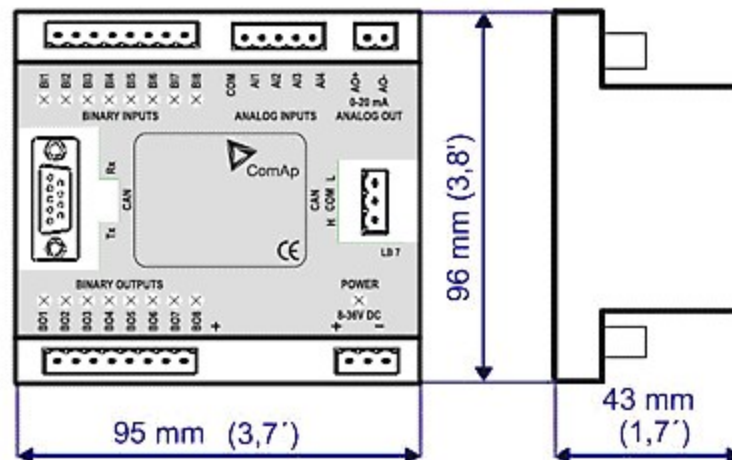
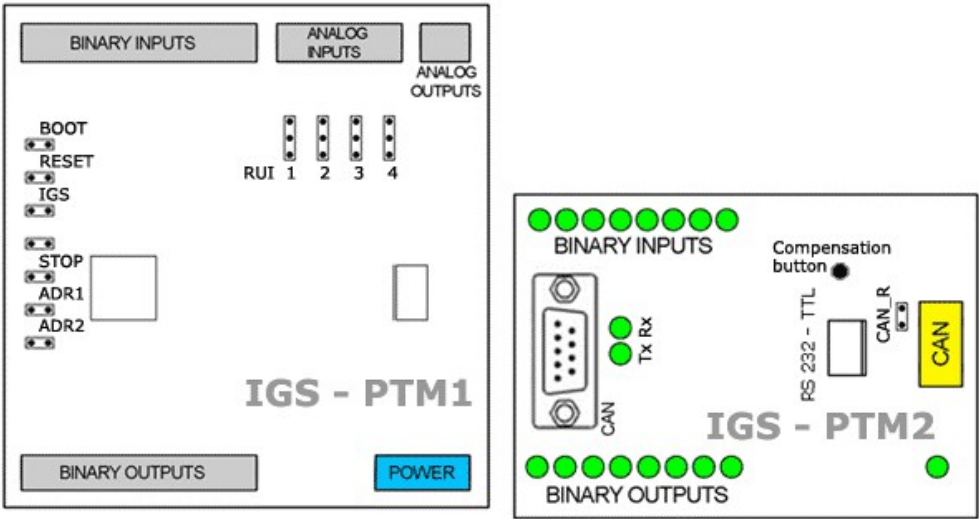


Image 7.48 IGS-PTM dimensions

Terminals



Binary inputs	8 binary inputs
Analog inputs	4 analog inputs
Analog outputs	1 analog output
Binary outputs	8 binary outputs
CAN	CAN1 (page 16) 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

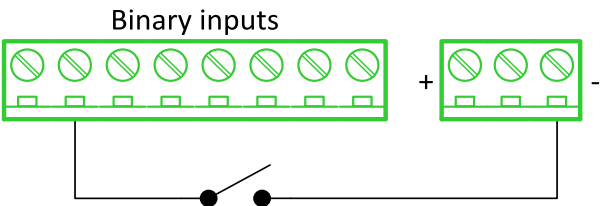
Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set.

LED at power connector - status LED

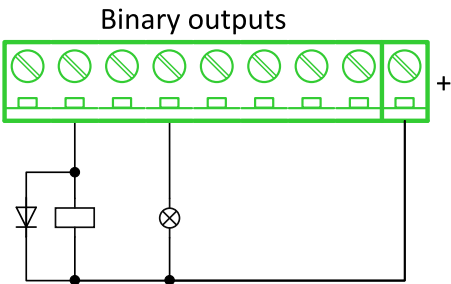
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

Wiring

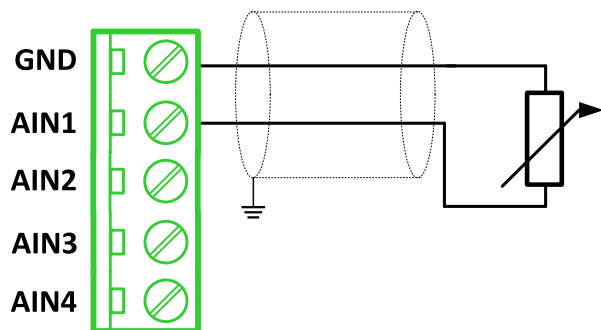
Binary inputs



Binary outputs



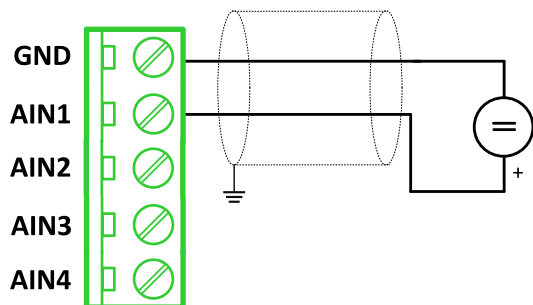
Resistance sensor



Note: Range: 0- 2400 Ω

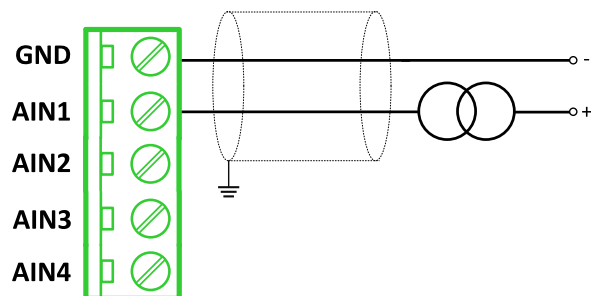
IMPORTANT: Physical analog input range is 0-250 Ω . In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.

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 16)
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

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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 16)** 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 7.49 Intel AIO9/1

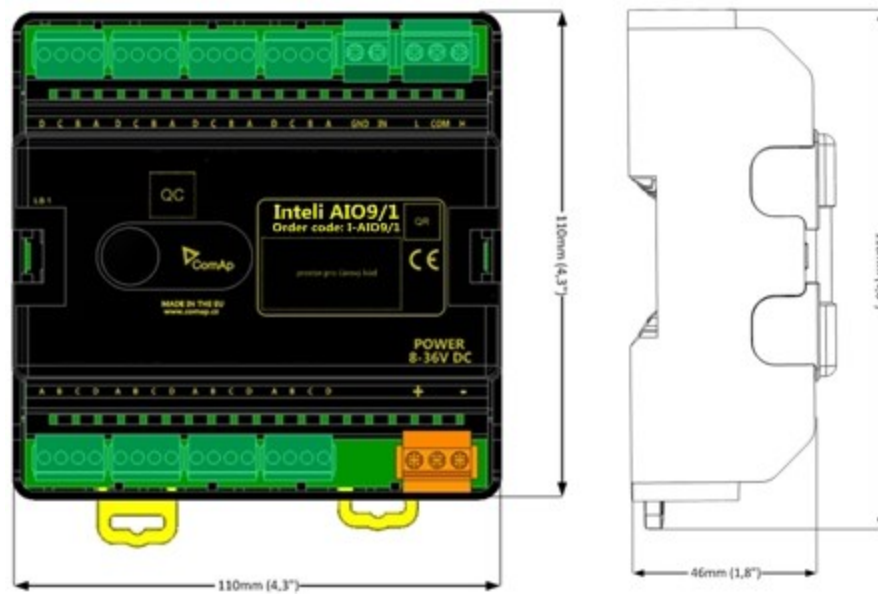
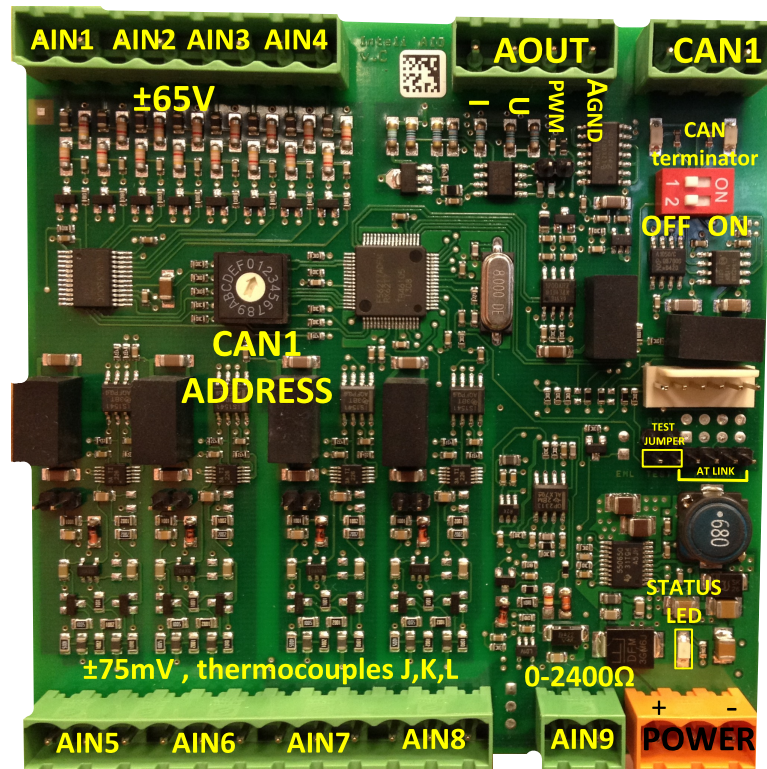


Image 7.50 Intel AIO9/1 dimensions

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 $\pm 65\text{V}$ (determined for measurement of battery voltage)
- 4 channels AIN5 – AIN8 can be configured as:
 - » Thermocouples – type J,K or L (in $^{\circ}\text{C}$ or $^{\circ}\text{F}$)
 - » Sensor $\pm 75\text{mV DC}$ – (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.

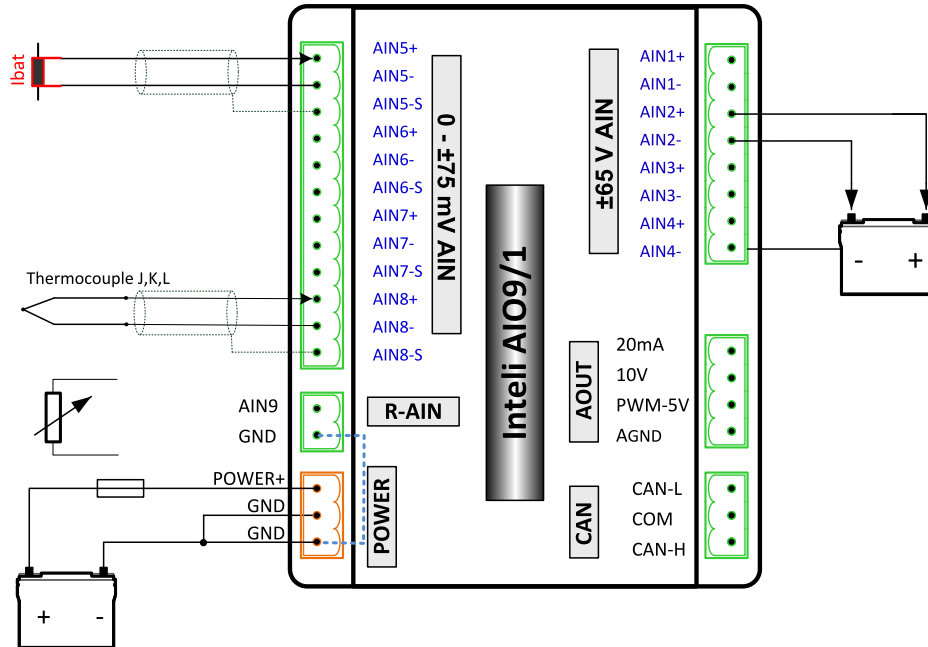
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)

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.



Measuring resistance – AIN9

> 2 – wire measurement



Ranges: Pt1000, Ni1000, 0 – 2400 Ω.

Analog input 9 is determined for measuring resistance only.

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.

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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 16) 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 7.51 Inteli AIN8TC

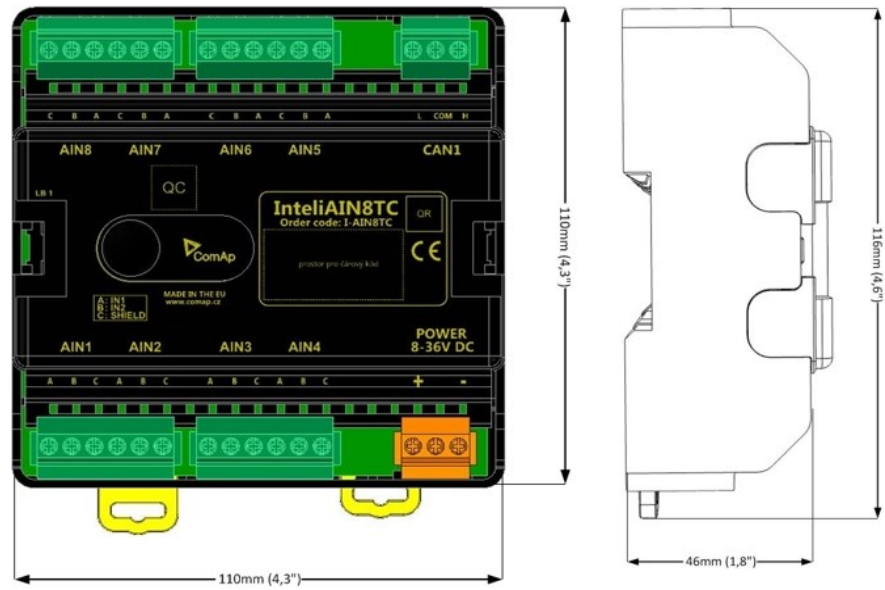
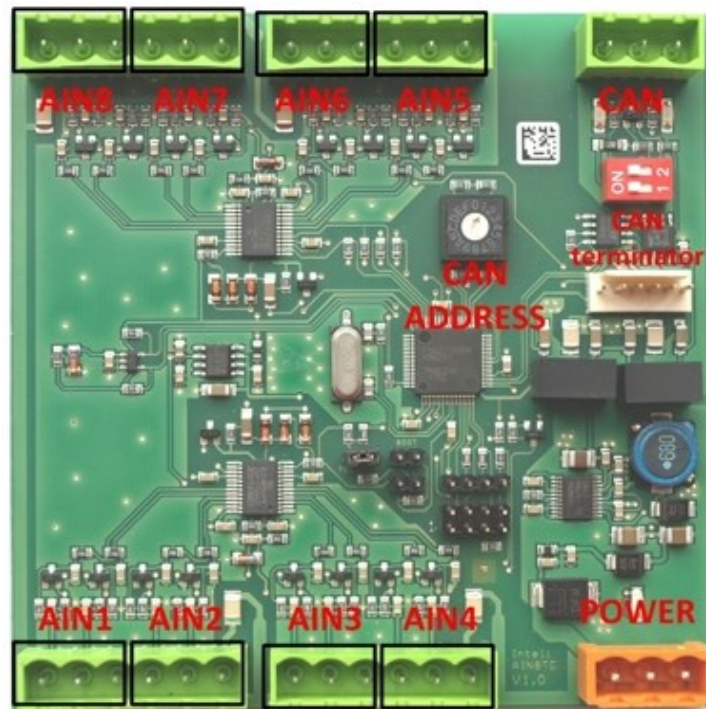


Image 7.52 Intel IAIN8TC dimensions

Terminals



Analog input	8 analog Inputs
CAN	CAN1 (page 16) 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.

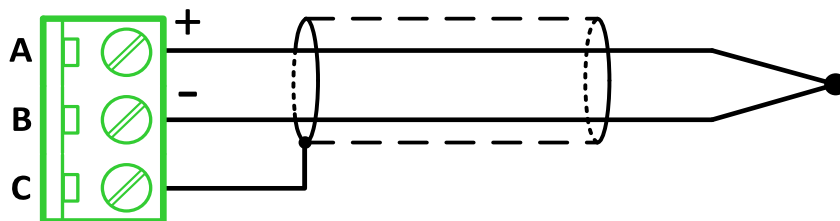
LED indication

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)

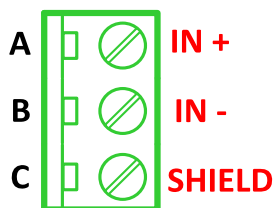
Wiring

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 16)
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)

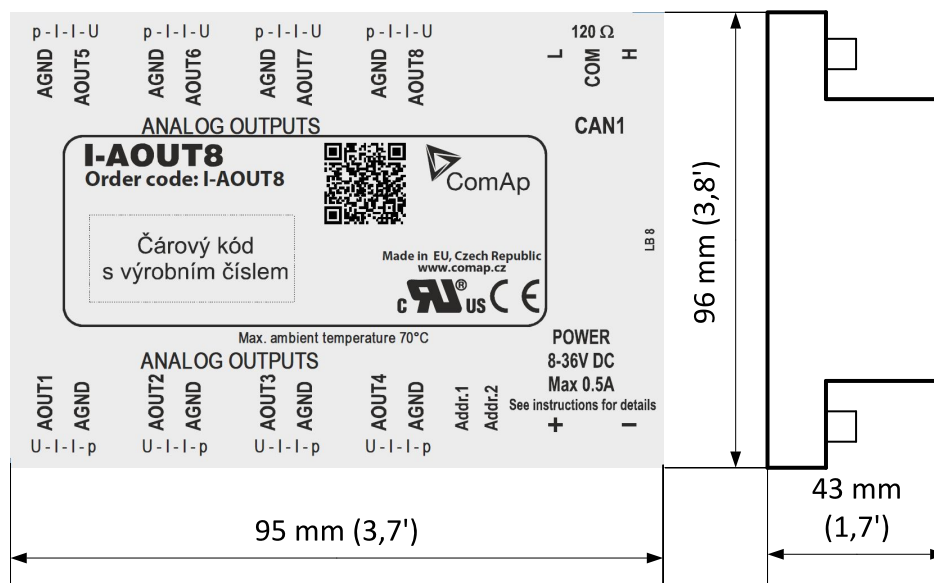
 [back to Extension modules](#)

I-AOUT8

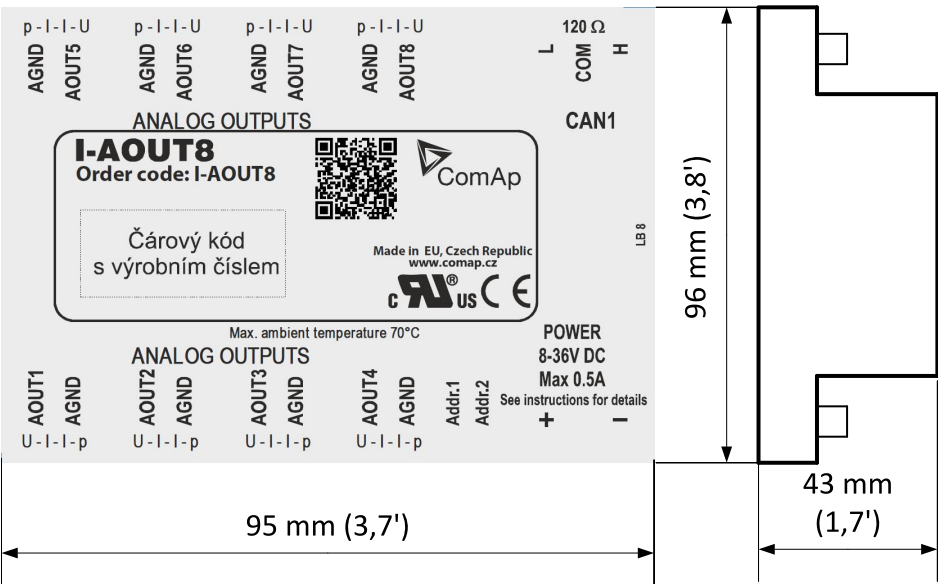
I-AOUT8 is an extension unit with 8 analog outputs. Each analog output can be switched to

- 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 16)** 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.

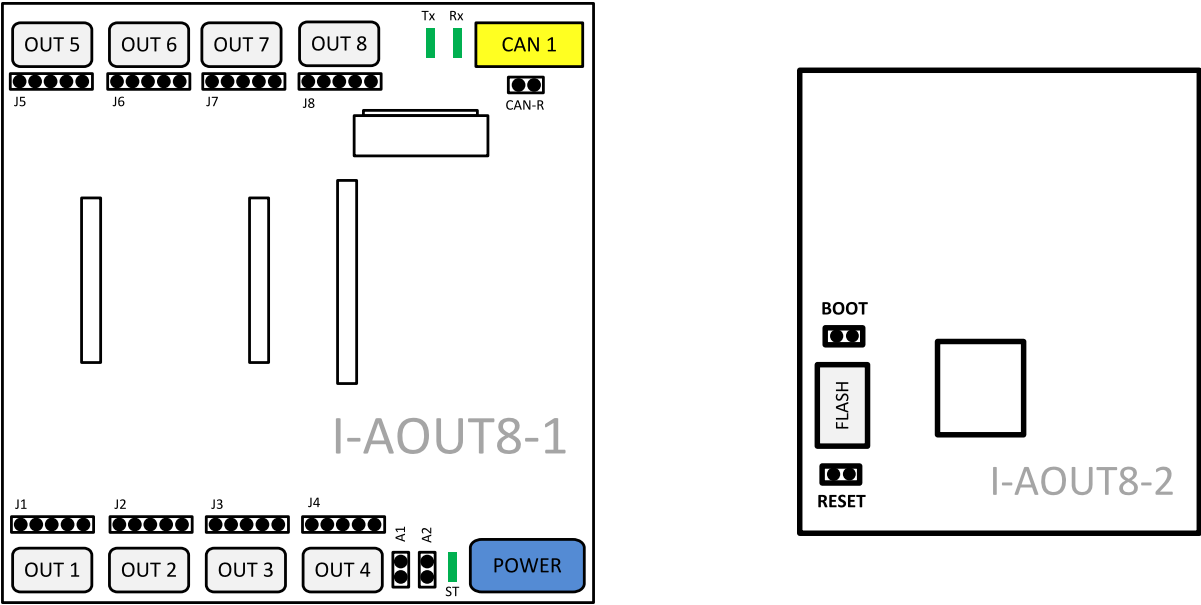


Dimensions



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

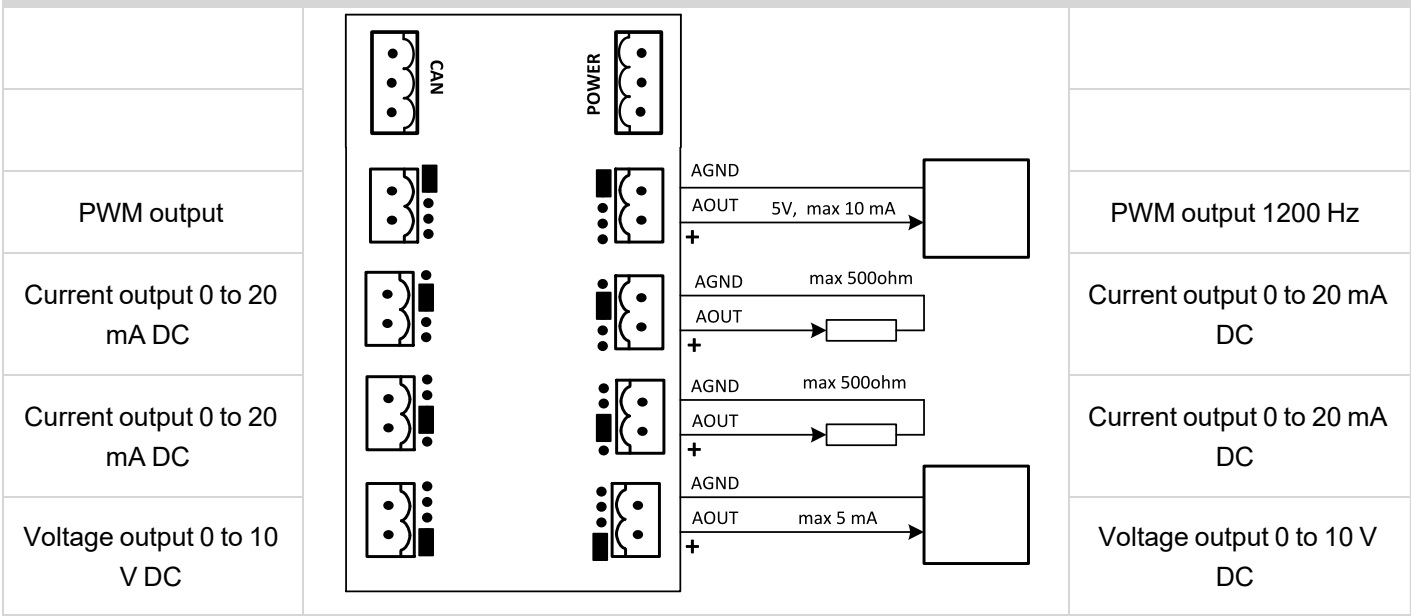


Image 7.53 Possible output modes

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

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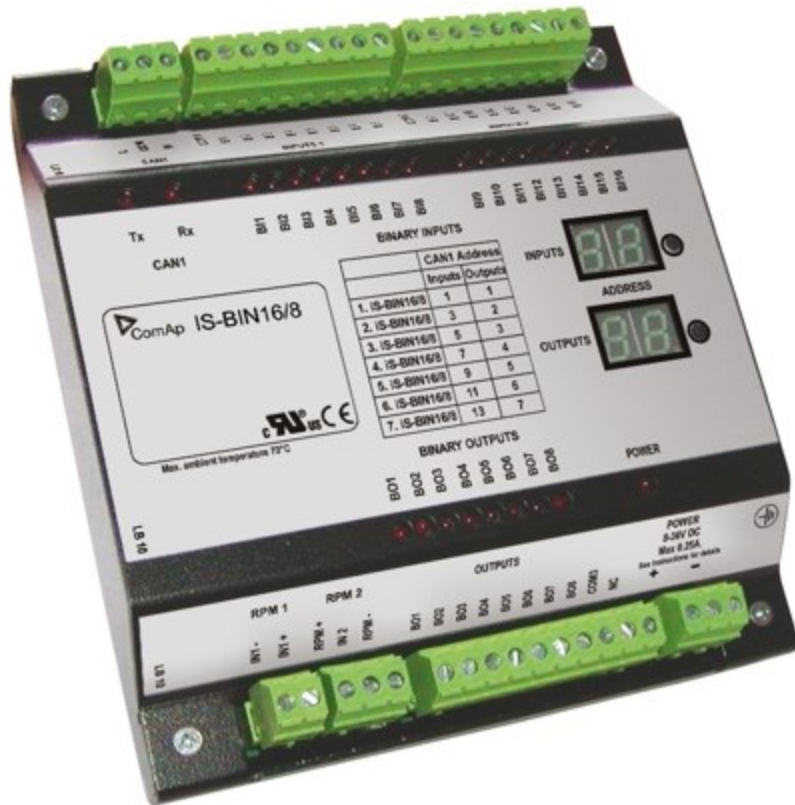
IS-BIN16/8

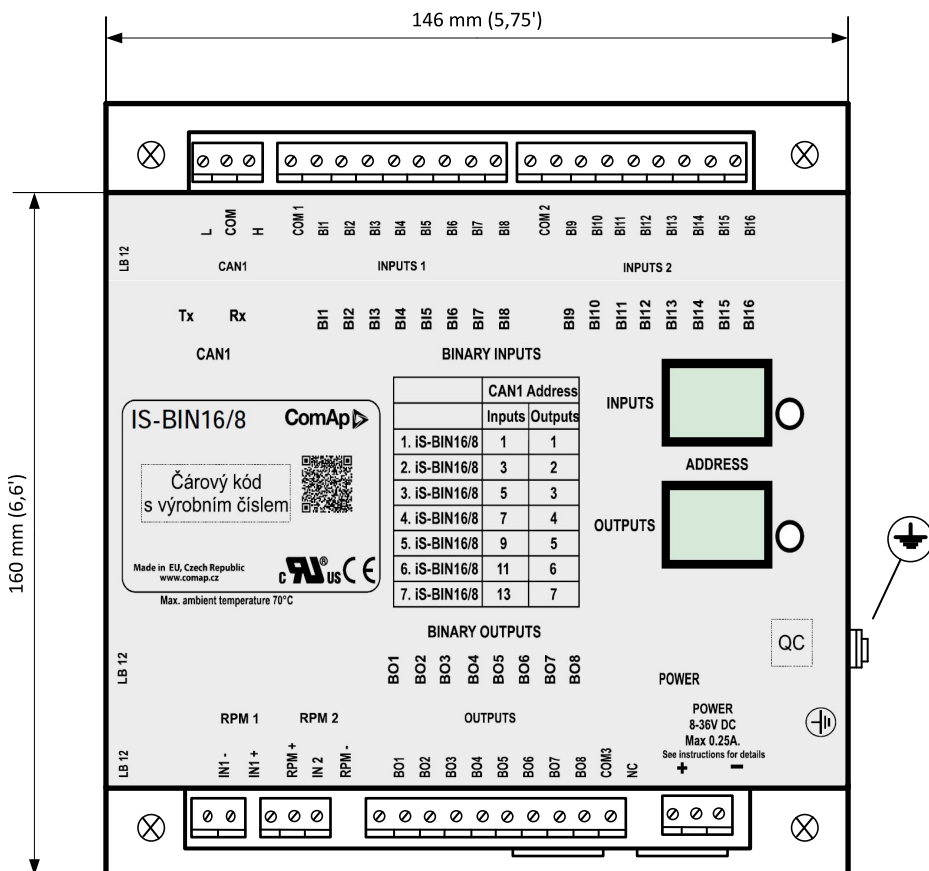
IS-BIN16/8 is an extension module with 16 binary inputs (galvanic separated) and 8 binary output (galvanic separated), 2 pulse inputs (frequency measurement or pulse counting). All I/O can be configured to any logical function or protection. It is possible to connect up to 7 IS-BIN16/8 external units to one controller. External modules IS-BIN16/8 is connected to controller **CAN1 (page 16)** 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

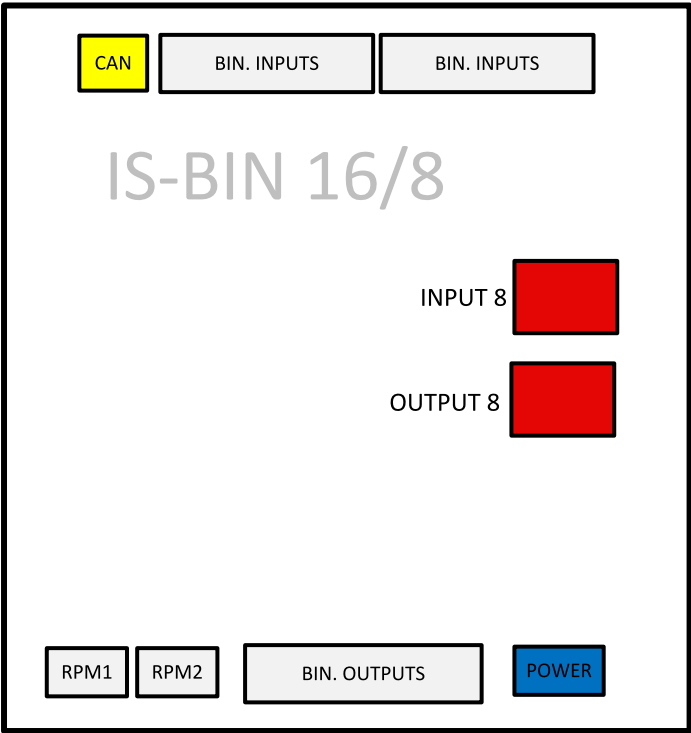
IS-BIN16/8 module has two separate CAN1 addresses for binary inputs Group 1, Group 2 and binary output Group (total three addresses). The CAN1 address for BI Group 1 and for BO Group 2 can be adjusted on the IS-BIN16/8. The address for BI Group 2 is set automatically to the address following BI Group 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

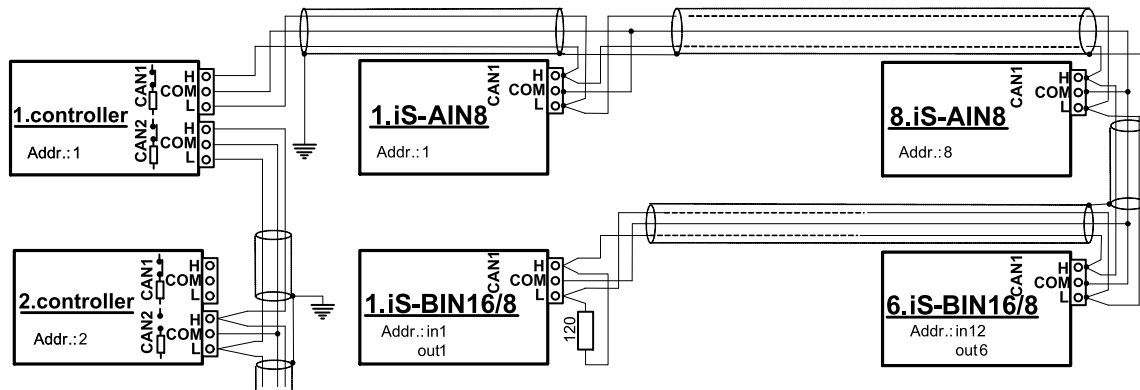


Image 7.54 CAN bus line has to be terminated by 120 ohm resistors on the both ends.

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.

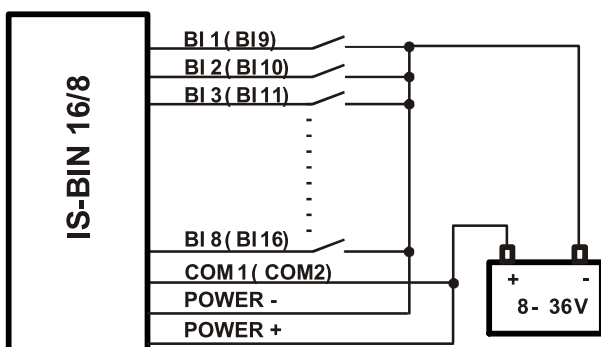
External units can be connected on the CAN bus line in any order, but line arrangement (no tails no star) is necessary- Recommended CAN bus data cables see in Chapter Technical data.

Binary inputs

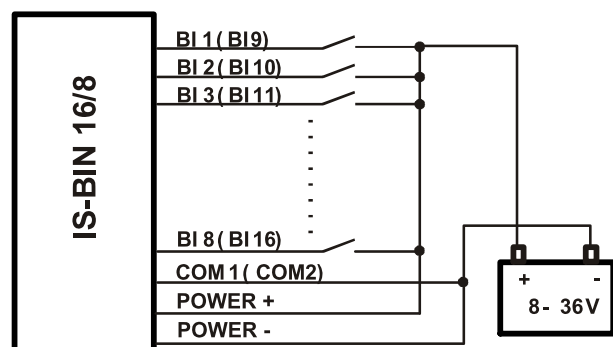
There are two groups of eight Binary inputs BI1 to BI8 and BI9 to BI16. Each group has a separate Common terminal COM1 and COM2. The Common terminal can be connected to positive or negative pole – see following drawing. Binary inputs are galvanically separated from IS-BIN16/8 power supply.

Note: See the *Theory of binary inputs and outputs* (page 583) (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.



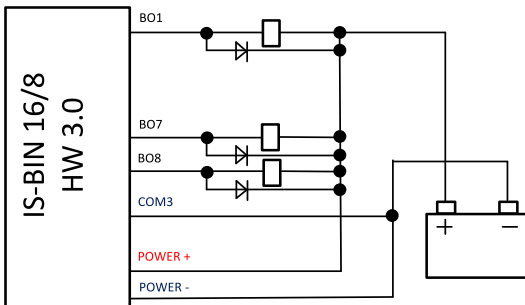
Input voltage range for opened contact is from 8 VDC to Power supply VDC. Input voltage range for closed contact is from 0 to 2 VDC. Voltage level is defined between Binary input and Binary input COM terminal and does not depend on “positive” or “negative” connection.

IMPORTANT: Impulse inputs are not supported by the controller.

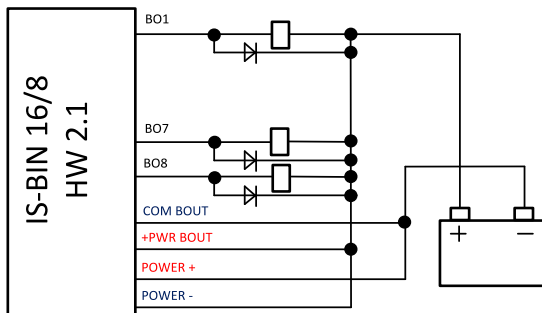
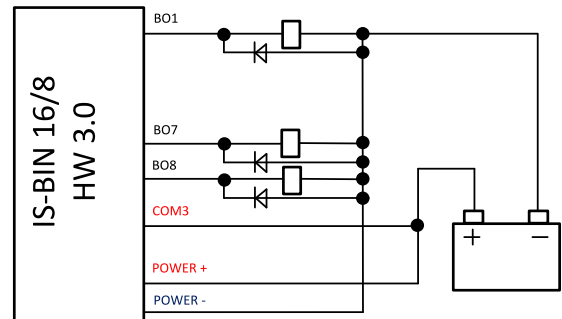
Binary output

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.



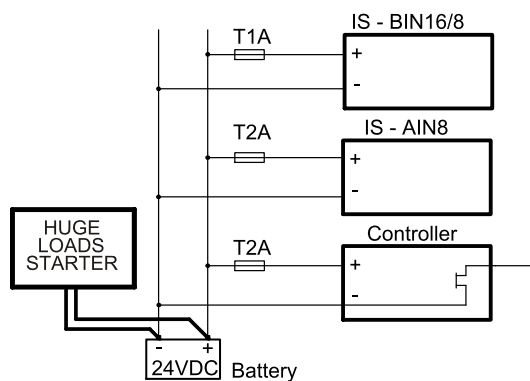
Power supply fusing

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 BTB 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 BTB 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.

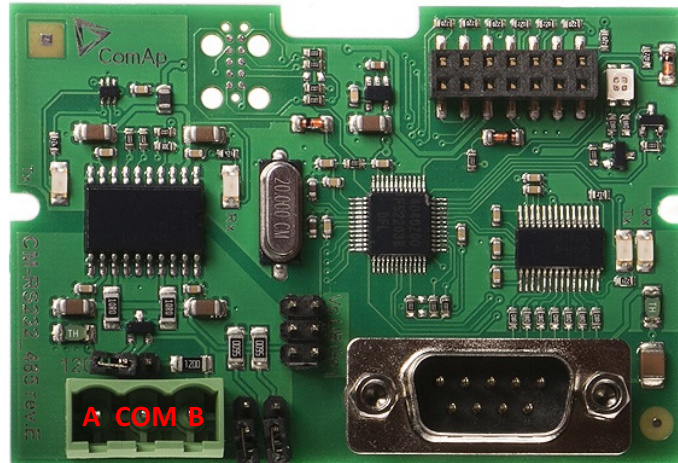


Image 7.55 CM-RS232-485 interface

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

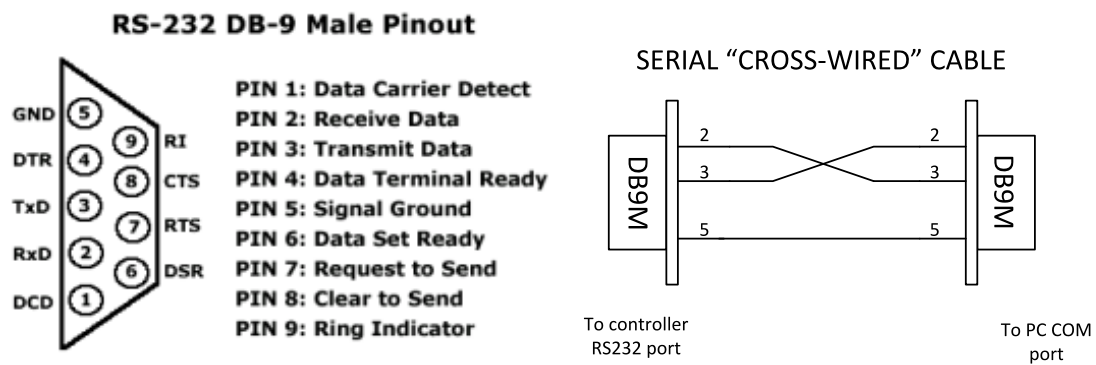


Image 7.56 Pinout of RS232 line

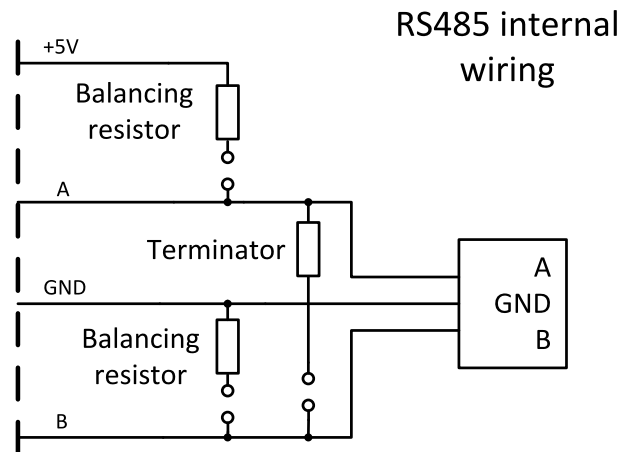


Image 7.57 Pinout of RS485 line

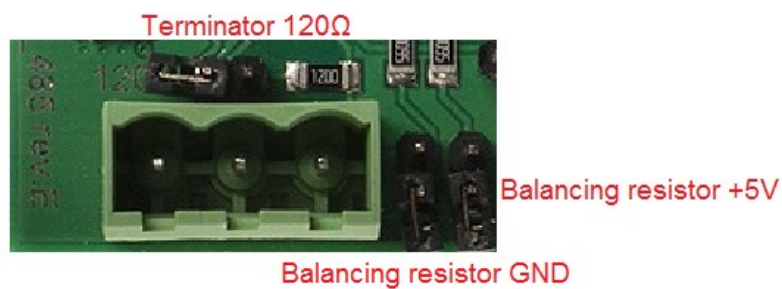


Image 7.58 Jumpers description

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).

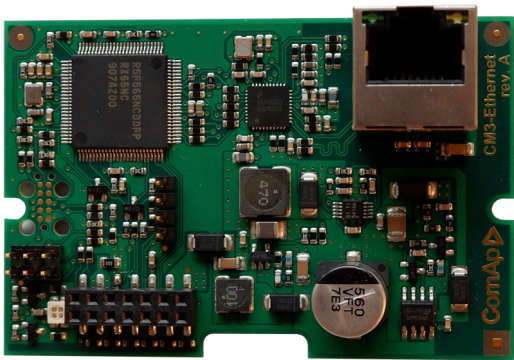


Image 7.59 CM3-Ethernet interface

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.

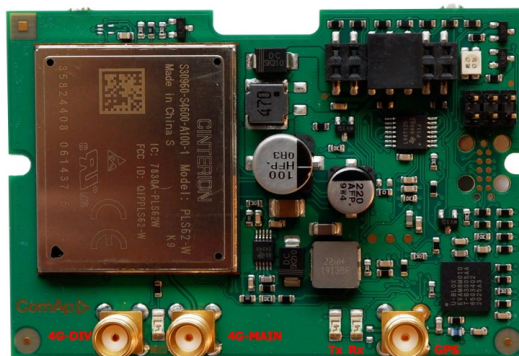


Image 7.60 CM2-4G-GPS module

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

IMPORTANT: Operating temperature of module is from -30 °C to +75 °C.

Note: Cellular data service must be enabled in your SIM card by your mobile operator for successful operation.

CM2-4G-GPS module works with:

- WebSupervisor – internet-based remote monitoring solution
- AirGate – powerful connection technology to make internet access as simple as possible

CM2-4G-GPS module also works like GPS locator. Geo-fencing function can be used with this module.

4G module types

- If the 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: <div> <div>> Wrong number</div> <div>> SIM doesn't support SMS</div> </div>
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