

InteliSys Gas

Gen-set controller for Gas application

SW version 2.2.0

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1.1 Clarification of Notation

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

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

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

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

1.2 About this Global Guide

This manual contains important instructions for IntelliSys Gas controllers that shall be followed during installation and maintenance of IntelliSys Gas Gen-set controllers.

This manual provides general information how to install and operate IntelliSys Gas controller.

This manual is dedicated for:

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

1.3 Legal notice

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

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

General security recommendations and set of measures

1. AccessCode

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

2. Password

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

3. Controller Web interface

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



4. MODBUS/TCP

- The MODBUS/TCP protocol (port TCP/502) is an instrumentation protocol designed to exchange data between locally connected devices like sensors, I/O modules, controllers etc. From 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 exposing the port TCP/502 to the public Internet.

5. SNMP

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

Certifications and standards

This product is CE compliant.		
<ul style="list-style-type: none"> ➤ EN 50549-1:2019 ➤ EN 50549-2:2019 ➤ EN 60068-2-6 ed.2:2008 ➤ EN 60068-2-27 ed.2:2010 	<ul style="list-style-type: none"> ➤ EN 60068-2-64 ➤ EN 61010-1:2003 ➤ EN 60068-2-30:2005 25/55°C, RH 95%, 48hours 	 
List of standards is available on: https://webstore.iec.ch/		

1.4 Document history

Revision number	Related SW version	Date	Author
20	2.0.0	23.03.2023	Ján Schrötter
19	1.10.0	12.05.2022	Daniel Madara
18	1.9.0	09.12.2021	Lubomír Brož
17	1.9.0	30.07.2021	Daniel Madara
16	1.8.0	22.04.2021	Daniel Madara
15	1.7.0	11.01.2021	Daniel Madara
14	1.7.0	18.12.2020	Daniel Madara
13	1.7.0	20.04.2020	Lubomír Brož
12	1.6.0	15.11.2019	Lubomír Brož
11	1.5.0	19.09.2019	Daniel Madara
10	1.5.0	28.08.2019	Miroslav Dvořák
9	1.5.0	05.08.2019	Lukáš Mrkvička
8	1.5.0	06.05.2019	Lubomír Brož
7	1.5.0	18.04.2019	Lubomír Brož
6	1.5.0	15.04.2019	Martin Klíma
5	1.5.0	09.04.2019	Lubomír Brož
4	1.2.0	26.07.2018	Lubomír Brož
3	1.2.0	13.02.2018	Lubomír Brož
2	1.1.0	01.07.2016	Lubomír Brož
1	1.0.0	01.01.2016	Lubomír Brož

1.5 General warnings

1.5.1 Remote control and programming

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

To be sure:

- > Disconnect remote control
- > Disconnect binary outputs

1.5.2 SW and HW versions compatibility

Be aware to use 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 any case do not disconnect controller CT terminals!



1.5.4 Adjust the setpoints

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












































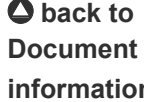












IMPORTANT: Wrong adjustment of setpoints can destroy the Gen-set.

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

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

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

1.6 Symbols in this manual

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

2 System overview

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2.1 General description

- The IntelliSys Gas is an industrial grade controller for gas all-speed engines.
- Preconfigured functions, scalable and configurable I/Os, broad communication capabilities and an easy-to-change software allows to adapt the controller to various applications without greater efforts.

2.1.1 Key features

- Predefined adjustable functions for Gen-set control
- Built-in PLC interpret to suit individual needs and design demanding applications like CHPs
- SIL2 certification for selected channels
- Grid codes requirements support (e.g. VDE-AR-N 4105 and VDE-AR-N 4110)
- Support wide range of applications – from single to multiple, from island to network parallel operation
- Power management function including new mode of effective engine run in network parallel operation
- Plug&Play support of ComAp IntelliVision display family
- Automatic synchronization and power control (via speed governor or ECU)
- Baseload, Imp / Exp, Peak shaving, Voltage and PF control (AVR bias output)
- Event-based history with customer-selectable list of stored values; RTC; statistic values
- Overspeed and Emergency stop detection

2.2 PC Tools

There are several tools that are used for the configuration and monitoring of IntelliSys Gas controllers. These tools are listed below with brief description. If you need more information on them you can use their built-in help.

2.2.1 IntelliMonitor

PC Monitoring tool for Intelli controllers. See more in the [IntelliMonitor Global Guide](#).

This tool provides the following functions:

- Online monitoring of a controller or whole site
- Fully customizable SCADA diagram
- Reading/writing/adjustment of setpoints
- Reading of measured values
- Browsing of controller history records



2.2.2 GenConfig

Configuration and monitoring tool for IntelliMainsNT, IntelliGenNT and other controllers. See more in [GenConfig Global Guide](#).

This tool provides the following functions:

- Direct, modem or internet communication with the controller
- Offline or online controller configuration
- Controller firmware upgrade
- Reading/writing/adjustment of setpoints
- Binary/Analog Inputs and Outputs logical functions adjustments
- Exporting data into a XLS file
- Controller language translation
- Screen Editor for editing IntelliVision 5 a 8 screens
- PLC Editor for editing built-in PLC functions
- Updating and configuration of IntelliVision 8 firmware
- User Protections, User sensor curves, password protection and history management

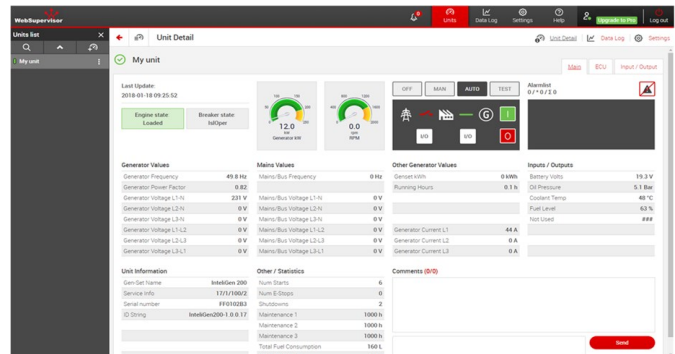


2.2.3 WebSupervisor

Web-based system for monitoring and controlling of controllers. See more at 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:

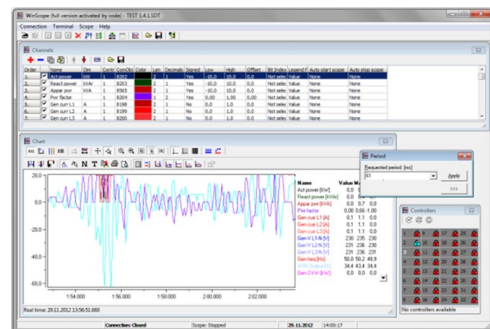
- > Login: comaptest
- > Password: ComAp123

2.2.4 WinScope

Special graphical controller monitoring software. See more in the [WinScope Global guide](#).

This tool provides the following functions:

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

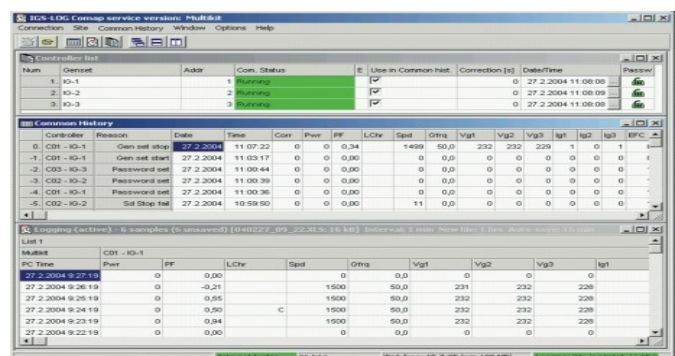


2.2.5 IGS-LOG

Continuous Monitoring of Single & Multiple IntelliSys Gas controllers. See more at the [IGS-LOG Global Guide](#).

This tool provides the following functions:

- > Stores measured values and history data from all controllers on the site
- > Direct, modem or internet on-line connection
- > Adjustable logging period
- > Automatic EXCEL or CSV data files storing procedure
- > Makes charts of measured (on-line) or stored (off-line) values



2.3 Extension modules

The controller provides vast options for extending I/Os, communication capabilities and other specialized functions. The most important extension modules and accessories are listed below.

2.3.1 Available extension modules

Available extension modules

Product	Description	Order code
Intel IO8/8	8 Binary inputs, 8 Binary outputs and 2 Analog outputs in a small unit (HW switchable to IO16/0)	I-IO8/8
Intel IO8/8	HW switchable to IO16/0 – 16 Binary inputs packed in a small unit	I-IO8/8
Intel AIN8	8 Analog inputs (R, I, V) and 1 pulse/frequency input in a small unit	I-AIN8
Intel AIN8TC	8 Thermocouple Analog inputs in a small unit	I-AIN8TC
Intel AIO9/1	9 Analog inputs (4× DC, 4× thermocouples, 1× R) in a small unit	I-AIO9/1
IS-AIN8	8 Analog inputs packed in a rugged metal unit	IS-AIN8
IGS-PTM	8 Binary inputs, 8 Binary outputs, 4 Analog inputs and 1 Analog output in a unit	IGS-PTM
IGL-RA15	15 Binary LED output (3 colors) packed in a rugged metal unit	EM2IGLRABAA
I-AOUT8	8 Analog outputs packed in a rugged metal unit	I-AOUT8
InternetBridge-NT	Multiple Internet connections (PC and Modbus) to all controllers on CAN2 or RS485	CM2IB4GABFB , CM2IB4GEBFB
I-LB+	Direct connection (PC) to all controllers on CAN2 or RS485	I-LB+

You can get more information on wiring of standard extension modules in the chapter **Extension modules** (page 931).

 [back to System overview](#)

3 Applications overview

3.1 General	14
3.2 Application with GCB & MCB control	14
3.3 Application with GCB control and no MCB	15
3.4 Application with GCB control and MCB control by IntelliMains	15
3.5 Application with GCB control and with external MCB	16
3.6 Examples of applications	16

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3.1 General

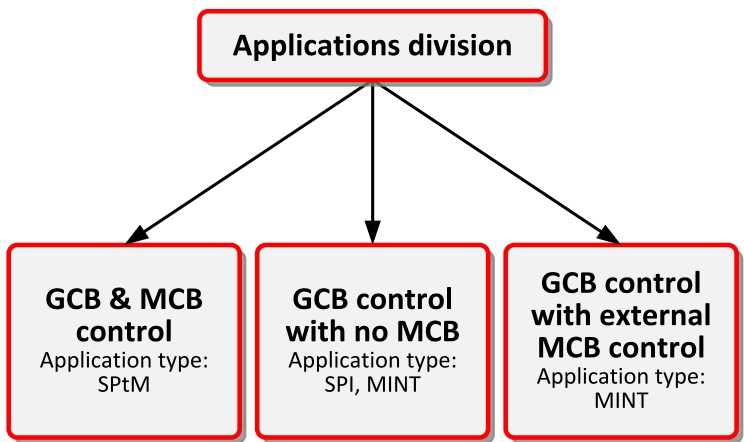


Image 3.1 IntelliSys Gas applications overview

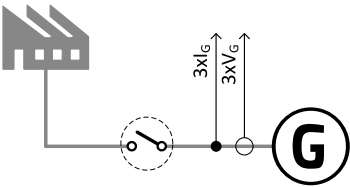
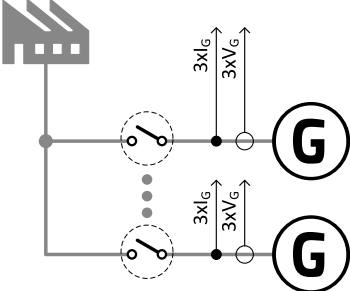
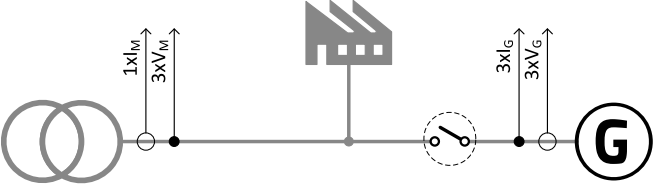
There are several core application that can be used in ComAp controllers. These applications represent basic uses of the controllers and by combining them and modifying the configuration highly complex installations can be achieved. This chapter contains simplified examples that show where measurement points are and what types of breakers are controlled. At the end of this chapter there are examples of basic configuration and wiring that illustrates usage of these applications.

Note: If you require further information on this topic please contact [ComAp technical support](#). We will gladly assist you and provide you with detailed information based on your specific needs.

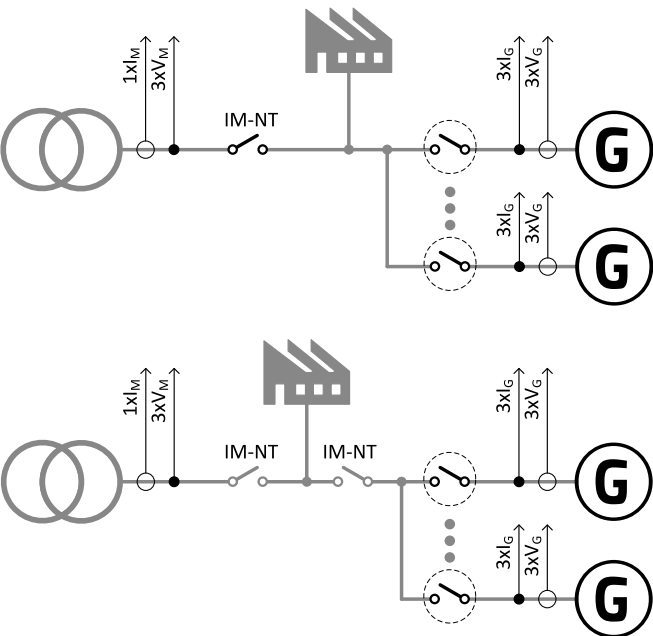
3.2 Application with GCB & MCB control

<p>Typical applications:</p> <ul style="list-style-type: none"> > AMF (SSB): Automatic mains failure start > AMF with no break return > Single set in Parallel to Mains with AMF (SPtM) > Combined heat and power (CHP) > Peak shaving > Import/Export power control 	
--	--

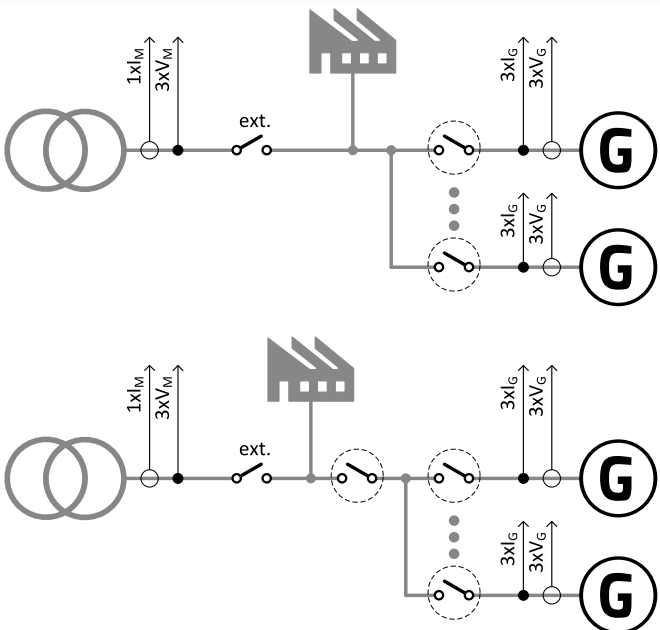
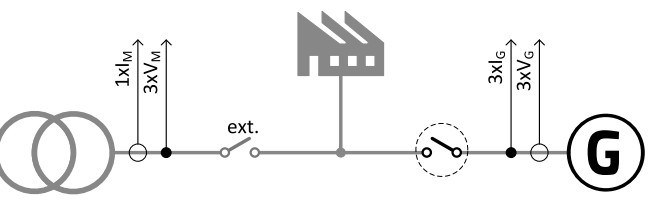
3.3 Application with GCB control and no MCB

<p>Typical applications:</p> <ul style="list-style-type: none"> > MRS (SPM): Manual or remote start/stop of a single engine 	
<p>Typical applications:</p> <ul style="list-style-type: none"> > Multiple sets running in island-parallel 	
<p>Typical applications:</p> <ul style="list-style-type: none"> > CHP with no island operation (no backup) 	

3.4 Application with GCB control and MCB control by IntelliMains

<p>Typical applications:</p> <ul style="list-style-type: none"> > Multiple Gen-sets in AMF (Open and close transitions) > Multiple Gen-sets producing power in Parallel to Mains (import/export control) > Multiple Gen-sets in Peak shaving > Multiple Gen-sets in CHP 	
---	--

3.5 Application with GCB control and with external MCB

<p>Typical applications:</p> <ul style="list-style-type: none"> > AMF with multiple sets running in island-parallel. MCB controlled by a simple mains protection relay > AMF with no break return (multiple sets). > Parallel to Mains with AMF for multiple sets (CHP) – no import/export control (optional by external device) 	
<p>Typical applications:</p> <ul style="list-style-type: none"> > CHP with external MCB control. Normally the load is higher than Gen-set capacity and non-preferential load must be switched off before Gen-set can be switched to island operation 	

3.6 Examples of applications

3.6.1 Single Gen-set	16
3.6.2 Multiple Gen-sets	21
3.6.3 Combi	31

There are several examples of wiring and basic settings in this chapter. The function of the controller can be greatly modified (e.g. add AMF function, Test on Load sequence). For further information on these functions see **Functions on page 83**.

3.6.1 Single Gen-set

A single Gen-set applications provide a whole variety of functions and modifications. In this example a setup of SPI application (GCB & no MCB control), SPtM application (GCB & MCB control) and modification to ATS (Automatic Transfer Switch) application are shown. Please note that the wiring and setting of the controller may vary widely based on the specific needs of individual installations. These examples show basic connections that support core control functions.

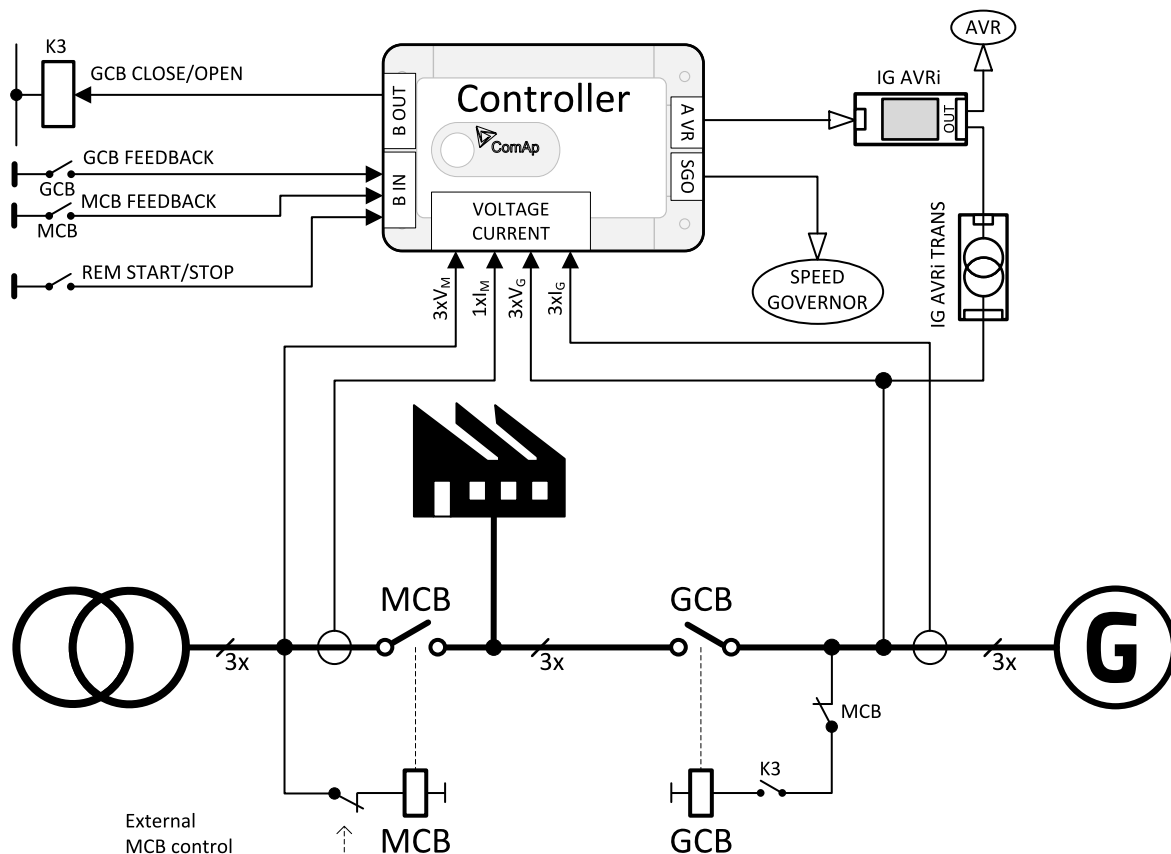
SPI application

SPI application can be used with no MCB or externally controlled MCB. The example with external control of MCB allows you to use Gen-set in Island and Parallel to Mains operation and AMF with Open transition return

sequence. The example with no MCB allows Gen-set to run in Parallel to Mains operation with no Island operation (typical application for power production facility, e.g. CHP).

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions** (page 83).

SPI with external MCB control



ComAp hardware requirements:

- > 1x IntelliSys Gas
- > 1x IG-AVRi
- > 1x IG-AVRi TRANS

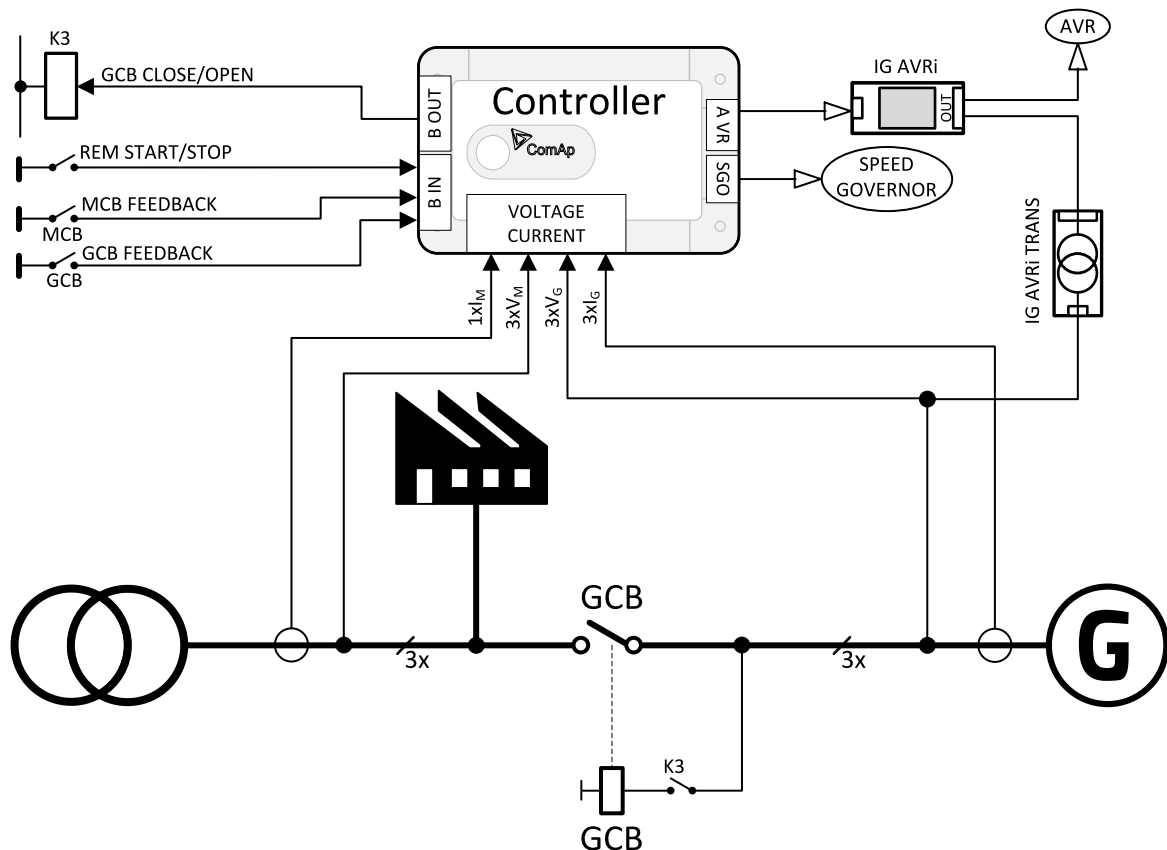
Core settings:

- > **Base load (page 326)** (in case you want your Gen-set to run on Base load)
- > **Base PF (page 326)** (in case you want your Gen-set to run on Base power factor)
- > **Import load (page 327)** (in case you want to control imported/exported active power)
- > **Import PF (page 327)** (in case you want to control imported/exported reactive power)
- > **Load ctrl PtM (page 328)** (you can choose whether you will control Base load or imported/exported active power)
- > **PF/Qctrl PtM (page 328)** (you can choose whether you will control Base load or imported/exported reactive power)
- > **Island enable (page 337)** (needs to be set to YES to enable AMF function)
- > **ParallelEnable (page 337)** (needs to be set to YES to enable continuous Parallel to Mains operation)

- **Synchro enable (page 338)** (needs to be set to YES to enable the controller to enter Parallel to Mains operation)
- Sync/Load ctrl settings
- Voltage/PF Control settings

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions (page 83)**.

SPI without MCB



ComAp hardware requirements:

- 1x IntelliSys Gas
- 1x IG-AVRi
- 1x IG-AVRi TRANS

Core settings:

- **Base load (page 326)** (in case you want your Gen-set to run on Base load)
- **Base PF (page 326)** (in case you want your Gen-set to run on Base power factor)
- **Import load (page 327)** (in case you want to control imported/exported active power)
- **Import PF (page 327)** (in case you want to control imported/exported reactive power)
- **Load ctrl PtM (page 328)** (you can choose whether you will control Base load or imported/exported active power)
- **PF/Qctrl PtM (page 328)** (you can choose whether you will control Base load or imported/exported reactive power)
- **Island enable (page 337)** (needs to be set to NO because Island operation is not available)

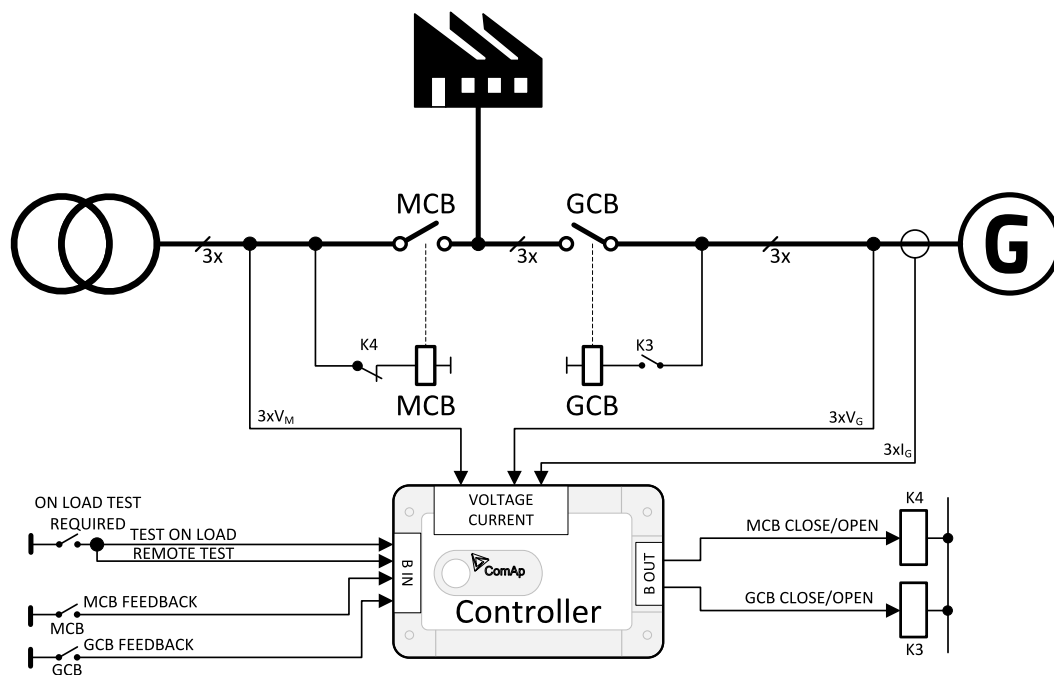
- **ParallelEnable (page 337)** (needs to be set to YES to enable continuous Parallel to Mains operation)
- **Synchro enable (page 338)** (needs to be set to YES to enable the controller to enter Parallel to Mains operation)

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions** (page 83).

SPtM application

ComAp controllers control both GCB and MCB in SPtM application. SPtM application can be used in variety of cases (AMF with close transition, continuous Parallel to Mains operation etc.). These examples show basic SPtM settings and modification of SPtM application to ATS.

Standard SPtM application



ComAp hardware requirements:

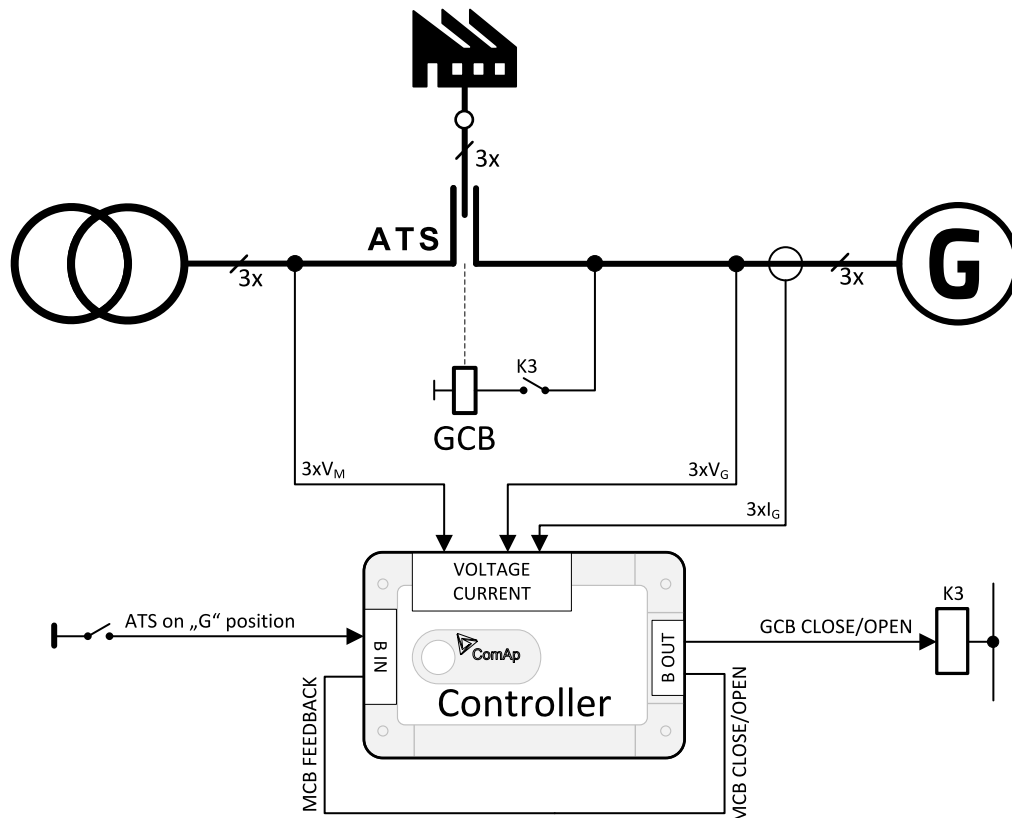
- 1x IntelliSys Gas
- 1x IG-AVRi
- 1x IG-AVRi TRANS

Core settings:

- **Base load (page 326)** (in case you want your Gen-set to run on Base load)
- **Base PF (page 326)** (in case you want your Gen-set to run on Base power factor)
- **Import load (page 327)** (in case you want to control imported/exported active power)
- **Import PF (page 327)** (in case you want to control imported/exported reactive power)
- **Load ctrl PtM (page 328)** (you can choose whether you will control Base load or imported/exported active power)
- **PF/Qctrl PtM (page 328)** (you can choose whether you will control Base load or imported/exported reactive power)

- **Island enable (page 337)** (needs to be set to YES to enable AMF function)
- **ParallelEnable (page 337)** (needs to be set to YES to enable continuous Parallel to Mains operation)
- **Synchro enable (page 338)** (needs to be set to YES to enable the controller to enter Parallel to Mains operation)
- Sync/Load ctrl settings
- Voltage/PF Control settings

ATS



The controller controls ATS with GCB close/open signal. It needs to be wired in a way that when the signal is active ATS connects Gen-set to the load and when the signal deactivates ATS connects Mains to the load. MCB feedback signal can be connected directly in the configuration to MCB close/open signal.

ComAp hardware requirements:

- 1x IntelliSys Gas
- 1x IG-AVRi
- 1x IG-AVRi TRANS

Core settings:

- **Island enable (page 337)** (needs to be set to YES to enable AMF function)
- **ParallelEnable (page 337)** (needs to be set to NO because ATS does not support Parallel to Mains operation)
- **Synchro enable (page 338)** (needs to be set to NONE because ATS does not support synchronization)

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions (page 83)**.

3.6.2 Multiple Gen-sets

Multiple Gen-set applications can also serve their purpose in single Gen-set applications (e.g. MRS). Multiple Gen-set applications can also be combined in various ways and create highly complex installations. The following examples represent just a fraction of all possibilities

Note: If you require further information on this topic please contact [ComAp technical support](#). We will gladly assist you and provide you with detailed information based on your specific needs.

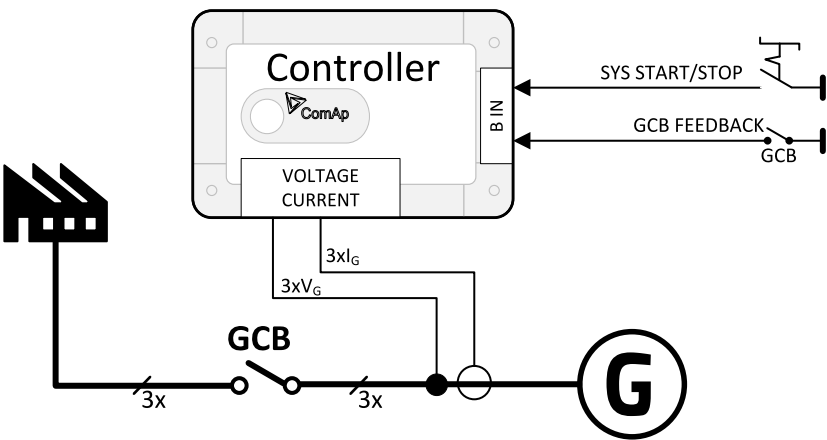
MINT application

MINT application is very variable and it is the most widely used application. It can be modified to serve various purposes. Several types of applications where MINT can be used are shown below.

MRS	21
Island without MGCB	22
Island with internal MGCB	24
Parallel with external Mains relay	25
Parallel with IntelliMainsNT	26
Multiple Mains incomers	27
Bus Tie Breaker examples	30

MRS

MRS represents very simple application that is use to power a load with the ability to start and stop the Gen-set remotely.



ComAp hardware requirements:

- > 1x IntelliSys Gas
- > 1x IG-AVRi
- > 1x IG-AVRi TRANS

Core settings:

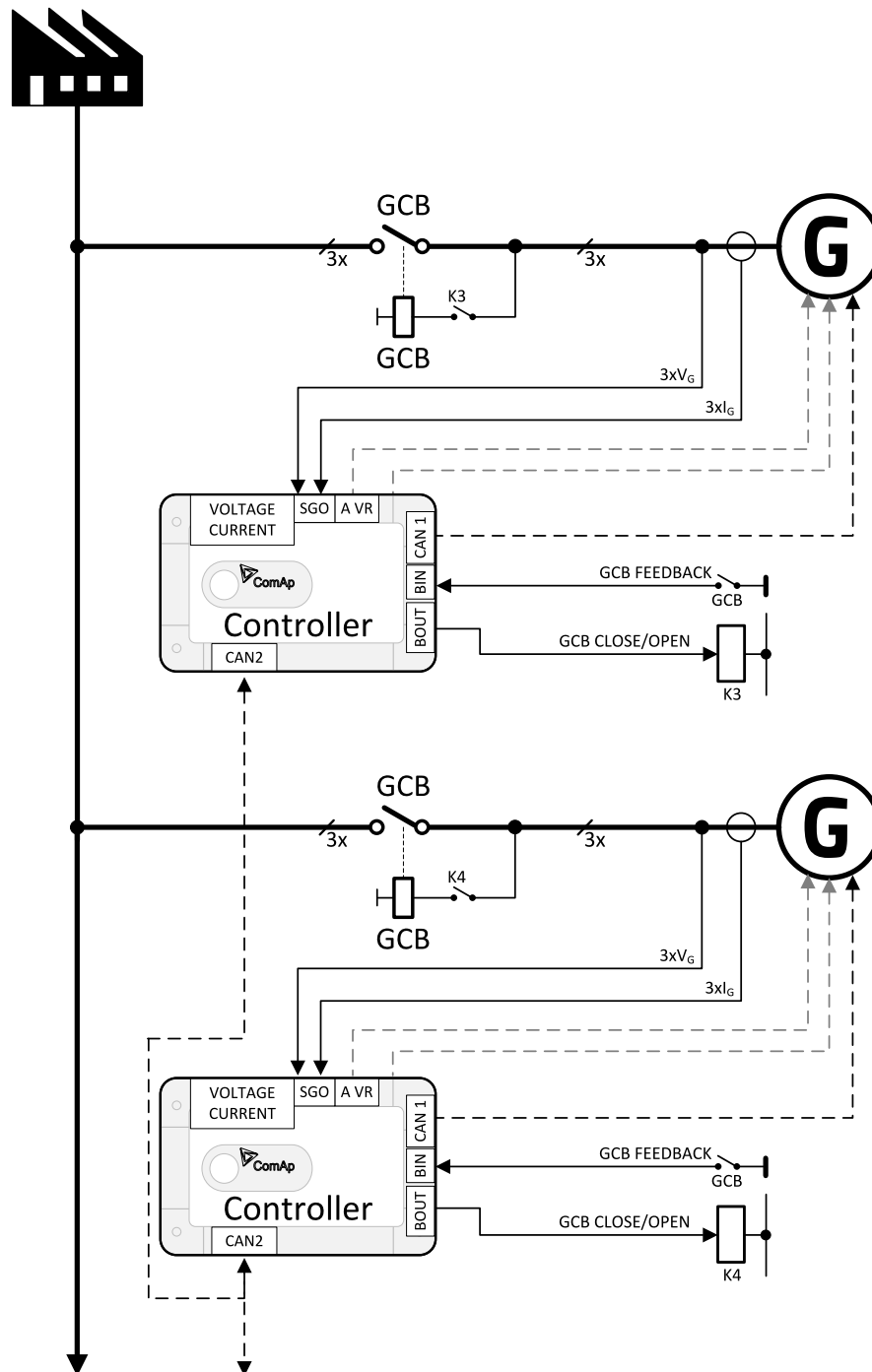
- > **CAN2emptDetect (page 370)** (this needs to be set to DISABLED to prevent warning from appearing)
- > **Pwr Management (page 430)** (this needs to be DISABLED to allow operation without Dongle)
- > **#SysLdCtrl PtM (page 324)** (this needs to be set to BASELOAD to allow operation without Dongle **or** there cannot be any CAN2 communication)
- > MCB feedback has to be 1 **or** there cannot be any CAN2 communication

- > **#SysAMFstrtDel** (page 433) (this should be set to 0 to prevent delay before start of the Gen-set)
- > **#SysAMFstopDel** (page 433) (this should be set to 0 to prevent delay before stop of the Gen-set)

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions** (page 83).

Island without MGCB

This is a basic application with several Gen-sets running in Load sharing and VAr sharing. Power management and other advanced functions can be used in this application.



ComAp hardware requirements:

- Nx IntelliSys Gas
- Nx IG-AVRi
- Nx IG-AVRi TRANS
- Nx IGS-NT-LSM+PMS
- 1x I-LB+ or IB-NT (optional for the whole site monitoring via WinScope)

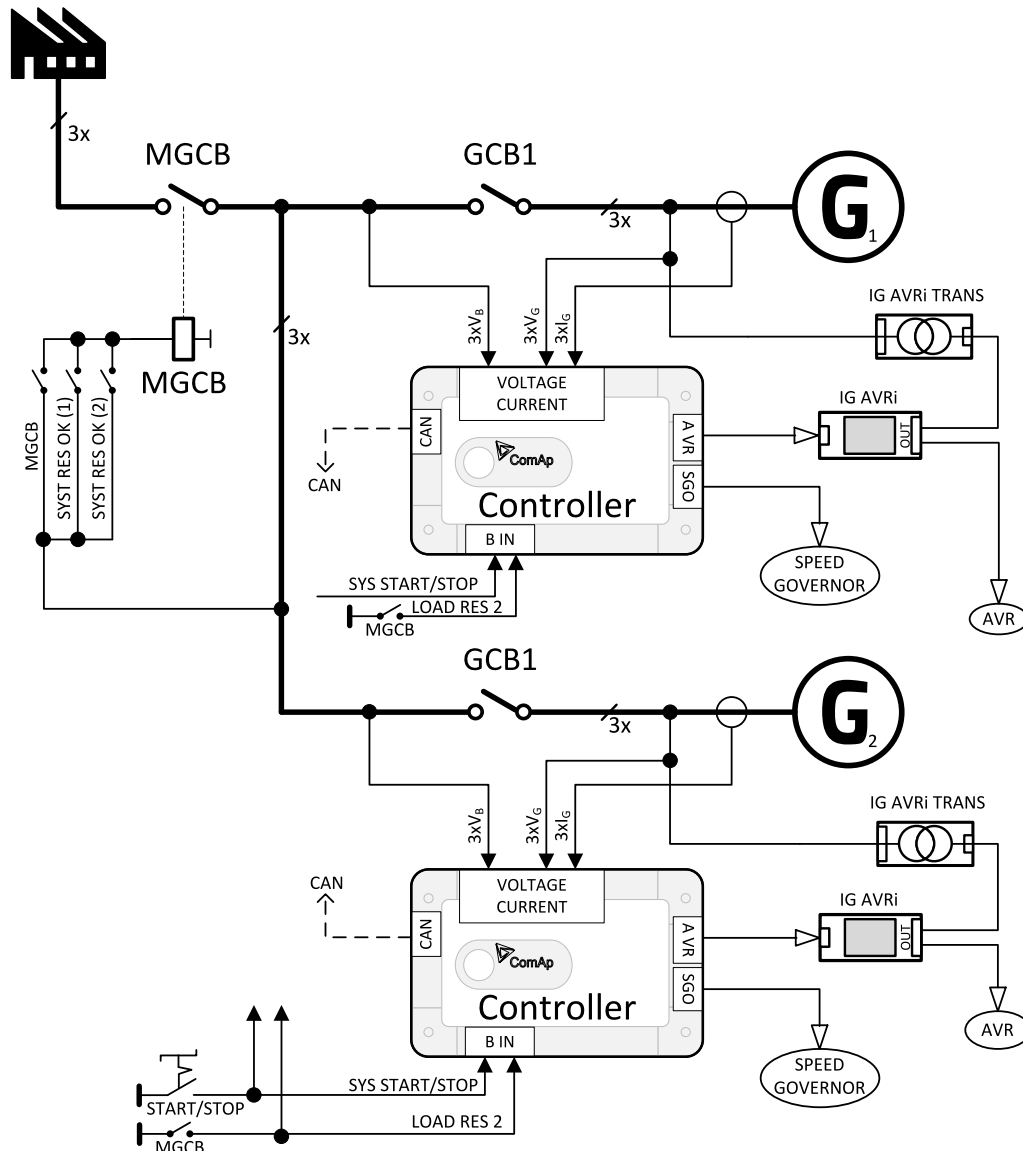
Core settings:

- **Control group (page 443)** (adjust in case the system is complex and contains more segments divided by a breaker, otherwise use COMMON in all the controllers)
- Power management settings
- Sync/Load ctrl settings
- Voltage/PF Control settings

Note: Always check *Basic settings group* which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions (page 83)**.

Island with internal MGCB

This is an application where the controller group controls MGCB based on the reserve that is available for the system.



ComAp hardware requirements:

- > Nx IntelliSys Gas
- > Nx IG-AVRi
- > Nx IG-AVRi TRANS
- > Nx IGS-NT-LSM+PMS
- > 1x I-LB+ or IB-NT (optional for the whole site monitoring via WinScope)

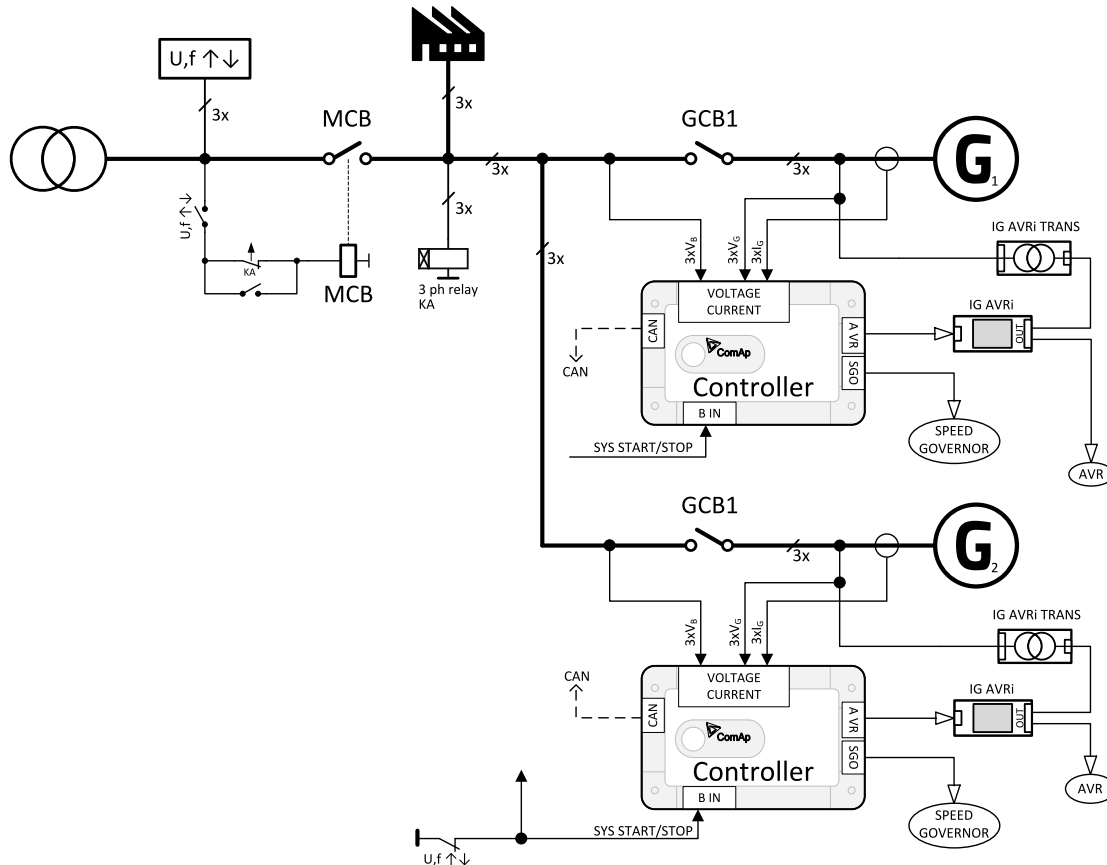
Core settings:

- > **Control group (page 443)** (adjust in case the system is complex and contains more segments divided by a breaker, otherwise use COMMON in all the controllers)
- > Power management settings
- > Sync/Load ctrl settings
- > Voltage/PF Control settings

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions** (page 83).

Parallel with external Mains relay

Multiple controllers with MINT application can be used in AMF function or in continuous Parallel to Mains. Common connection point with a protection relay is required (this may depend on regional requirements).



ComAp hardware requirements:

- Nx IntelliSys Gas
- Nx IG-AVRi
- Nx IG-AVRi TRANS
- Nx IGS-NT-LSM+PMS
- 1x I-LB+ or IB-NT (optional for the whole site monitoring via WinScope)

Core settings:

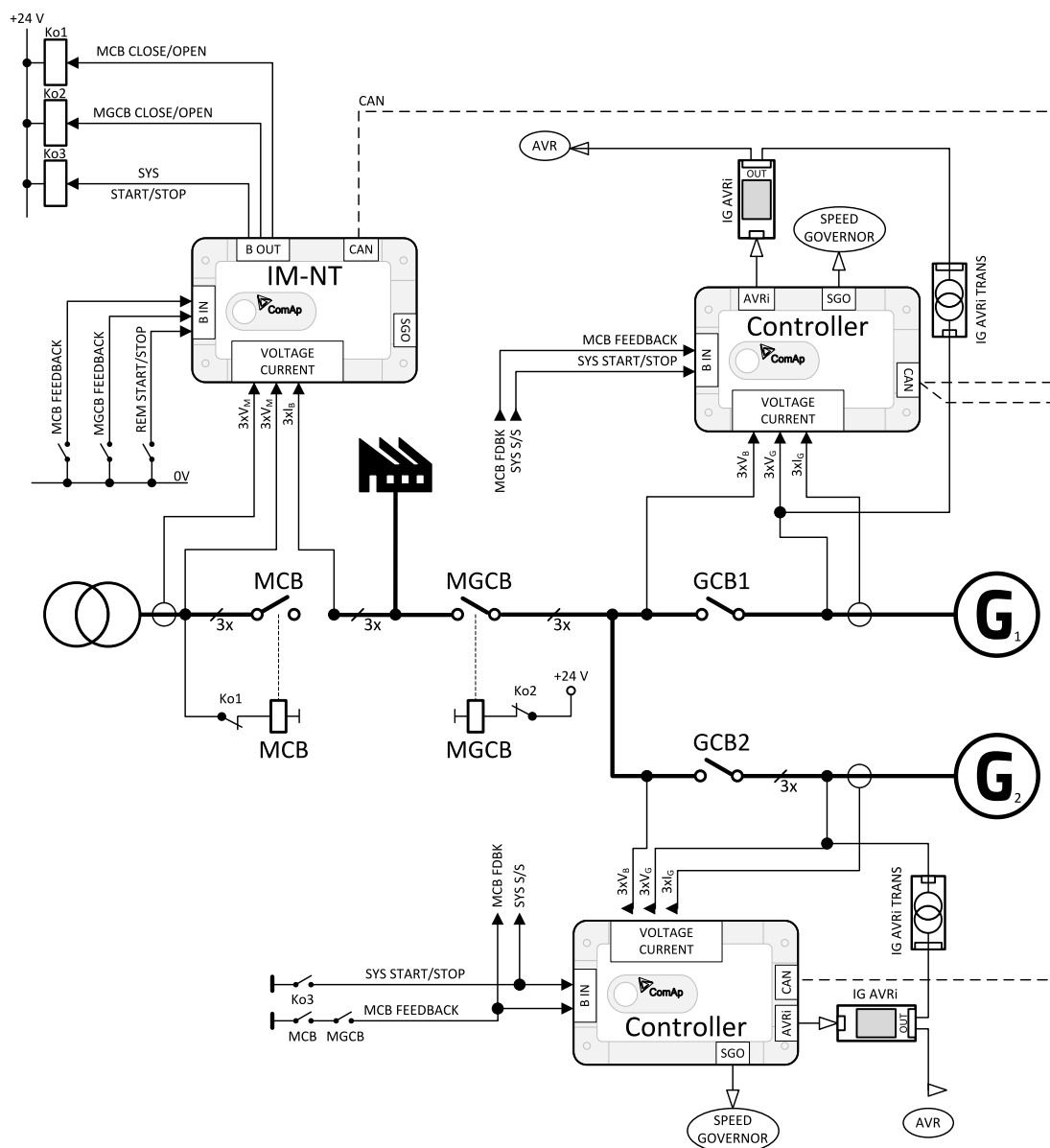
- **#SysBaseLoad** (page 322) (in case you want your Gen-set to run on System Base load)
- **#SysPwrFactor** (page 323) (in case you want your Gen-set to run on System Base power factor)
- **#SysLdCtrl PtM** (page 324) (in case you want to run in Parallel to Mains operation you need to set this to BASE LOAD)
- **#SysPFCtrl PtM** (page 324) (in case you want to run in Parallel to Mains operation you need to set this to BASEPF)

- **Control group (page 443)** (adjust in case the system is complex and contains more segments divided by a breaker, otherwise use COMMON in all the controllers)
- Power management settings
- Sync/Load ctrl settings
- Voltage/PF Control settings

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions** (page 83).

Parallel with IntelliMains^{NT}

Multiple controllers with MINT application can be used in Parallel to Mains. Common connection point with a protection relay is required (this may depend on regional requirements). For detailed description of IntelliMains controllers please refer to the latest IntelliMains^{NT} manual.



ComAp hardware requirements:

- 1x IntelliSys Gas
- Nx IntelliSys Gas
- Nx IG-AVRi
- Nx IG-AVRi TRANS
- Nx IGS-NT-LSM+PMS
- 1x I-LB+ or IB-NT (optional for the whole site monitoring via WinScope)

Core settings:

- **#SysBaseLoad (page 322)** (in case you want your Gen-set to run on System Base load)
- **#SysPwrFactor (page 323)** (in case you want your Gen-set to run on System Base power factor)
- **#SysLdCtrl PtM (page 324)** (in case you want to control active power in Parallel to Mains from the Gen-set controller or from IntelliMains controller)
- **#SysPFCtrl PtM (page 324)** (in case you want to control reactive power in Parallel to Mains from the Gen-set controller or from IntelliMains controller)
- **Control group (page 443)** (adjust in case the system is complex and contains more segments divided by a breaker, otherwise use COMMON in all the controllers)
- Power management settings
- Sync/Load ctrl settings
- Voltage/PF Control settings

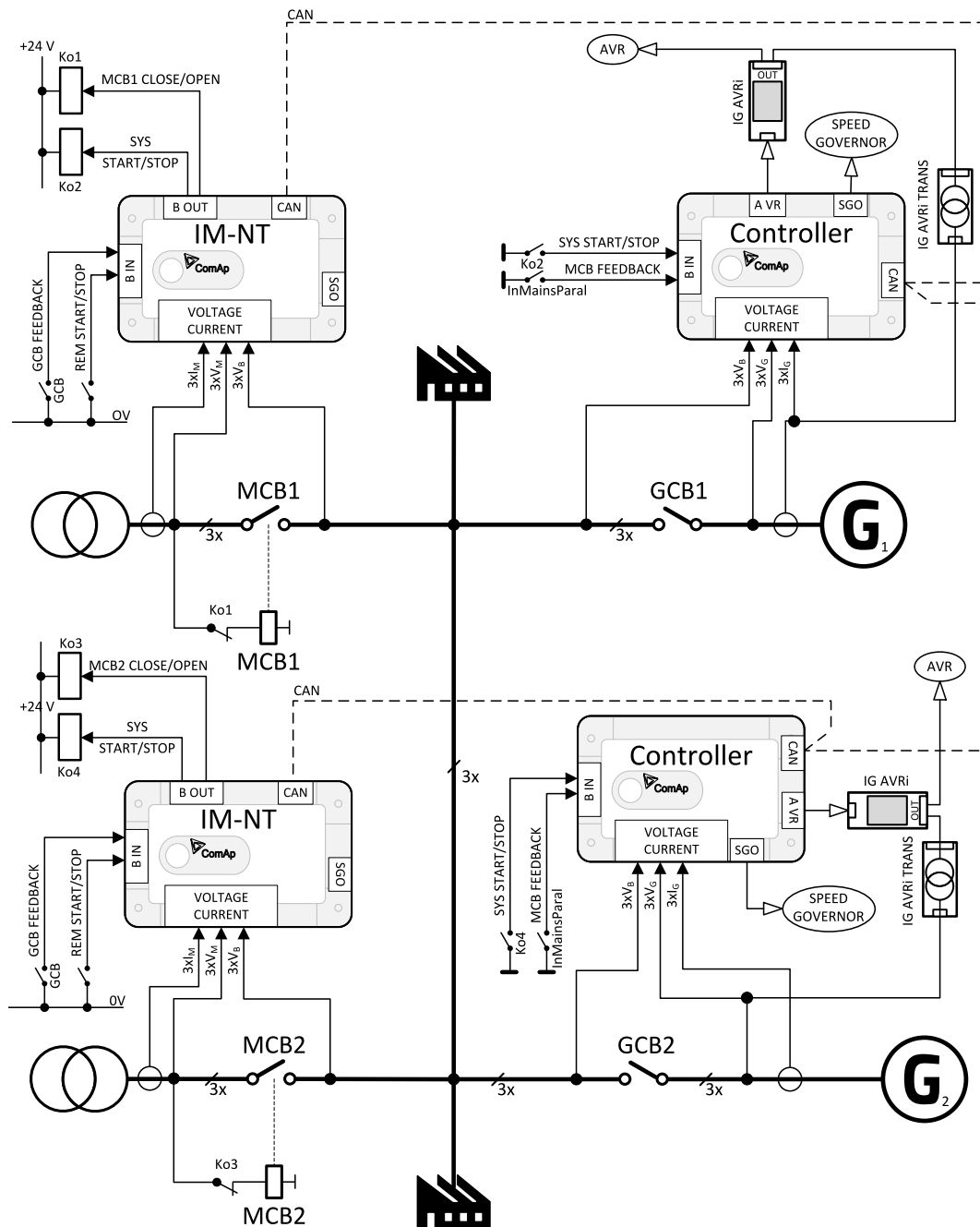
Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions (page 83)**.

Note: You can use ComAp's shared virtual peripherals to send signals among the controllers. Go to the chapter **Shared virtual inputs and outputs (page 160)**.

Multiple Mains incomers

The system can become highly complex. This is illustrated in this example. The setting may vary greatly in this case and there are no simple recommended settings. Study the functions of the controller in the chapter **Functions (page 83)** to get deeper understanding of complex systems using ComAp controllers. For detailed description of IntelliMains controllers please refer to the latest IntelliMains^{NT} manual.

Note: If you require further information on this topic please contact [ComAp technical support](#). We will gladly assist you and provide you with detailed information based on your specific needs.



ComAp hardware requirements:

- Nx IM-NT/C-BB
- Nx IntelliSys Gas
- Nx IG-AVRi
- Nx IG-AVRi TRANS
- Nx IGS-NT-LSM+PMS
- 1x I-LB+ or IB-NT (optional for the whole site monitoring via WinScope)

Core settings:

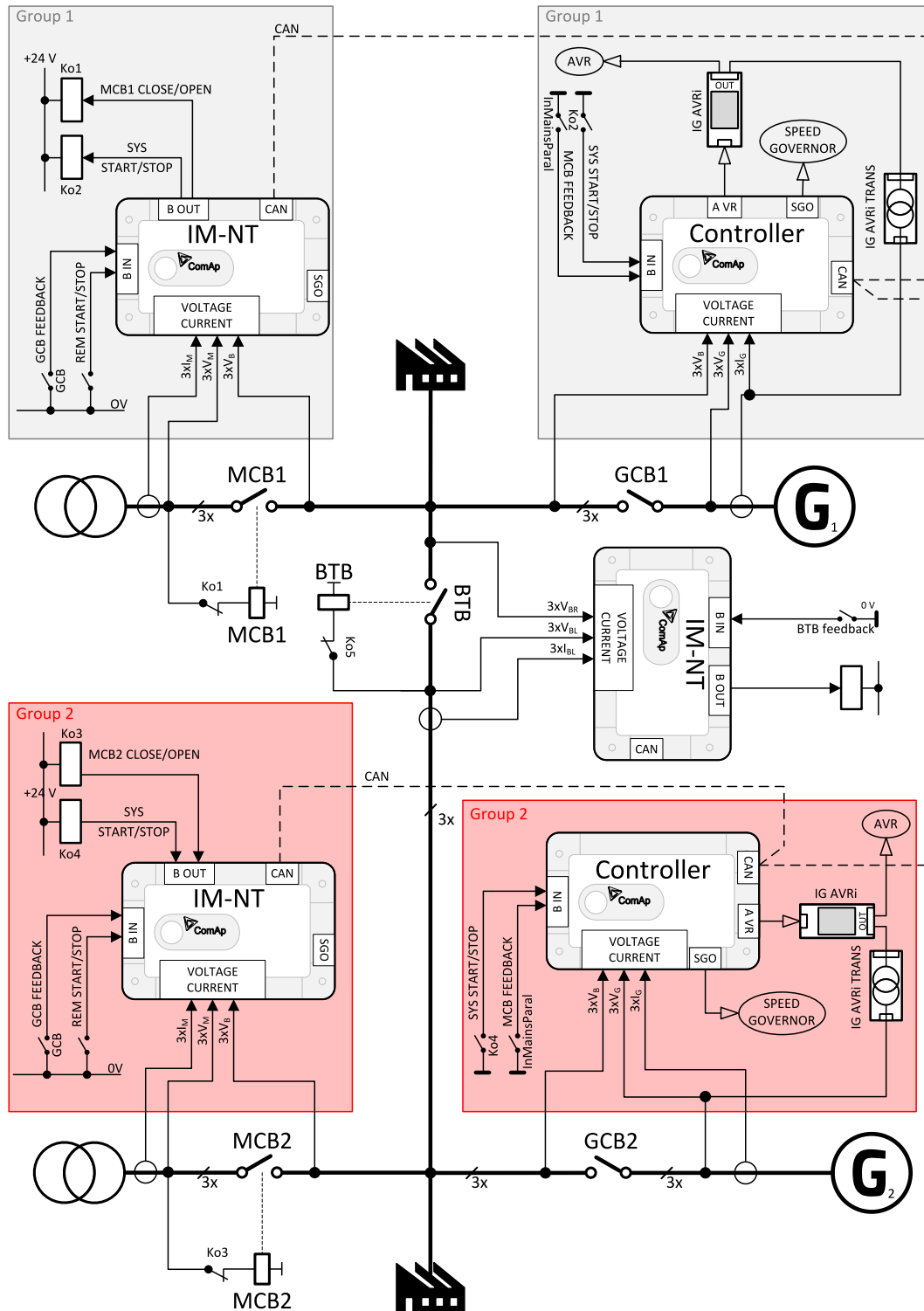
- **#SysBaseLoad (page 322)** (in case you want your Gen-set to run on System Base load)
- **#SysPwrFactor (page 323)** (in case you want your Gen-set to run on System Base power factor)
- **#SysLdCtrl PtM (page 324)** (in case you want to run in Parallel to Mains operation you need to set this to BASE LOAD)
- **#SysPFCtrl PtM (page 324)** (in case you want to run in Parallel to Mains operation you need to set this to BASEPF)
- **Control group (page 443)** (adjust in case the system is complex and contains more segments divided by a breaker, otherwise use COMMON in all the controllers)
- Power management settings
- Sync/Load ctrl settings
- Voltage/PF Control settings

Note: Always check *Basic settings* group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions** (page 83).

IMPORTANT: Please note that the controllers cannot control the output power of each incomer. The balance of imported/exported power via each Mains incomer is given by the actual situation on site and needs to be resolved individually for each case.

Bus Tie Breaker examples

For the most complex installations ComAp controllers support control groups which are used to divide the installation to segments that can work individually. In these cases ComAp provides a solution for Bus Tie Breakers (BTBs). The control functions are realized in IntelliMains controllers. For detailed description of IntelliMains controllers please refer to the latest IntelliMains^{NT} manual.



ComAp hardware requirements:

- Nx IM-NT/C-BB (for MCB, MGCB and BTB control)
- Nx IntelliSys Gas
- Nx IG-AVRi
- Nx IG-AVRi TRANS
- Nx IGS-NT-LSM+PMS
- 1x I-LB+ or IB-NT (optional for the whole site monitoring via WinScope)

Core settings:

- **#SysBaseLoad (page 322)** (in case you want your Gen-set to run on System Base load)
- **#SysPwrFactor (page 323)** (in case you want your Gen-set to run on System Base power factor)
- **#SysLdCtrl PtM (page 324)** (in case you want to run in Parallel to Mains operation you need to set this to BASE LOAD)
- **#SysPFCtrl PtM (page 324)** (in case you want to run in Parallel to Mains operation you need to set this to BASEPF)
- **Control group (page 443)** (adjust to different value for each control group – see the scheme above)
- Power management settings
- Sync/Load ctrl settings
- Voltage/PF Control settings

Note: Always check Basic settings group which allows you to set nominal values of the Gen-set (e.g. nominal power, nominal frequency). Further settings of separate functions can be found in the chapter **Functions (page 83)**.

IMPORTANT: Please note that the controllers cannot control the output power of each incomer. The balance of imported/exported power via each Mains incomer is given by the actual situation on site and needs to be resolved individually for each case.

3.6.3 Combi

Combi application provides you with great flexibility since it contains SPtM, SPI and MINT applications combined to one. These applications can be switched while the controller starts up using Binary inputs (either virtually controlled or physically). This is great mainly for Gen-sets that are used in different situations all the time (e.g. Rental sets).

For more information on individual applications please go to the chapters **SPtM application (page 19)**, **SPI application (page 16)** and **MINT application (page 21)**.

If you want to learn more on Combi application functions **see Combi overview on page 31**.

Combi overview

The Combi application provides users with great flexibility for demanding applications working under various conditions every time. Combi archive consists of SPtM, SPI and MINT archives combined in one. There are all necessary settings for each application and settings that are redundant for certain applications are omitted (e.g. when switched to SPtM the controller will not react to settings in Power management in any way).

Changing of Combi modes (selected application) can be done by Binary inputs and it is described in **Combi mode activation (page 32)**.

Combi mode activation

The Combi modes (applications) are selected by activation of Logical binary inputs. The following Logical binary inputs are used: **SPI ENABLE (PAGE 745)** and **MULTIPLEENABLE (PAGE 729)**.

When none of these Logical binary inputs is activated SPtM application is selected. The activated mode is shown on any connected display and it is also available in the value **Combi select (page 652)**.

When **SPI ENABLE (PAGE 745)** is activated SPI application is active.

When **MULTIPLEENABLE (PAGE 729)** is activated MINT application is active. The same applies for the case when both Logical binary inputs are activated.

IMPORTANT: It is necessary to switch the application by reset of the controller's DC power supply or by activation of the Logical binary input **EMERG. MANUAL (PAGE 679)**. Otherwise the controller does not react on changes in **SPI ENABLE (PAGE 745)** and **MULTIPLEENABLE (PAGE 729)**. The selection must be active when the controller restarts or when **EMERG. MANUAL (PAGE 679)** is activated.

 [back to Applications overview](#)

4 Installation and wiring

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4.3 Terminals, Jumpers and I/O overview	37
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4.1 Package content



The package contains:

- Controller
- Terminal blocks
- Screws for mounting to IntelliVision 5 or IntelliVision 8 (if you want to know more on mounting options **see Mounting on page 35**).

Note: The package does not contain a communication or extension modules. The required modules should be ordered separately. If you want to know more about extension or communication modules **see Extension modules on page 931**.

4.2 Controller installation

4.2.1 Dimensions

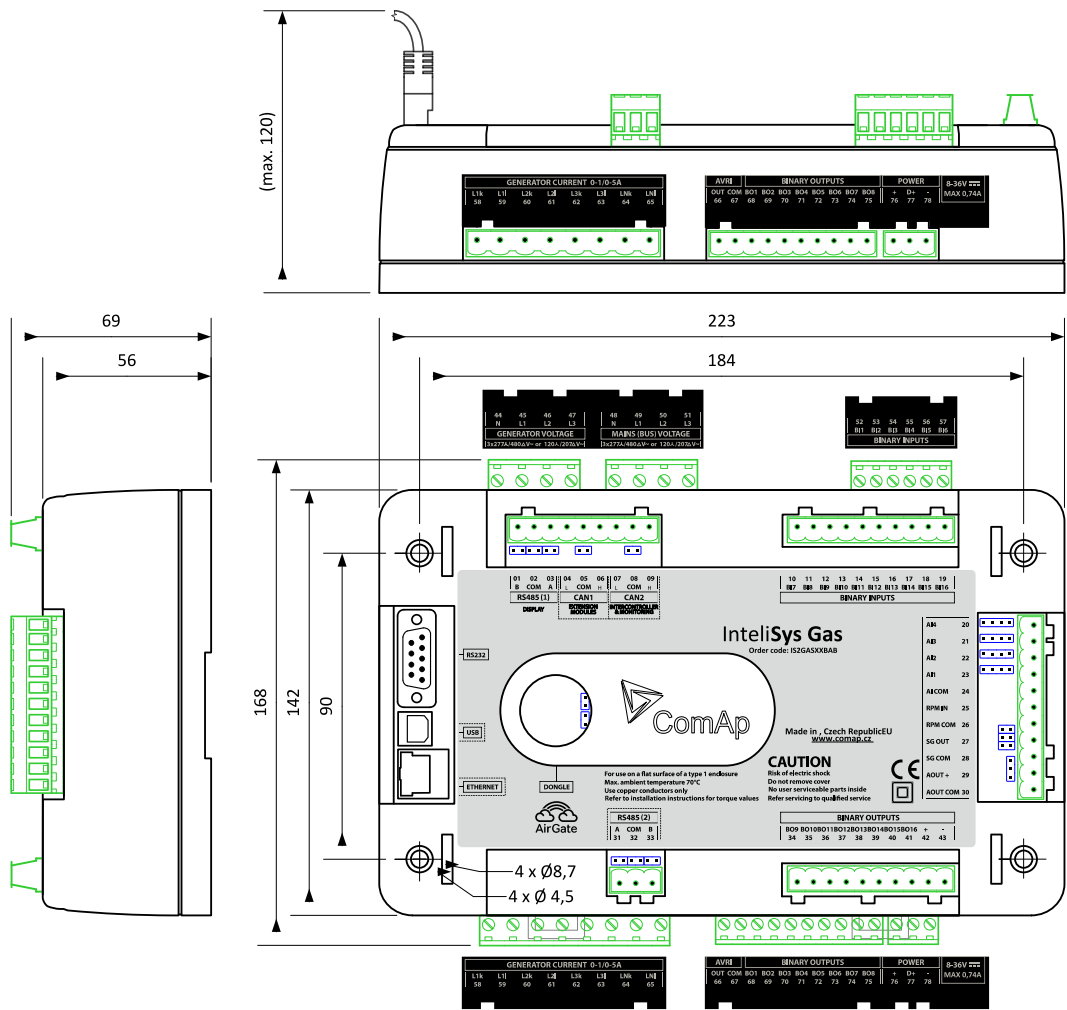


Image 4.1 Dimensions of IntelliSys Gas

4.2.2 Mounting

Mounting on DIN rail

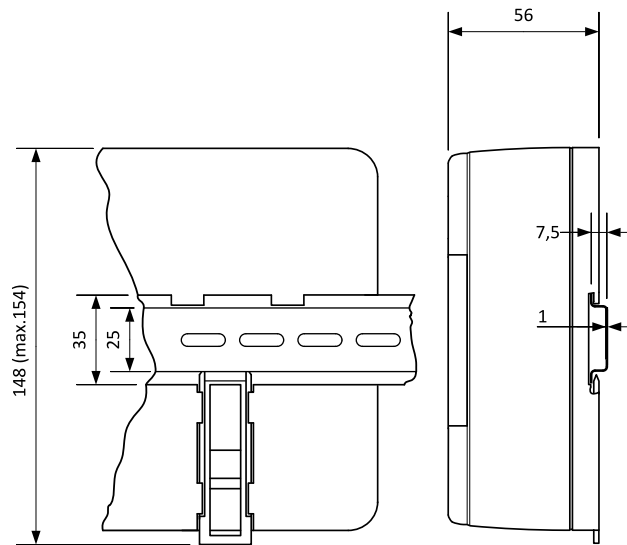


Image 4.2 BaseBox mounted on DIN rail

Note: All dimensions are in millimeters.

Mounting in the cabinet doors

The controller can be mounted to the cabinet door in combination with IntelliVision 5 or IntelliVision 8. Use the provided screws in the package to connect the controller to a display and mount into cabinet doors as shown below.

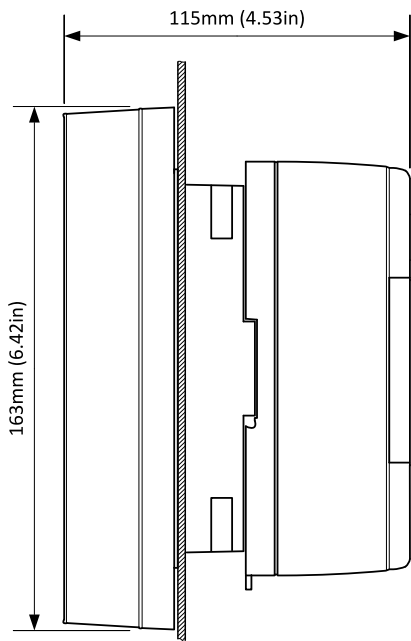


Table 4.1 Panel door mounting – IntelliVision 5

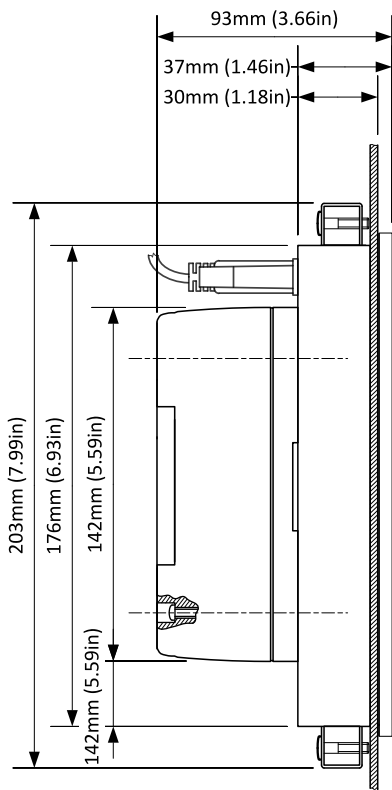


Image 4.3 Panel door mounting – IntelliVision 8

			
4	Left to right: Pull up Bias / 120 Ω / Pull down Bias		PWM VoutR VOut For more information see Speed governors interfaces on page 913

4.3.2 Terminals, Inputs and Outputs

Function	Terminals	Note
Generator voltage	L1,L2,L3, (N)	3x120 / 277 Ph-N or 207 / 480 Ph-Ph VAC (neutral not needed), max 350 / 600 VAC, CAT III ¹
Mains/Bus voltage	L1,L2,L3, (N)	3x120 / 277 Ph-N or 207 / 480 Ph-Ph VAC (neutral not needed), max 350 / 600 VAC, CAT III
Generator current	L1k,L1l, L2k,L2l, L3k,L3l	0 ÷ 5 Amps, max 10 A all time, 150 A for 1 sec 0 ÷ 1 Amp, max 2 Amps all time
Neutral/Mains current	LNk,LNI	0 ÷ 5 Amps, max 10 A all time, 150 A for 1 sec 0 ÷ 1 Amp, max 2 Amps all time
IG-AVRi interface	AVRI-OUT, AVRI-COM	TTL (5V PWM) interface to IG-AVRi
Power supply	+ , -	8 ÷ 36 VDC
D+		D plus
Inputs and outputs		
Binary inputs	BI1 ÷ BI6 BI7 ÷ BI16	Activation to minus power supply
Binary outputs	BO1 ÷ BO8 BO9 ÷ BO16	Load is connected to plus power supply (defined in GenConfig)
Analog inputs	AI1 ÷ AI4	Ω , mA, Volts sensors
Analog outputs	SG-OUT, SG-COM AOUT+, AOUT-COM	Speed governor output interface (± 10 V / 5 V PWM; 500 – 3000 Hz); Configurable analog output, mA, V
RPM	RPM-IN, RPM-COM	Min 2 Vpk-pk (from 4 Hz to 4 kHz)
Communication interface		
RS232(1)	D SUB9 (male)	PC: IntelliMonitor, GenConfig or Modem, GSM modem or ECU (e.g. Cummins Modbus) or IV 8
RS485 (Display) ²	A, B, COM	Up to 3 IV 8 displays (remote display) or 3 IV 5
RS485 (2) ²	A ,B ,COM	Redirected RS232(2) – see Basic settings: RS485(2)conv. PC: IntelliMonitor, GenConfig or Modem, GSM modem or IV 8
USB Electrical	2.0 slave	PC: IntelliMonitor, GenConfig

¹IG-MTU or IG-MTU-2-1 can be used for three wire systems, systems with separated Neutral or when galvanic separation between generator or mains voltage and controller is required.

²When more devices connected to RS485 bias resistor jumpers should be closed only on one of them.

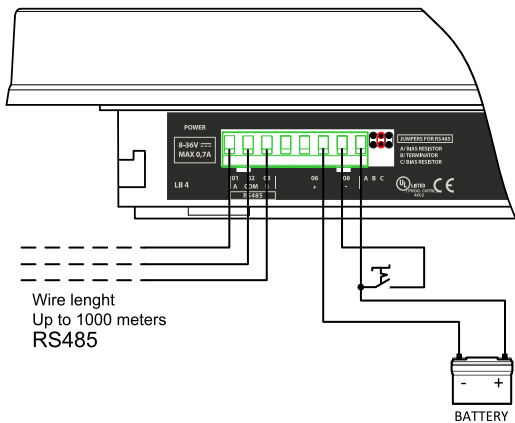
Function	Terminals	Note
isolated		
CAN1	L, H, COM	Extension modules
CAN2	L, H, COM	Intercontroller (Load&VAR sharing, Power management), monitoring (IG-IB, I-LB+) and up to 4 IV 8
RJ45 (Ethernet)	Ethernet cable	Remote monitoring via Ethernet, IntelliMonitor, WebSupervisor etc...

4.4 Display interface

4.4.1 IntelliVision 5 Wiring	39
4.4.2 IntelliVision 8 Wiring	40
4.4.3 IntelliVision 12Touch Wiring	41

4.4.1 IntelliVision 5 Wiring

General guidelines



IntelliVision 5 connections

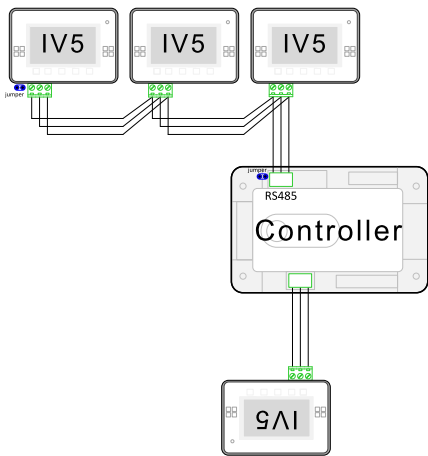
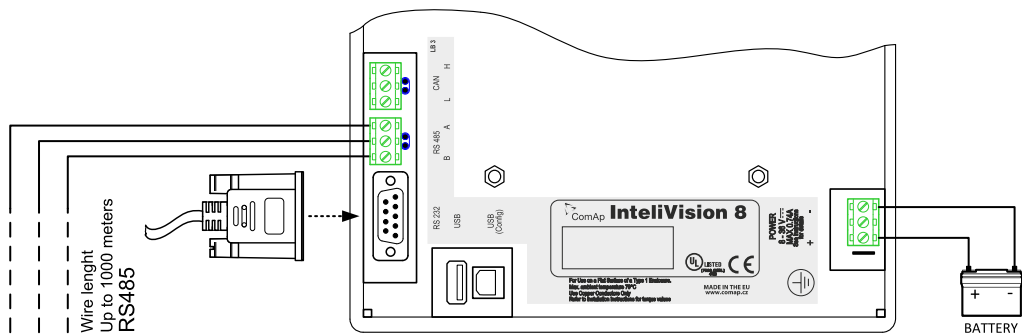


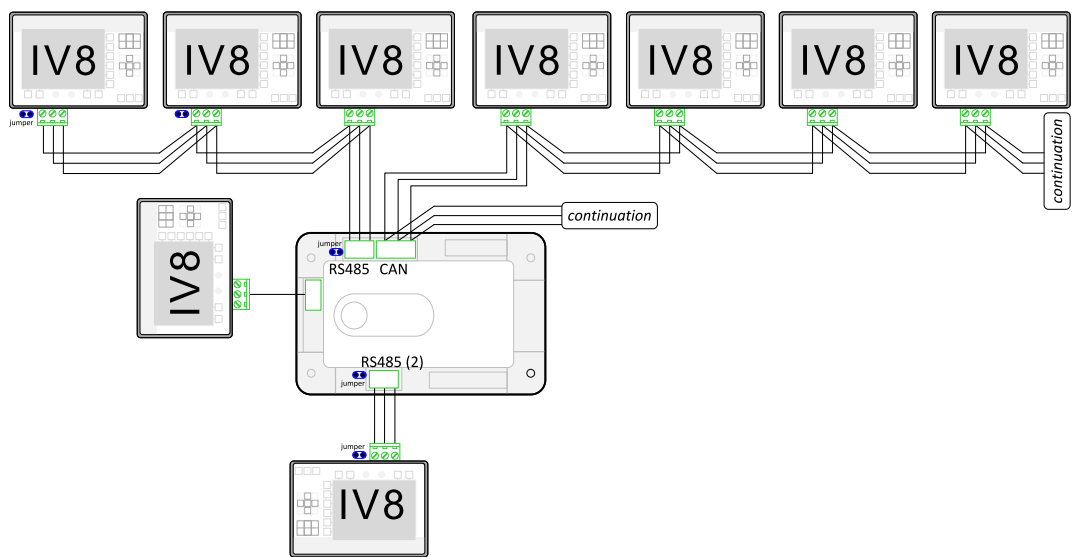
Image 4.5 Connection to IntelliSys Gas

4.4.2 IntelliVision 8 Wiring

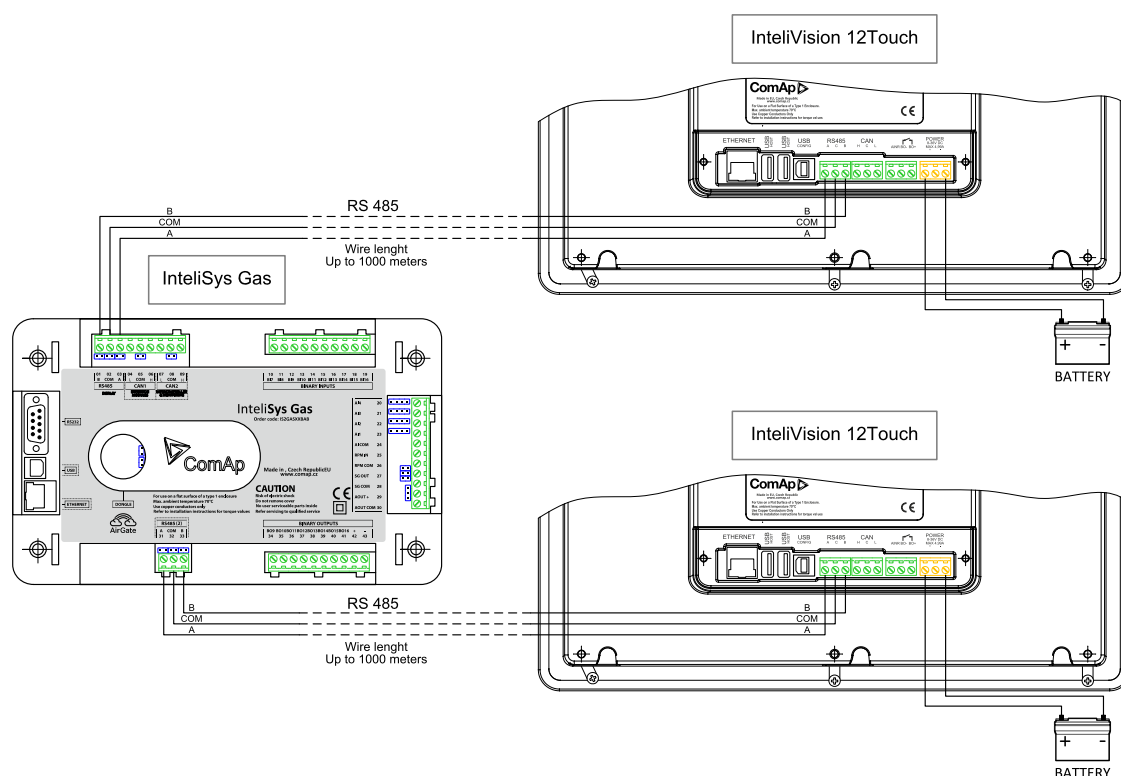
General guidelines



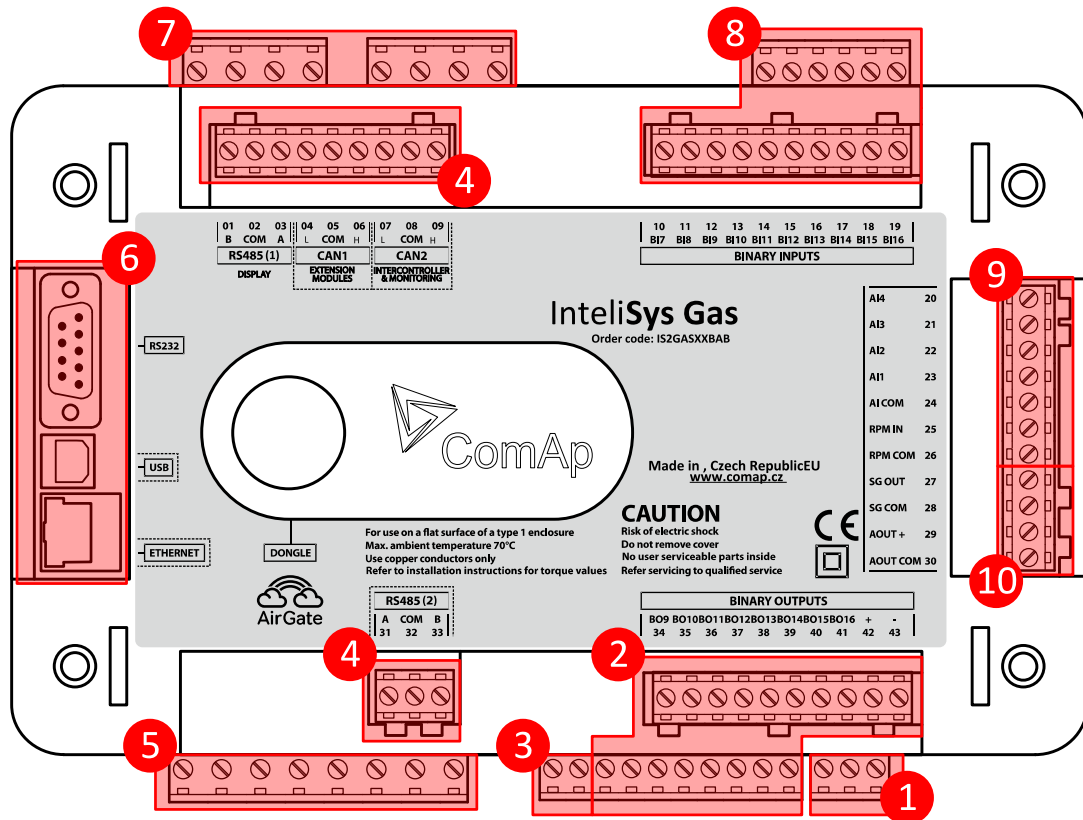
IntelliVision 8 connections



4.4.3 IntelliVision 12Touch Wiring



4.5 Recommended wiring



1	Power supply	Power supply (page 43)
2	Binary outputs	Binary Outputs wiring (page 51) Binary Outputs protections (page 52)
3	AVRi	ComAp AVRi connection (page 53)
4	CAN and RS485	CAN bus and RS485 wiring (page 57) Extension modules (page 931)
5	Current inputs	Current measurement wiring (page 47)
6	Communications	Display interface (page 39)
7	Voltage inputs	Voltage measurement wiring (page 45)
8	Binary inputs	Binary Inputs wiring (page 50)
9	Analog inputs	Analog Inputs wiring (page 55) Magnetic pick-up (page 59)
10	Analog outputs	Analog Outputs wiring (page 56)

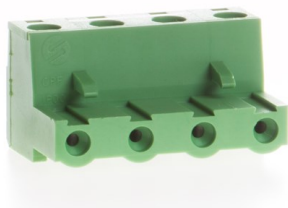
4.5.1 General

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(Bus) Voltage, Generator Voltage and Current terminals



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

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

For more info .

For other controller field wiring terminals



Specified tightening torque 0.79 nm (7.0 In-lb)

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



Use copper conductors only

4.5.2 Grounding

The shortest possible piece of wire should be used for controller grounding. Use cable min. 2.5 mm². A brass M4 x 10 screw with star washer securing ring type grounding terminal shall be used.

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

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

4.5.3 Power supply

To ensure proper function:

- Use power supply cable min. 2.5 mm²
- Use fuse
 - 2 A for IntelliSys Gas
- Maximal continuous DC power supply voltage is 36 VDC

IMPORTANT: Switchboard lightning strikes protection according standard regulation is expected. The maximum allowable current through the controller negative terminal is 3 to 8 A (depends on the controller type and binary output load).

Power supply fusing

Always use according fuse (1 A or 2 A) when connection controller, extension modules or relays to a power source.

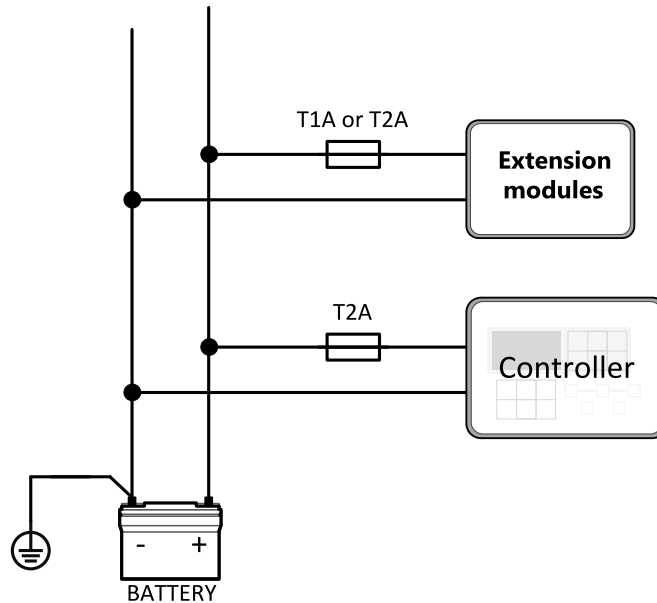
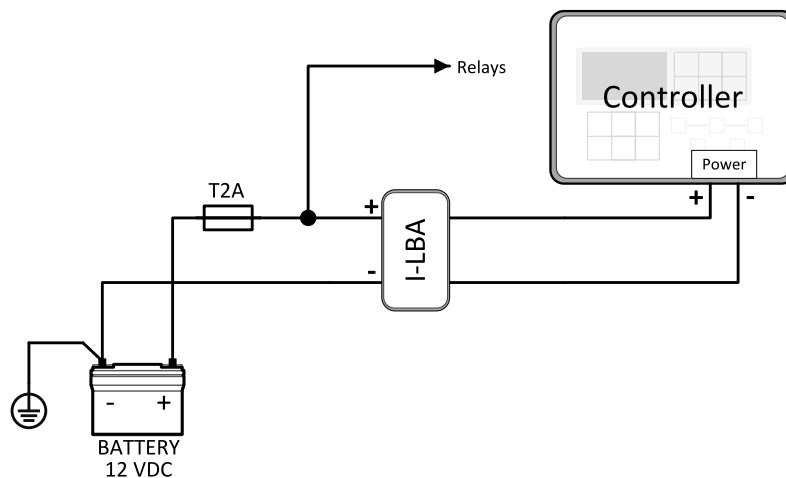


Image 4.6 Diagram for proper fusing

For more extension units use separate fusing according to the table above.

Controller power supply should never be connected to starter terminals.

For the connections with 12 VDC power supply an I-LBA module can be connected to controller power terminals in order to allow the controller to continue operation during cranking if the battery voltage dip occurs. I-LBA module can not be connected on +PWR BOUT outputs on the controller, because their consumption would exhaust I-LBA capacitors very fast.



4.5.4 Measurement

Voltage measurement wiring

Use 1.5 mm² cables for voltage connection and 2.5 mm² for current transformers connection.

Adjust nominal voltage, nominal current, CT ratio and PT ratio 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.

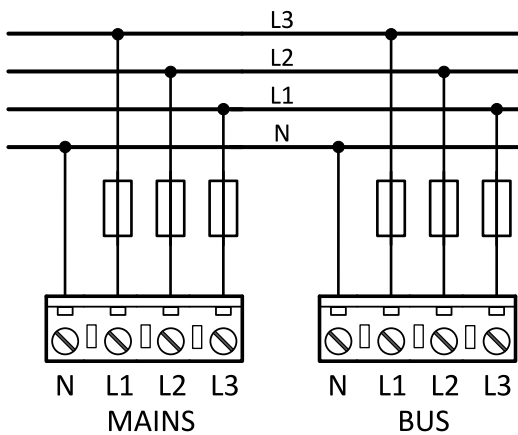


Image 4.7 Voltage measurement wiring

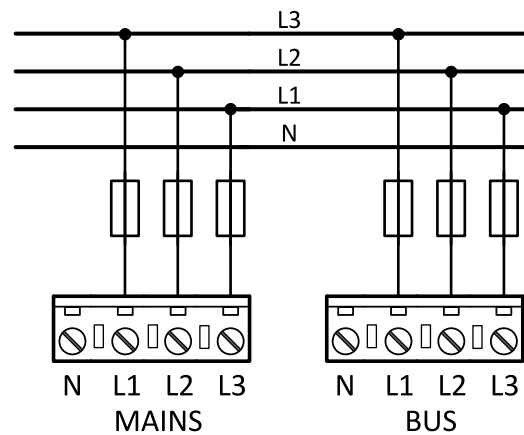


Image 4.8 Voltage measurement wiring

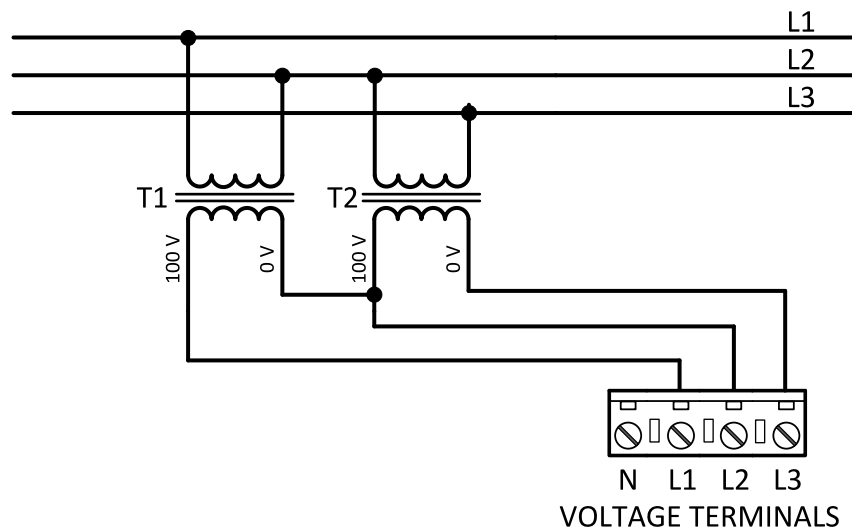


Image 4.9 Principle of two transformers measuring

Note: It is recommended to use T1A fuses for controller voltage measurement circuits protection.

IG-MTU

For optional separation of Mains/Bus and generator voltage from the controller (e.g. on ships) use IG-MTU. Connect one or two IG-MTU units to separate generator and Mains/Bus voltage from controller.

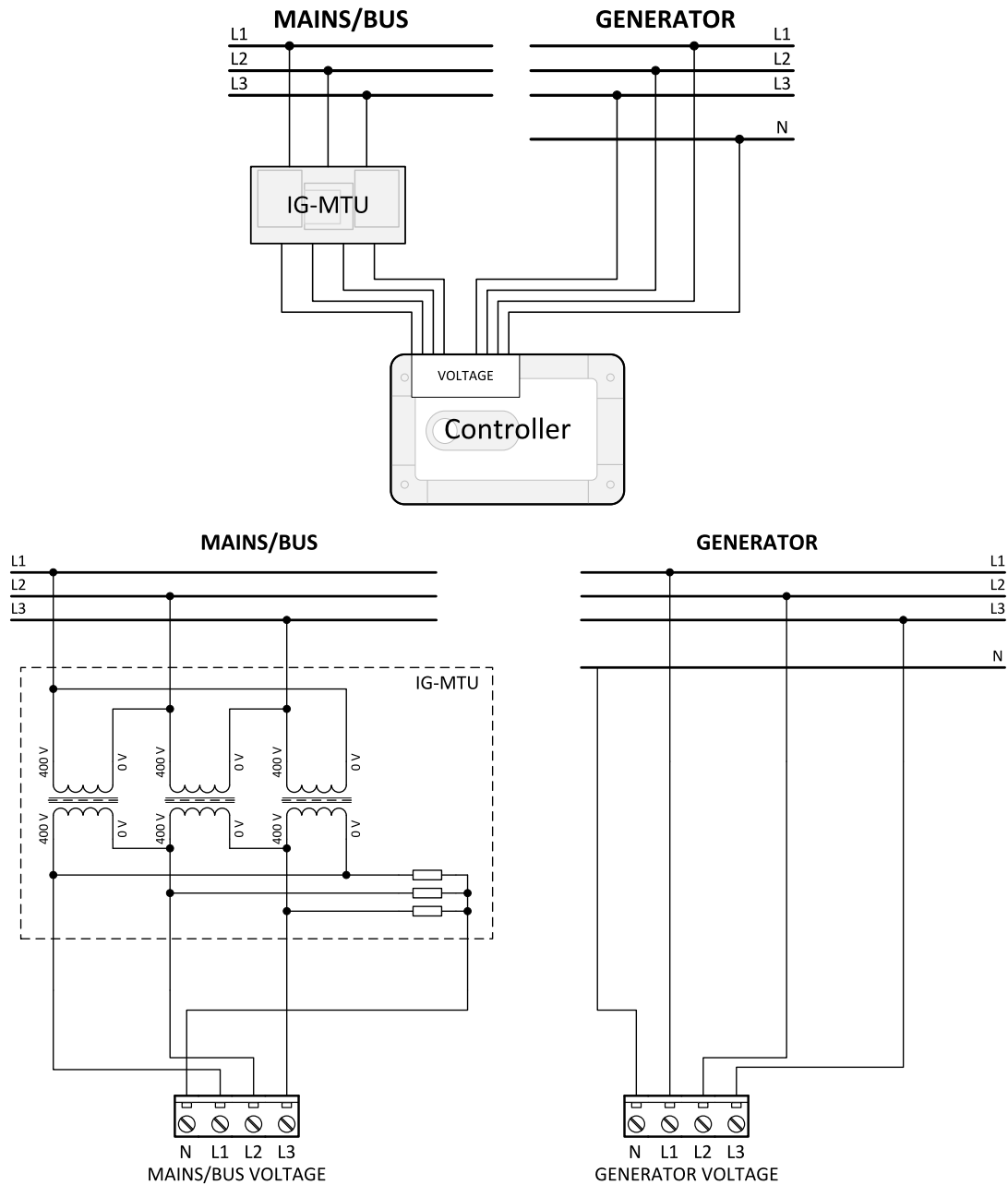


Image 4.10 Three wire mains

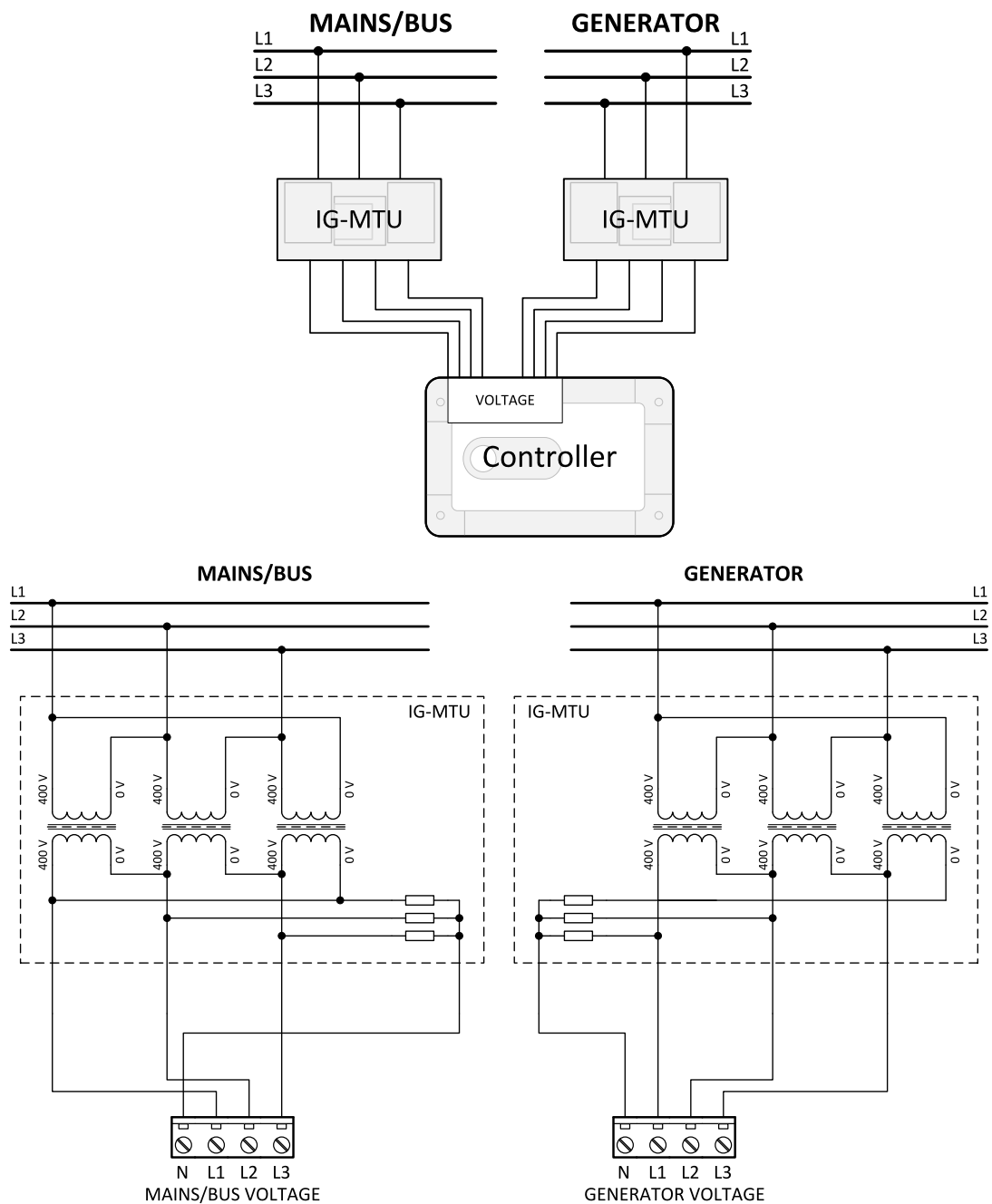


Image 4.11 Three wire mains and three wire Gen-set or electric separation

Current measurement wiring

Check measurement connections carefully. Failure is possible if phases are connected in wrong order (WrongPhSequence detected by the controller) but this is not detected if the phases are just rotated (i.e. instead of phase sequence L1, L2, L3, phase sequence is e.g. L2, L3, L1).

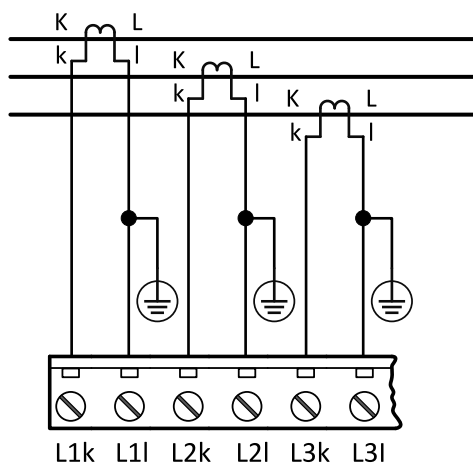


Image 4.12 Current measurement wiring

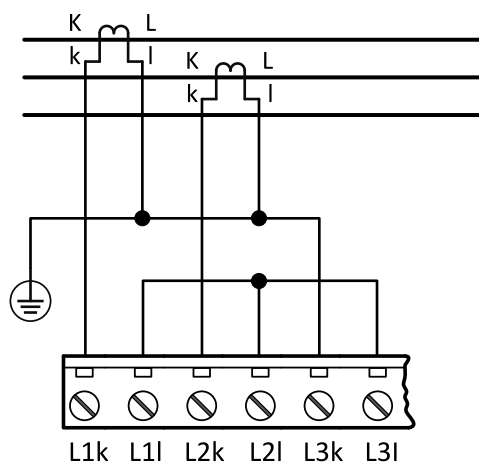


Image 4.13 Current measurement wiring

IMPORTANT: Check measurement connections carefully! Failure is possible if phases are connected in wrong order (WrongPh Sequence detected by the controller) but this is not detected if the phases are just rotated (i.e. instead of phase sequence L1, L2, L3, phase sequence is e.g. L2, L3, L1).

Mains power and PF measuring (e.g. SPtM application)

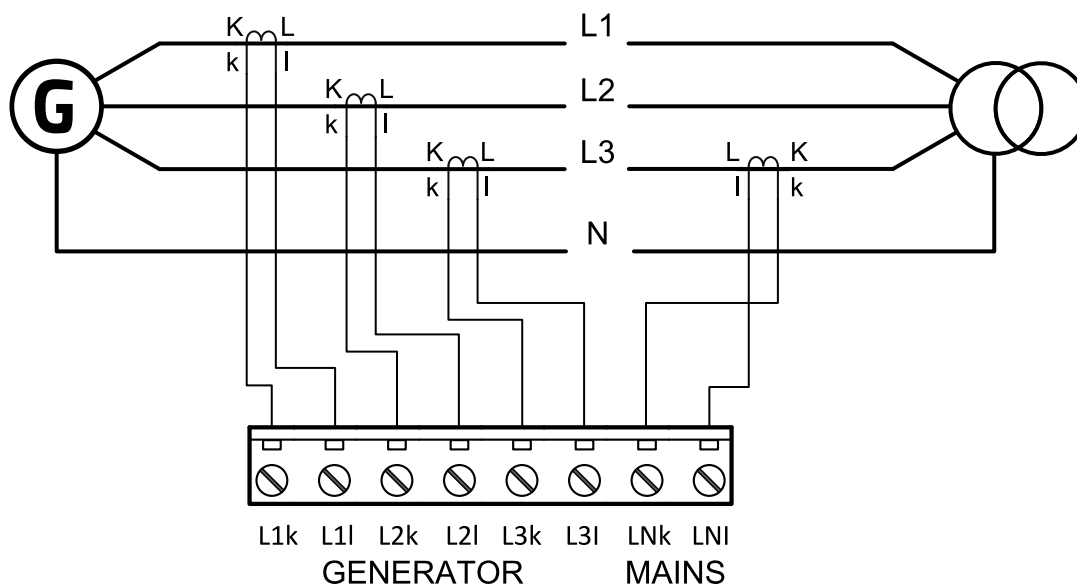
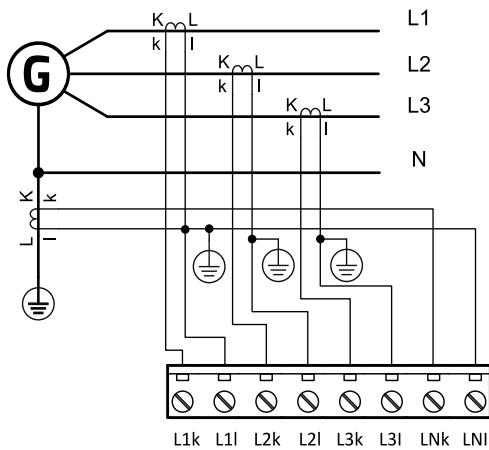


Image 4.14 Mains power and PF measuring (e.g. SPtM application)

Earth fault protection (e.g. MINT application)

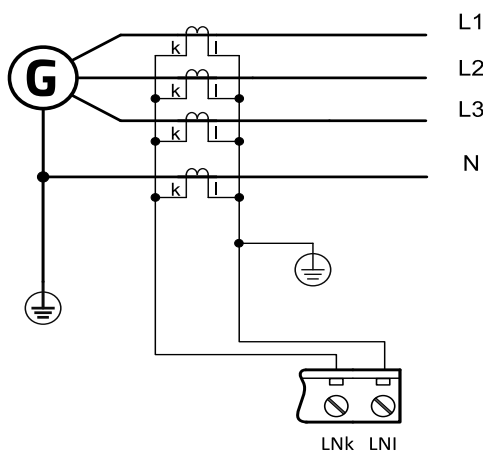
Earth fault current protection is active only when Process control: IE measurement = ANALOG INPUT or NONE.

Connect separate current transformer to Gen-set neutral. Adjust EarthFltCurrCT in Basic settings and EarthFaultCurr and EthFltCurr del limits in Generator protection group.



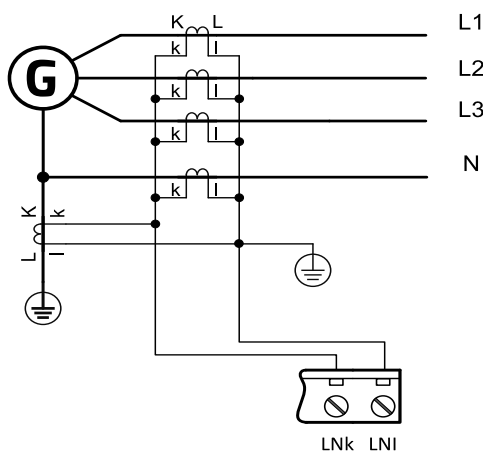
The simplest arrangement covers all zones from the generator windings to the final circuits in the load network.

Image 4.15 Simplest arrangement of earth fault protection



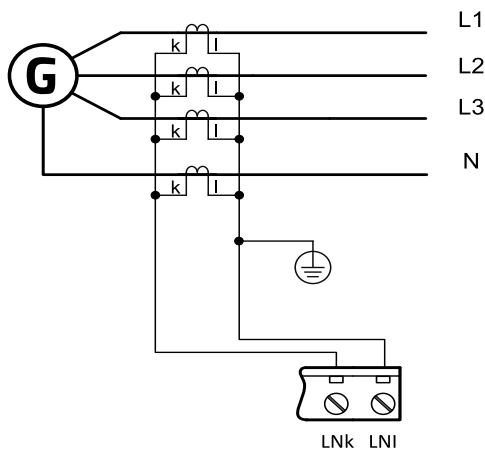
This arrangement covers earth faults in the load network only.

Image 4.16 Arrangement covering earth faults in the load network only



This arrangement necessary for restricted earth fault protection. The location of the neutral earthing point in relation to the protection current transformers in the neutral conductor determines whether four or five current transformers are employed.

Image 4.17 Arrangement for restricted earth protection



This arrangement necessary for restricted earth fault protection. The location of the neutral earthing point in relation to the protection current transformers in the neutral conductor determines whether four or five current transformers are employed.

Image 4.18 Arrangement for restricted earth protection

4.5.5 Binary Inputs wiring

Use min. **1 mm²** cables for wiring of binary inputs.

The name and function or alarm type for each binary input have to be assigned during the configuration. Binary inputs may be used in built-in PLC as well. Please refer to the manual of GenConfig for more information

It is recommended to use separation diodes when multiple binary input terminals are connected together to prevent unwanted activation of binary input when one of the controllers is switched off.

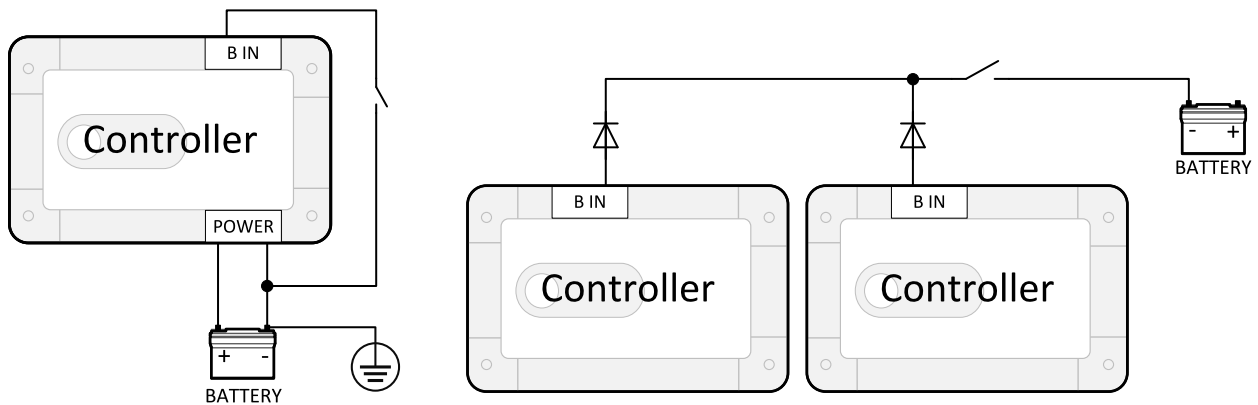


Image 4.19 Binary inputs wiring

4.5.6 Binary Outputs wiring

Controller with High-Side, Low-Side Switch

It is possible to use binary outputs as low side switch or high side switch in BaseBox type of controller. For correct wiring in both cases please refer to the following diagrams.

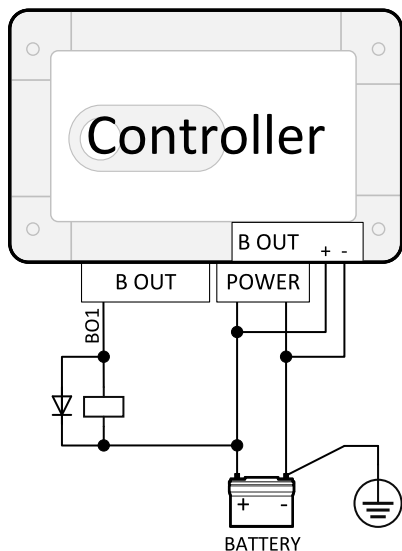


Image 4.20 Low side switch

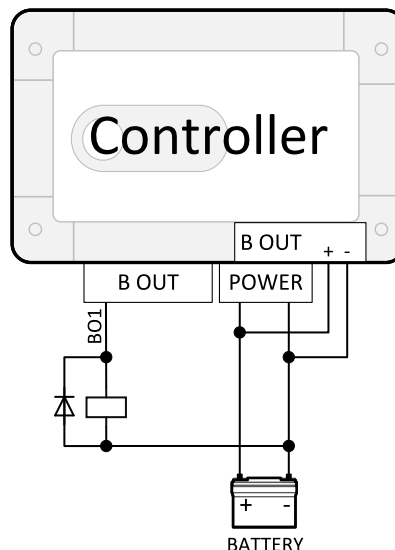
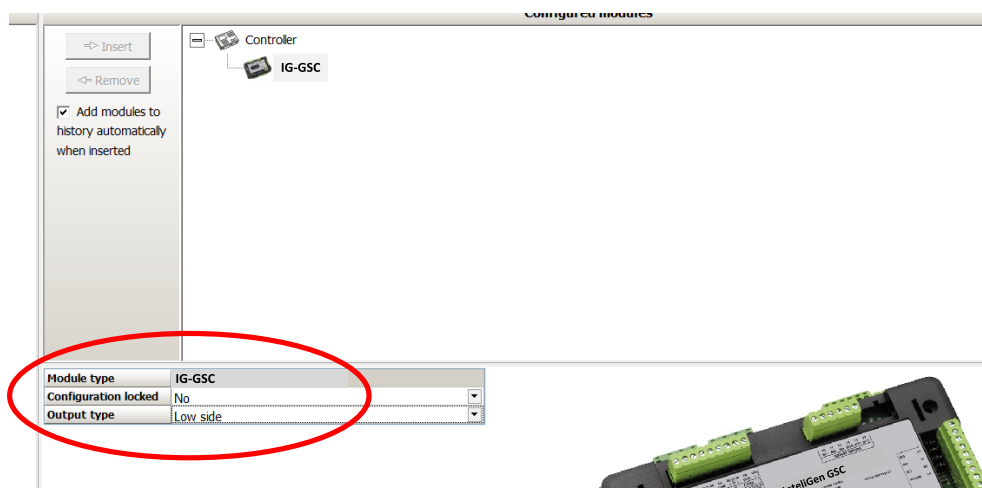


Image 4.21 High side switch

IMPORTANT: Both power supply sockets for binary outputs need to be connected to ensure proper function of binary outputs.

Never use DC relays without protection diodes!

Low side or High side function of binary outputs can be chosen in configuration tool GenConfig in Modules tab. This configuration is used for all binary inputs available on the controller.



Every group of outputs (i.e. 1..8 and 9..16 or 1..6 and 7..12) can provide steady current of up to 2 A. Every single binary output can provide up to 0.5 A of steady current unless the total current of group of outputs does not exceed 2 A.

IMPORTANT: Both "+" and "-" terminals (power supply for lower part of the controller and for higher part) on the controller need to be connected at all times to ensure the proper function of Binary Outputs 9 to 12 (16).

Binary Outputs protections

Controller inputs and outputs terminals are protected against transient disturbance. Protection capability is limited. Relays in application could be disturbed. Relay K1 is close to controller and than it should be disturbed minimally.

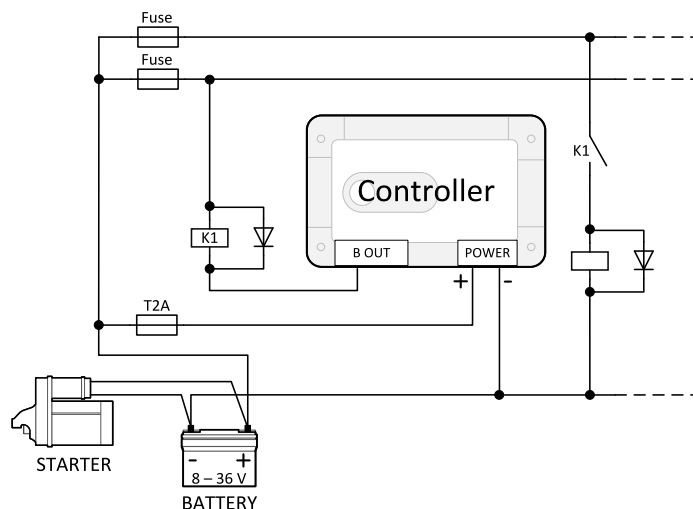


Image 4.22 Example of controller protection

IMPORTANT: Never use DC relays without protection diodes. Use protection diodes at all relays in the switchboard even if they are not connected directly to controller Binary outputs.

4.5.7 Examples of BI and BO wiring

Binary Outputs wiring with I-RB16

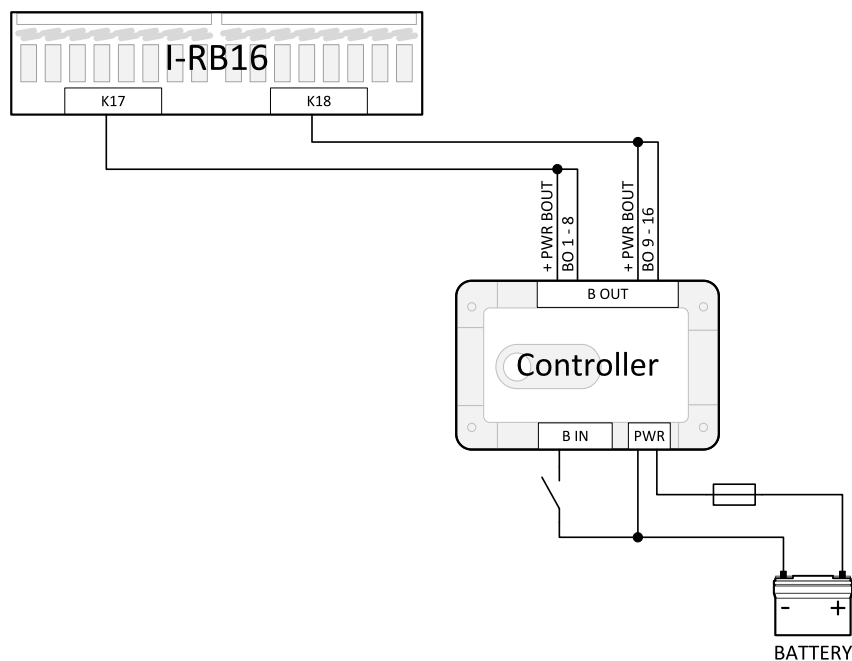


Image 4.23 Binary outputs wiring with I-RB16

Binary Inputs and Outputs wiring

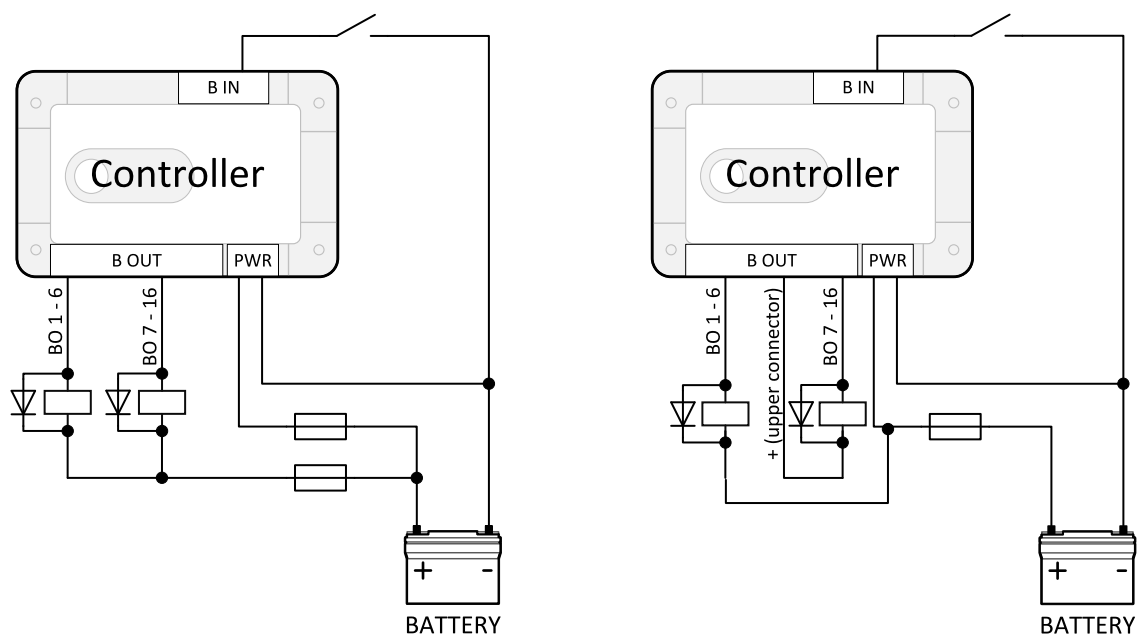


Image 4.24 Binary outputs and inputs wiring examples

4.5.8 ComAp AVRi connection

This is general diagram of how ComAp external module IG-AVRi is connected to IntelliSys Gas. For the connection of individual AVRis **see AVR interfaces on page 902**.

You can get more technical information on IG-AVRi and IG-AVRi TRANS.

You can get more information on AVRi and Speed governor settings in the controller in the chapter **Speed Governor and AVR general settings (page 205)**.

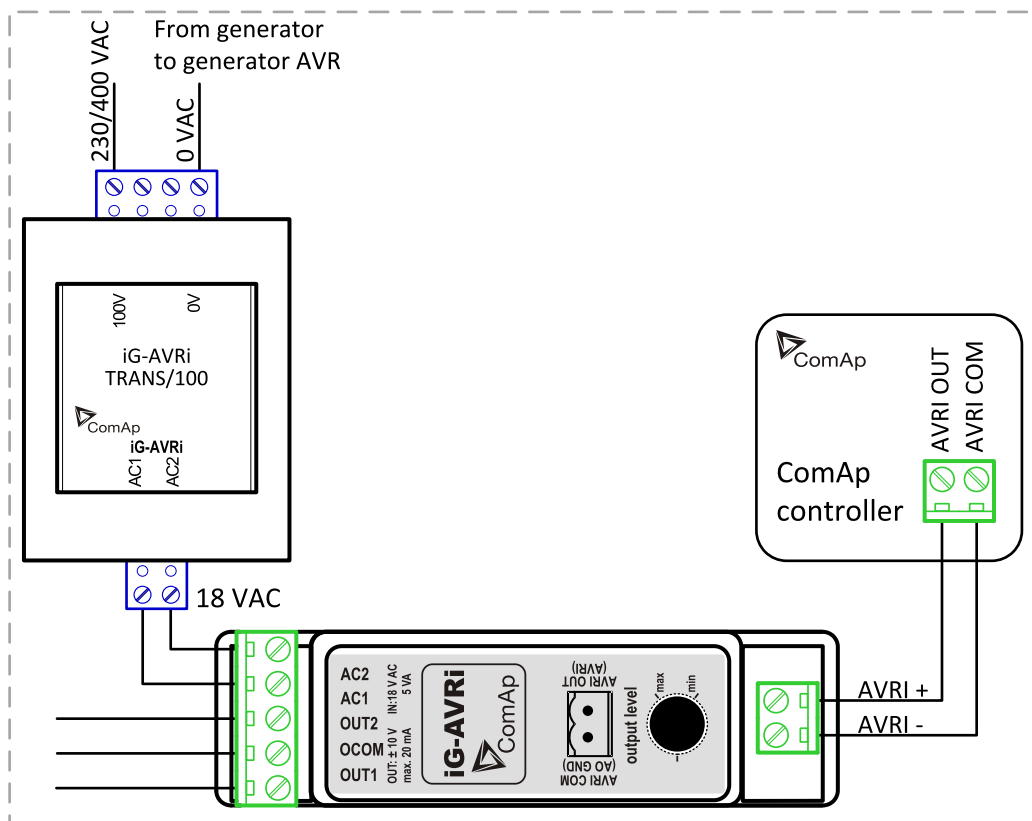


Image 4.25 ComAp AVRi connection IG-AVRi and IG-AVRi TRANS

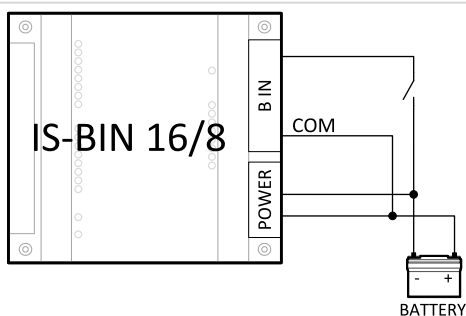
IMPORTANT: Read carefully specific AVRi instructions before connecting to controller!

4.5.9 Binary I/O on IS-BIN16/8

Binary inputs on IS-BIN16/8

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.

A 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.

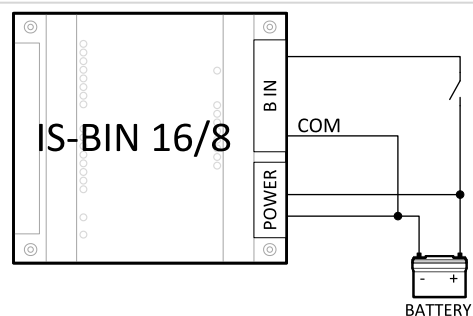


Image 4.26 Binary inputs on IS-BIN 16/8

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.

Binary outputs on IS-BIN16/8

IS-BIN16/8 binary outputs are galvanically separated from IS-BIN16/8 power supply. It is necessary to connect plus 24 VDC (power supply) to IS-BIN16/8 terminal according to following drawing.

The maximum load values are 0.5 A / 36 V for one output.

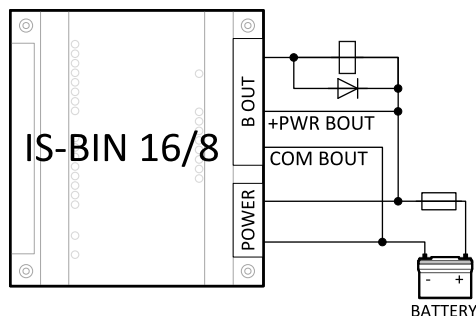


Image 4.27 Binary outputs on IS-BIN 16/8

4.5.10 Analog Inputs wiring

Note: For more information on technical data regarding supply, inputs, outputs and jumper setting of Analog inputs please refer to the section **Terminals, Jumpers and I/O overview (page 37)**.

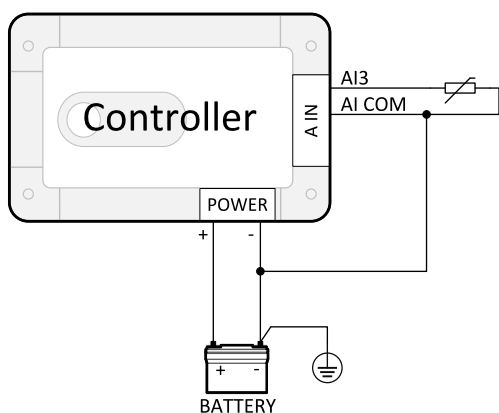


Image 4.28 Resistive sensor on Analog input 3

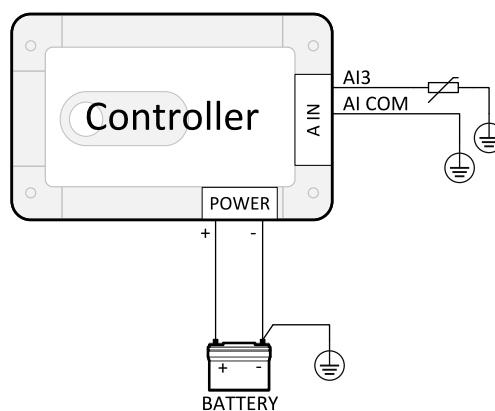


Image 4.29 Resistive sensor with grounding on Analog input 3

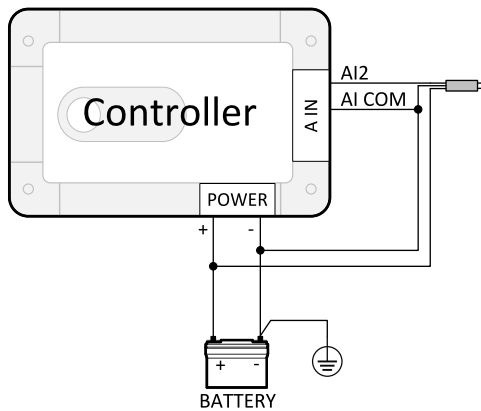


Image 4.30 Active Current sensor on Analog input 2

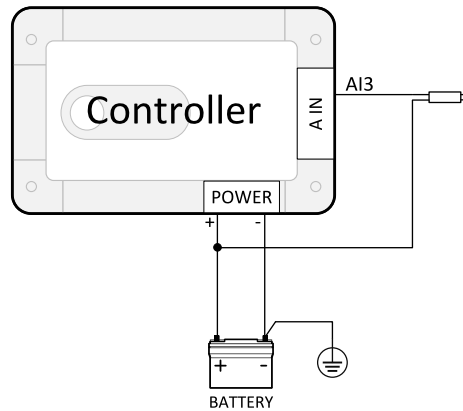


Image 4.31 Passive Current sensor on Analog input 3

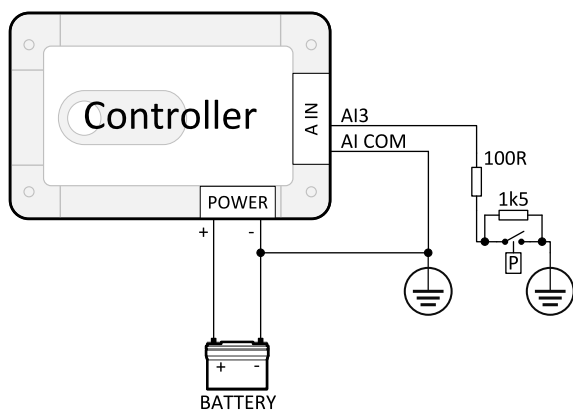


Image 4.32 Tristate sensor

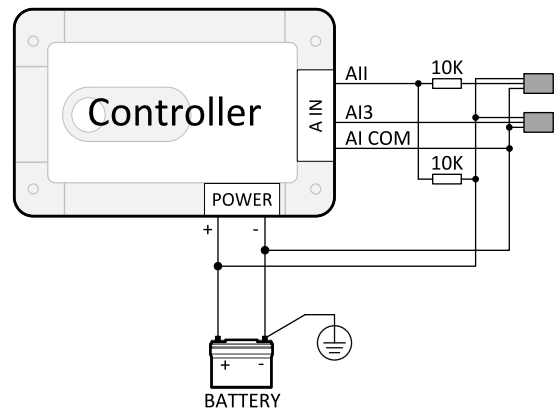


Image 4.33 Voltage sensors on Analog input 1 and 3

Tristate sensor (binary sensor with fail detection) on Analog input 3

- > **Below 750 Ω** = Inactive
- > **Between 750 Ω and 2400 Ω** = Active
- > **Below 10 Ω or Over 2400 Ω** = sensor failure (wire shorted or interrupted)

4.5.11 Analog Outputs wiring

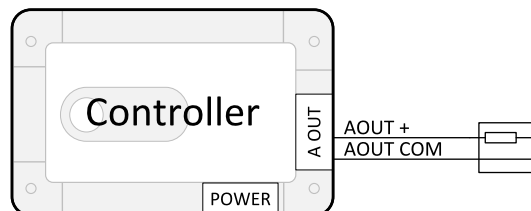


Image 4.34 Analog outputs wiring

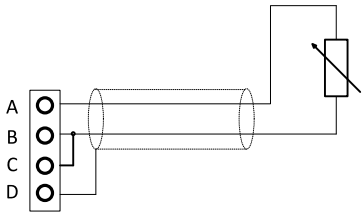
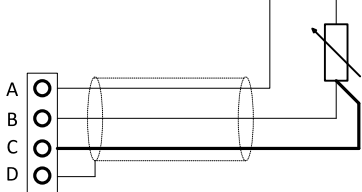
4.5.12 Analog Inputs on IS-AIN8

IS-AIN8 extension module analog inputs can be configured to

- > Resistor two wire input
- > Resistor three wire input

- > Current input
- > Thermocouple input
- > Voltage input

Select sensor characteristic from the list or define user sensor characteristic in PC configuration tool.

	<p>Resistor sensor input – two wire connection. Range 0 to 2400 Ω. Pt100, Pt1000, Ni100, Ni1000 D terminal is shielding</p>
	<p>Resistor sensor input – three wire connection. Range 0 to 2400 Ω. Pt100, Pt1000, Ni100, Ni1000 – recommended. D terminal is shielding</p>

4.5.13 CAN bus and RS485

CAN bus Tx, Rx LED indication

Tx and Rx LED is connected directly to Tx and Rx signal.

Status	Tx	Rx
Communication is OK	Fast flashing – data transfer	
CAN bus is interrupted	Continuous light	Continuous light
Short connection H – L	Fine flashing	Dark
Short connection L – COM	Dark	Dark
Short connection H – COM	Fine flashing	Dark
Wrong connection H – H, L – L	Synchro flashing	

CAN bus and RS485 wiring

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

- > The maximum length of the CAN bus depends on the communication speed. For a speed of 250 kbps, which is used on the CAN1 bus (extension modules, ECU) and CAN2 bus if it is switched to 32C mode, the maximum length is 200 m. If the CAN2 bus is switched to 8C mode the speed is 50 kbps and the maximum length is 800 m.
- > The maximum length of the RS485 bus is 1000 m
- > The bus (CAN and RS485) must be wired in linear form with termination resistors at both ends. No nodes are allowed except on the controller terminals.

Note: A termination resistors at the CAN and RS485 are already implemented on the PCB. For connecting, close the jumper near the appropriate CAN or RS485 terminal.

Use a cable with these 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 (@1 MHz)	≤ 2 dB / 100 m

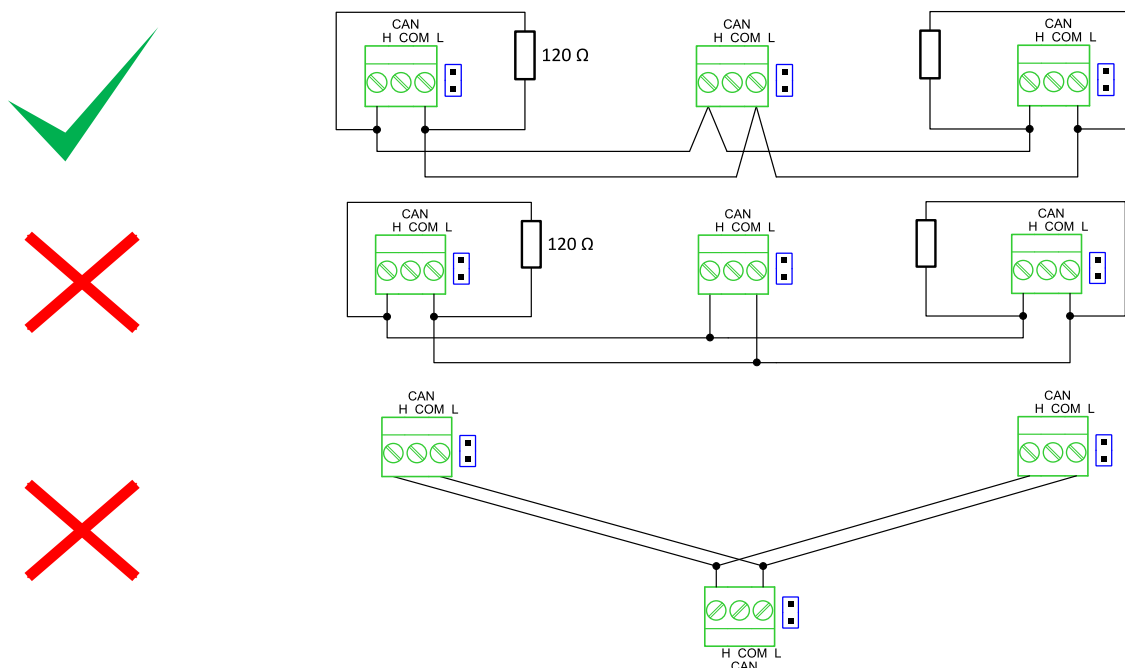


Image 4.35 CAN bus and RS485 topology

Note: See the website www.can-cia.org for information about the CAN bus, specifications etc.

Wiring examples

1. For shorter distances (all network components within one room) – picture 1
interconnect A and B; shielding connect to PE on controller side
2. For longer distances (connection between rooms within one building) – picture 2
interconnect A, B, COM; shielding connect to PE at one point
3. In case of surge hazard (connection out of building in case of storm etc.) – picture 3

We recommend using the following protections:

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

Recommended data cables: BELDEN (www.belden.com)

1. For shorter distances: 3105A Paired – EIA Industrial RS-485 PLTC/CM (1x2 conductors)
2. For shorter distances: 3105A Paired – EIA Industrial RS-485 PLTC/CM (1x2 conductors)
3. In case of surge hazard: 3106A Paired – EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

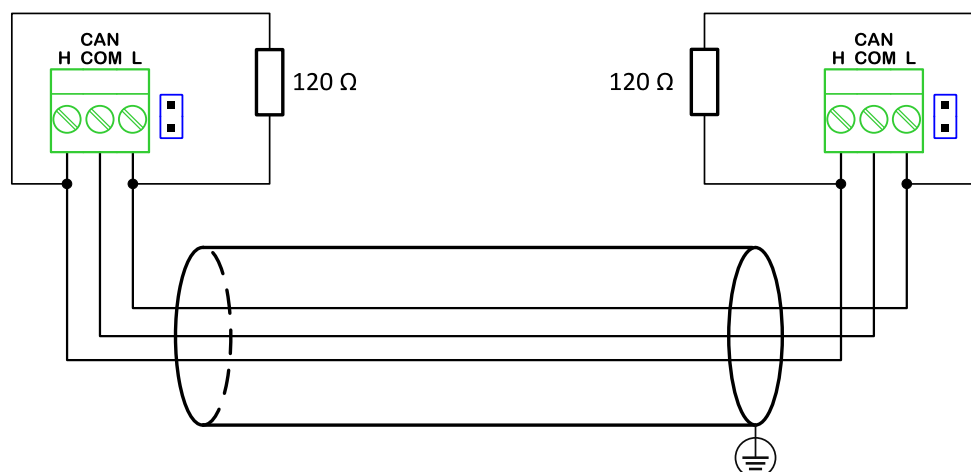


Image 4.36 CAN wiring – shorter distances (all network components within one room)

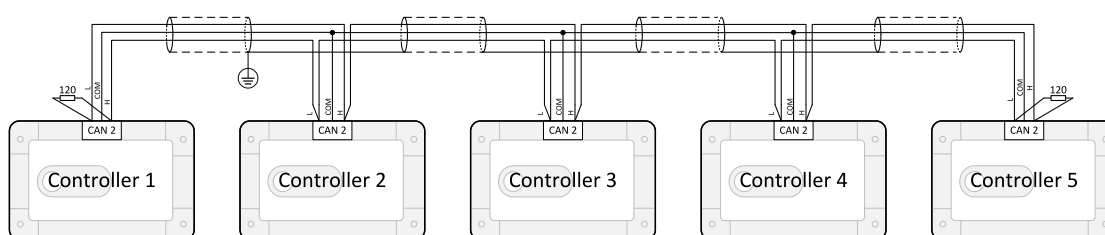


Image 4.37 CAN wiring – longer distances (connection between rooms within one building)

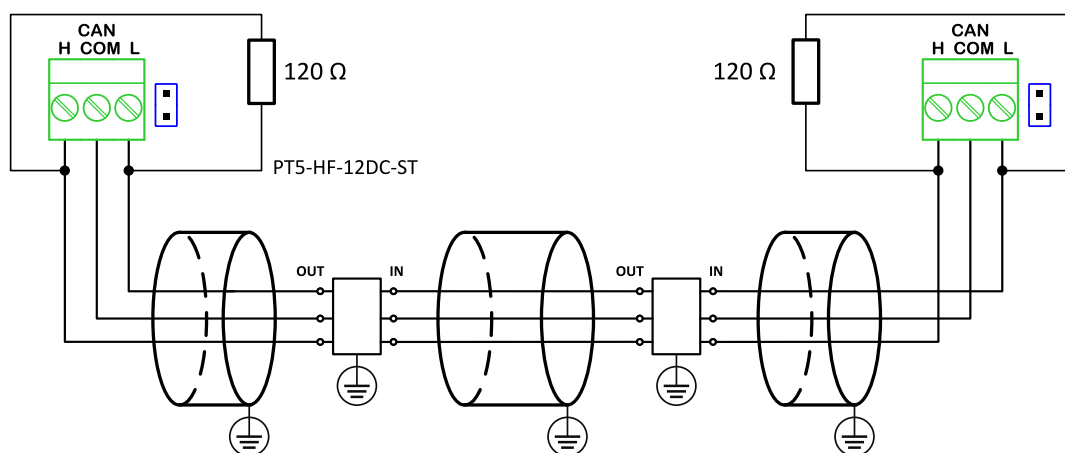


Image 4.38 CAN wiring – surge hazard (connection out of the building in case of storm etc.)

4.5.14 Magnetic pick-up

To ensure proper function:

Use a shielded cable.

Take care to interference signal when one common speed pick-up is used for both Speed governor and Controller. When some problems occur:

- Check grounding connection from pick-up to controllers, disconnect ground connection to one of them.
- Galvanically separate Controller RPM input using ComAp separation transformer RPM-ISO (1:1).
- Use separate pick-up for Speed governor and Controller.

Controller indicates "Sd Underspeed" + "Pickup fault" after engine start when the pickup signal is good for start and low speed but too strong for higher speed (loss of signal due to RPM input saturation).

Increase gap between pickup and engine flywheel or change pickup type.

If RPM is measured from the generator voltage (Gear teeth = 0), controller can detect RPM on no running gen-set when:

- Controller generator voltage terminals are opened (e.g. due to opening of fuse switch)
- Non zero RPM causes controller "Not ready" state and engine start is blocked

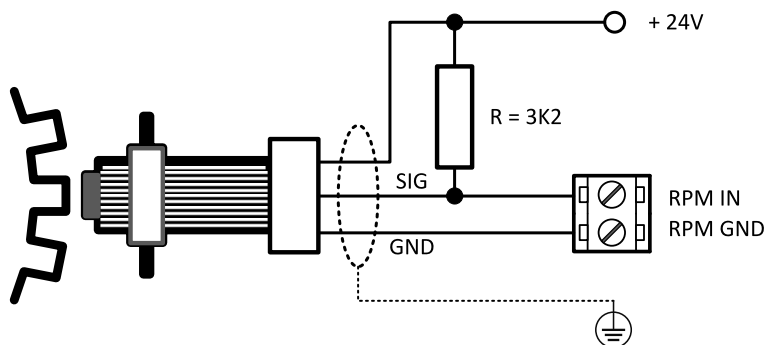


Image 4.39 Active NPN pick-up sensor recommended connection

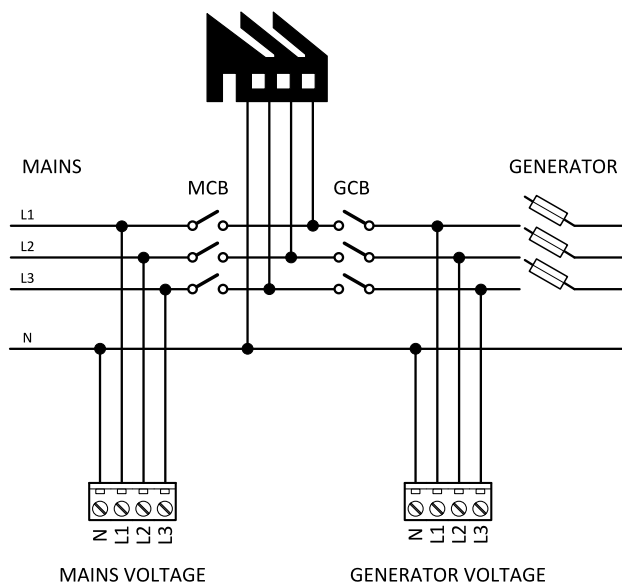


Image 4.40 Magnetic pick-up wiring

[back to Installation and wiring](#)

5 Controller setup

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5.1 Operator Guide

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5.1.1 IntelliVision 5

IntelliVision 5, industrial operator panel equipped with 5.7" color screen, is dedicated together with the main ComAp controller to visualize and control single Gen-set in various applications.

- 5.7" Color TFT Display with resolution 320 × 240 pixels
- Local and Remote display for single controller monitoring
- Plug and play operation (auto configuration based on controller application)
- Direct connection to the controller
- Simple, fast and intuitive control
- Easy drag and drop screen configuration in graphical editor
- Five active buttons – fast access to important data
- Configurable active buttons
- Support of Tiers 4 icons
- Mounting screw available at the rear face of IntelliVision 5 to mount a compatible controller
- Same language support as the controller including graphic languages
- Communication connection via RS485 (galvanically separated)
- Same cut out as IntelliGen-NT
- Operating temperature: -30 °C to +70 °C (-40 °C to +70 °C if the device is powered on above -30 °C).
- Face is sealed to IP65
- EMC, climatic and mechanical tests
- CE, UL certification

Supported controllers

IntelliGen GSC	IG2GSCXXBAB
IntelliGen GSC-C	IG2GSCCXBAB
IntelliSys GSC-C	IS2GSCCXBAB
IntelliSys GAS	IS2GASXXBAB

InteliGen ^{NT} BaseBox	IG-NT-BB
InteliGen ^{NTC} BaseBox	IG-NTC-BB
InteliSys ^{NTC} BaseBox	IS-NTC-BB
InteliMains ^{NTC} BaseBox	IM-NT-BB
InteliSys ^{NTC} Hybrid	IS-NTC HYBRID

Note: It is recommended to upgrade both display unit and controller firmware to the newest version in order to fully utilize features of ScreenEditor within GenConfig. For more information please see the New Feature List.

Note: For more information refer to [InteliVision 5 Global Guide](#).

5.1.2 InteliVision 8

InteliVision 8, industrial operator panel equipped with 8" color screen, is dedicated together with the main ComAp controller to visualize and control single gen-set in various applications.

- 8" color TFT display with resolution of 800 × 600 px
- PLUG and PLAY operation (auto configuration based on controller application)
- Complete access to all control and monitoring functions
- More information in less time
- Fast and intuitive navigation
- TRENDS monitoring screen
- USB flash disk file storage (export/import trends, history, archive of controller and InteliVision 8 firmware to USB stick)
- Quick auto login with USB stick
- User's picture import
- Easy Drag and Drop screen configuration in graphical editor
- ADAPTIVE and COLOR alarm list
- Configurable soft keys buttons:
- Fast skip to any screen
- Binary signal activation – S/R button / toggle button / pulse generator
- Association to various Gen-set commands
- Large History screen
- Support of Tier 4 Final icons
- Communication connection via of RS232/485 and CAN bus
- Same cut profile as IS-Display (simple replacement of monochrome displays)
- Mounting screw available at the rear face of InteliVision 8 to mount a compatible controller
- Direct connection to the controller (converters are not needed)
- Designed to be mounted in both monitoring and engine room
- Windows CE operating system
- Operating temperature: -20 to + 70 °C
- Face is sealed to IP65

- EMC, climatic and mechanical tests
- CE, UL, cUL certification

Supported controllers

InteliGen GSC	IG2GSCXXBAB
InteliGen GSC-C	IG2GSCCXBAB
InteliSys GSC-C	IS2GSCCXBAB
InteliGen ^{NT} BaseBox	IG-NT-BB
InteliGen ^{NTC} BaseBox	IG-NTC-BB
InteliSys ^{NTC} BaseBox	IS-NTC-BB
InteliMains ^{NTC} BaseBox	IM-NT-BB
InteliSys ^{NTC} Hybrid	IS-NTC HYBRID
InteliDrive DCU	ID2DCUINBAA , ID2DCUINBLA(LT)
InteliDrive DCU Marine	ID-DCU Marine
InteliDrive Mobile	ID-MOBILE
InteliDrive Mobile Logger	ID-MOBILE LOGGER

Note: It is recommended to upgrade both display unit and controller firmware to the newest version in order to fully utilize features of ScreenEditor within GenConfig. For more information please see the New Feature List.

Note: For more information refer to [InteliVision 8 Global Guide](#).

5.1.3 InteliVision 12Touch

InteliVision 12Touch, industrial operator panel equipped with 12.1" color, multi-touch screen, is dedicated together with the main ComAp controller to visualize and control single gen-set in various applications.

- 12.1" color, multi-touch screen, TFT display unit with resolution of 1280 × 800 pixels
- Touch based Graphical User Interface, support for multi-touch gestures
- Plug & Play operation (auto configuration based on controller application)
- Complete access to all control and monitoring functions
- Fast and intuitive navigation
- Extended trends monitoring screen
- USB flash disk file storage (export/import trends, history, archive of controller and InteliVision 12Touch firmware and others to USB stick)
- User's pictures import
- Adaptive alarm list
- Large History screen
- Adjustable setpoints help
- Multi-language support
- Communication connection via RS485, CAN or Ethernet
- Integrated easy to use mounting system
- Designed to be mounted in both monitoring and engine room
- Industrial and robust design

- Rugged housing manufactured from a single piece of aluminium alloy
- Chemically strengthened front glass (8 times as strong as normal glass)
- Sun-readable display (1000 cd/m2)
- Automatic brightness control
- Operating temperature: -30 to + 70 °C
- Face is sealed to IP65
- EMC, climatic and mechanical tests
- CE, UL and cUL certification

Supported controllers

InteliGen GSC	IG2GSCXXBAB
InteliGen GSC-C	IG2GSCCXBAB
InteliSys GSC-C	IS2GSCCXBAB
InteliGen ^{NT} BaseBox	IG-NT-BB
InteliGen ^{NTC} BaseBox	IG-NTC-BB
InteliSys GAS	IS2GASXXBAB
InteliSys ^{NTC} BaseBox	IS-NTC-BB
InteliSys ^{NTC} Hybrid	IS-NTC HYBRID
InteliMains ^{NTC} BaseBox	IM-NT-BB
InteliDrive Mobile (from SW version 2.6.0)	ID-MOBILE

Note: It is recommended to upgrade both display unit and controller firmware to the newest version in order to fully utilize features of ScreenEditor within GenConfig. For more information please see the New Feature List.

Note: For more information refer to [InteliVision12T Global Guide](#).

5.1.4 InteliVision 17Touch

InteliVision 17Touch is 17" Touchscreen display unit designed for complete monitoring and control of multiple controllers or co-generation installation.

HARDWARE FEATURES

- 17" touch SXGA (1280 × 1024) TFT LCD Display with LED backlight
- Intel Celeron 827E Processor, Fanless Cooling System
- IP-65 NEMA 4 Aluminium Die Cast Front Bezel
- Two easy access front USB ports
- Over and under voltage protection
- Polarity protection
- Extended temperature range from -20 up to 60 °C
- UL certified

SOFTWARE FEATURES

- InteliMonitor / IGS-LOG (included for free)
- Multiple controllers monitoring

- Mode change feature for any connected controller
- Start/Stop any connected Gen-set manually
- Control / Monitor of all GCBs / MCBs controlled by ComAp units
- Setpoints configurable from one device
- History logs of all controllers
- Fullscreen mode with lock protection / PIN
- Onscreen keyboard

IMPORTANT: This product was in OBSOLETE status until 31st December 2018. Since 1st January 2019 it is in REFER FOR AVAILABILITY status.

Note: For more information refer to [InteliVision17T Global Guide](#).

5.1.5 Mode and function description

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This chapter contains brief information on how the controller behaves in different modes of operation. If you require more information on separate functions of the controller please go to the chapter **Functions (page 83)**.

There are five Gen-set operation modes: OFF, MAN, SEM, AUT and TEST in SPtM application.

There are four Gen-set operation modes: OFF, MAN, SEM and AUT in SPI, COX and MINT application.

OFF mode

- No start of the Gen-set is possible. Outputs **STARTER (PAGE 844)**, **GCB CLOSE/OPEN (PAGE 775)** and **FUEL SOLENOID (PAGE 774)** are not energized.
- No reaction if buttons **START, STOP, GCB ON/OFF** are pressed.
- MCB behavior depends on the **MCB Opens on (page 425)** setpoint:
 - **MAINSFAIL:** When power-cut comes, MCB opens. After Mains returns, MCB closes with **MCB Close del (page 424)**.
 - **GEN RUNNING:** When power-cut comes, MCB stays closed until the Gen-set starts and produces voltage within limits.

MAN mode

1. To start the Gen-set press **START**.
2. When the generator voltage is within limits (adjusted in the setpoints group Generator protections) GCB green LED on the front panel lights.
3. Press **GCB ON/OFF** to close the GCB. If the generator voltage is out of the limits, controller does not respond to the **GCB ON/OFF**.

- a. If controller detects dead bus, immediately closes output.
 - b. If controller detects voltage on the bus, starts synchronizing.
4. To stop the engine press **STOP**
- a. Controller unloads the Gen-set, opens **GCB CLOSE/OPEN (PAGE 775)**. Unloading is active only when binary input **MCB FEEDBACK (PAGE 725)** is closed or other Gen-set is connected to bus. In other case **GCB CLOSE/OPEN (PAGE 775)** opens immediately.
 - b. Gen-set is cooled down and stopped.

Controller does not respond to external signals and/or conditions. The Gen-set is fully in manual control; there is no automatic way to stop it (except protections). The gen-set stays running until STOP button is pressed.

Controller does not take place in Power management in MINT application (for more information on Power management **see Power Management on page 168**).

AUT mode

Gen-set is controlled based on external signals (**REM START/STOP (PAGE 738)**, **SYS START/STOP (PAGE 747)**) or conditions (AMF, Peak shaving, Power management system, ...).

When one condition deactivates the engine does not stop if another condition for automatic starts is active.

Example: If peak stop condition occurs, but **REM START/STOP (PAGE 738)** or **SYS START/STOP (PAGE 747)** is active, engine stays running.

Controller does not respond to **GCB ON/OFF**, **MCB ON/OFF**, **STOP**, **START** buttons and corresponding remote IntelliMonitor or Modbus commands.

Set **FitRes GoToMAN (page 357)** = ENABLED to avoid automatic engine start.

IMPORTANT: When pressing FAULT RESET after Shut down or Slow stop alarm. Engine can start automatically without warning when pressing FAULT RESET after shut down alarm.

TEST mode (SPtM only)

Use TEST mode for Gen-set start test if the Mains is OK or to transfer the load to the Gen-set when Mains fail is announced in advance.

The controller does not respond to **GCB ON/OFF**, **STOP**, **START** (if **RetFromIsland (page 427)** = AUTO).

Engine automatically starts, when TEST mode is selected.

Engine can start automatically without warning when pressing FAULT RESET after shut down alarm.

SEM mode

Button **START** – starts the Gen-set.

- > The controller closes GCB to dead bus.
- > If the Mains is within limits and MCB is closed, the controller starts synchronizing and closes GCB when synchronizing conditions are met. Gen-set remains running in parallel.
- > If Mains failure is recognized during parallel operation the controller opens MCB.
- > After Mains recovers the controller synchronizes MCB and returns to parallel operation

Button **STOP** – Unloads the Gen-set, opens GCB, cools down the engine and stops.

AMF function – If the Mains fails while the gen-set is not running, the controller automatically starts and closes GCB.

Other automatic starts/stops (e.g. due to peak shaving, BI Rem start/stop activation) are not performed in SEM mode.

Basic operation

The controller can be set to run in basic operation modes as described below.

Basic Baseload

Relevant for SPtM, SPI (first setpoint) and MINT, COX (second setpoint). Similarly for Combi modes.

Load ctrl PtM (page 328) or #SysLdCtrl PtM (page 324) = BASELOAD

Gen-set power is kept at value given by **Base load (page 326) or #SysBaseLoad (page 322)** setpoint.

Basic internal Import export

Relevant for SPtM, SPI and Combi in SPtM or SPI mode.

Load ctrl PtM (page 328) = IMP/EXP

I/E-Pm meas (page 329) and I/E-Qm meas (page 330) = IM3 CT INPUT

Gen-set power is controlled to keep the import load at the level given by setpoint **Import load (page 327)** value.

Controller measures Import/Export value via current transformers connected to In/Im3 terminal. The value of L3 is then multiplied by 3 to give an estimation of the actual Imp/Exp.

5.2 Controller configuration and PC tools connection

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back to Controller setup

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

5.2.1 Controller connections

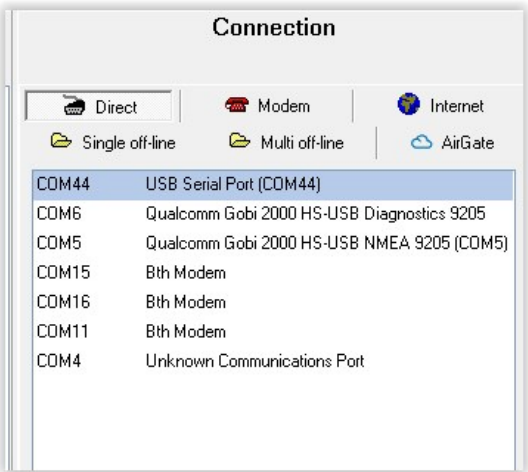
PC tools can be connected to the controller in many ways. These ways are described below in detail.

RS232

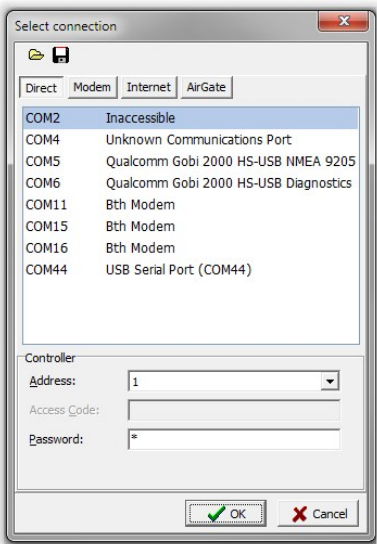
It is possible to connect to the controller using RS232 direct connection (serial port or USB to RS232 converter may be used). The following settings need to be checked in the controller:

- **RS232(1) mode (page 366)** has to be set to DIRECT
- **Contr. address (page 365)** has to be set to the same value as in the PC tool

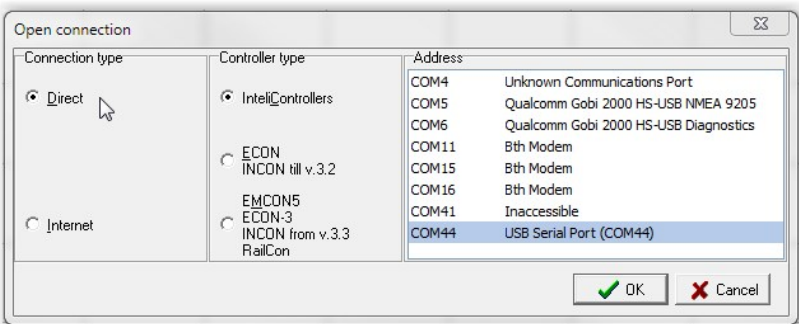
Connection using IntelliMonitor



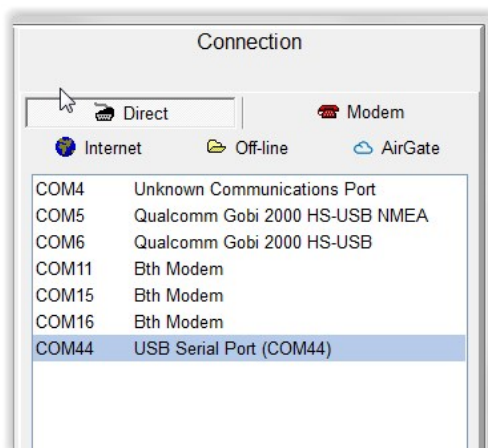
Connection using GenConfig



Connection using WinScope



Connection using IGS-LOG

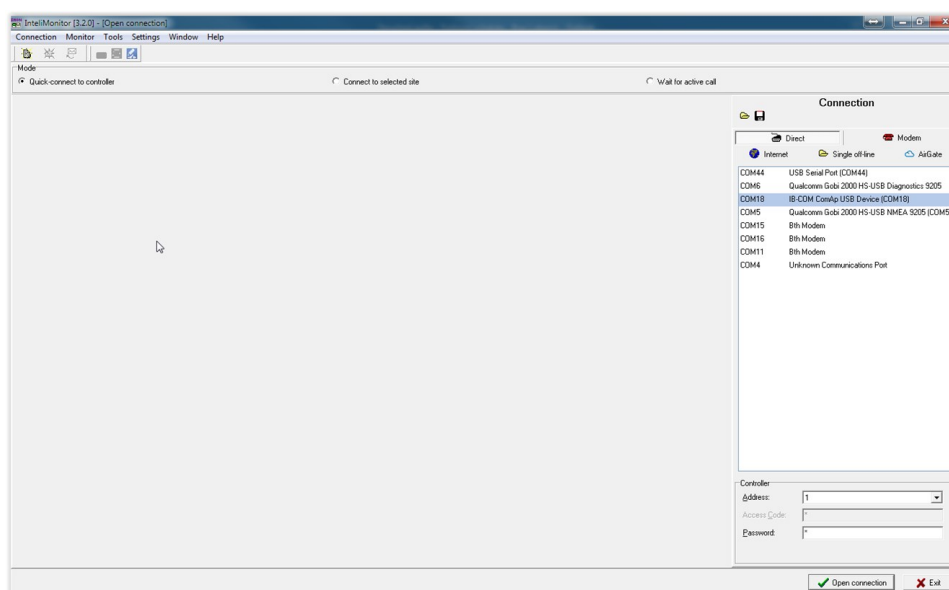


USB

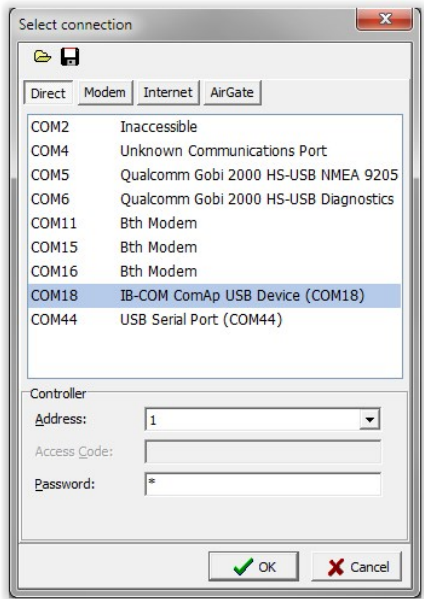
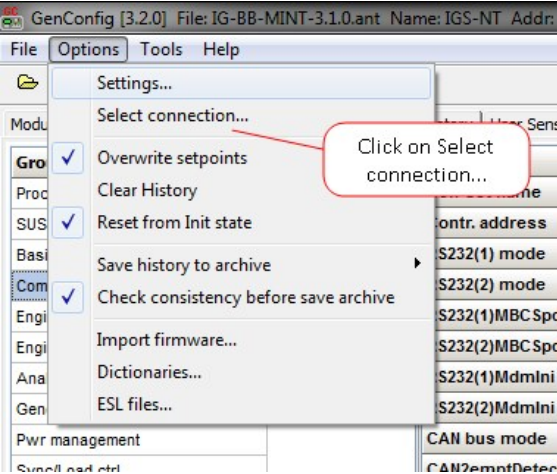
You may connect to the controller using the USB port. In this case standard USB A to B cable should be used. The following settings need to be checked:

- **Contr. address (page 365)** has to be set to the same value as in the PC tool.

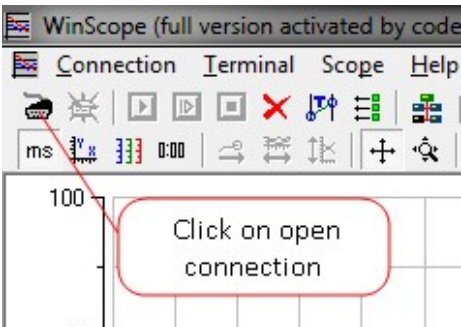
Connection using IntelliMonitor

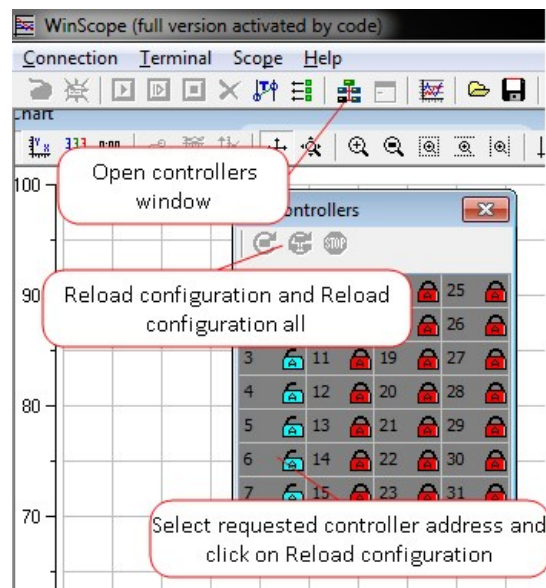
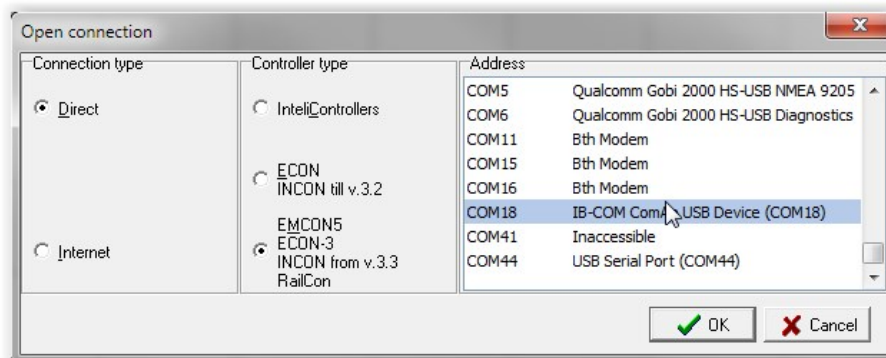


Connection using GenConfig

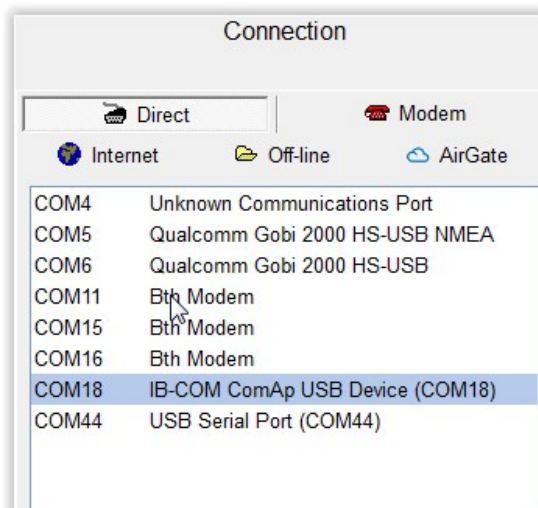


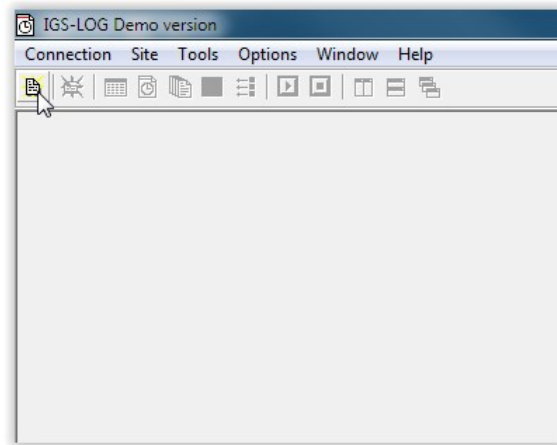
Connection using WinScope





Connection using IGS-LOG





Ethernet

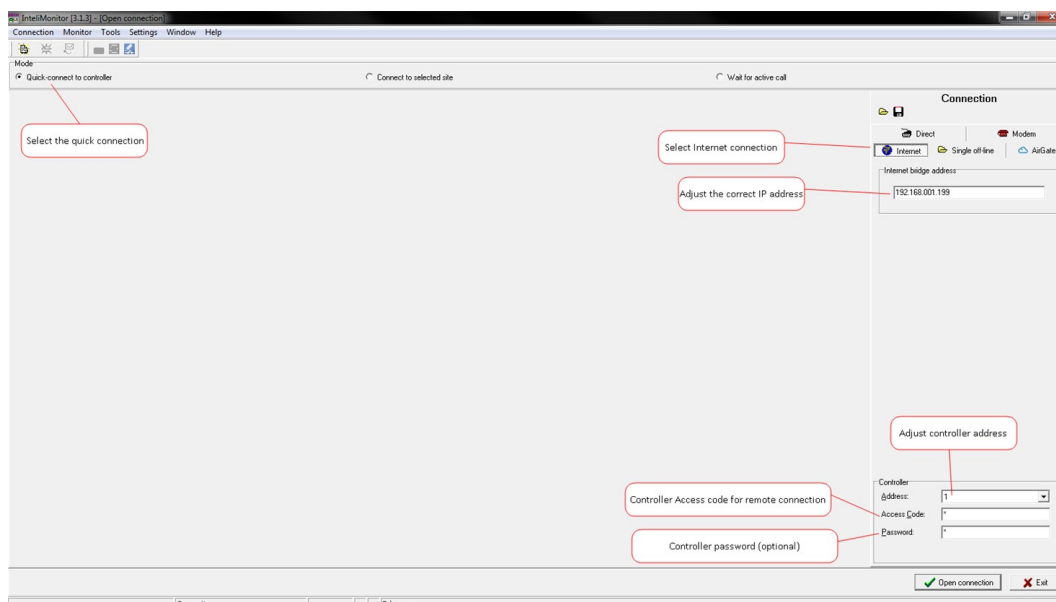
It is possible to connect to the controller using Ethernet port either directly or using ComAp's AirGate service.

Direct connection

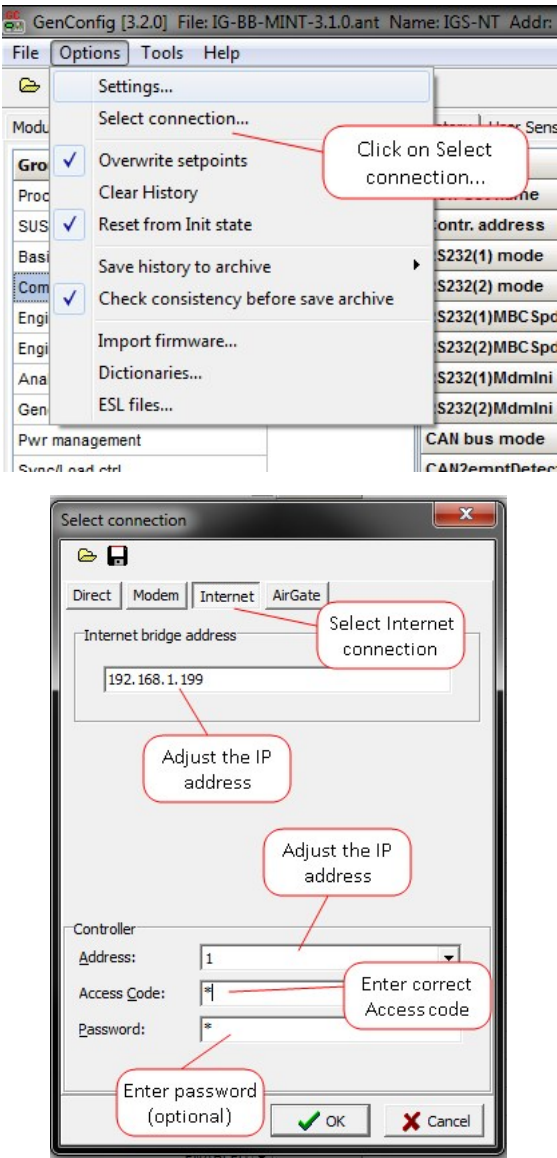
When you use direct connection the controller needs to be reachable directly from the PC you use (i.e. one LAN or WAN without any firewalls and other points that may not allow the connection). The following settings need to be checked in the controller:

- **Contr. address (page 365)** has to be set to the same value as in the PC tool
- **IP Addr mode (page 372)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED
- **IP address (page 372)** – IP address is either set automatically or it can be adjusted to a specific requested value
- **Net mask (page 373)** – Network mask is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 373)** – IP of a gateway can be set by this setpoint when it is used
- **ComApProtoPort (page 373)** – ComAp protocol port number is 23. Make sure that this port is open for communication in your network

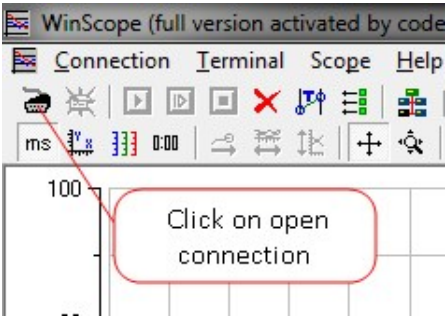
Connection using IntelliMonitor

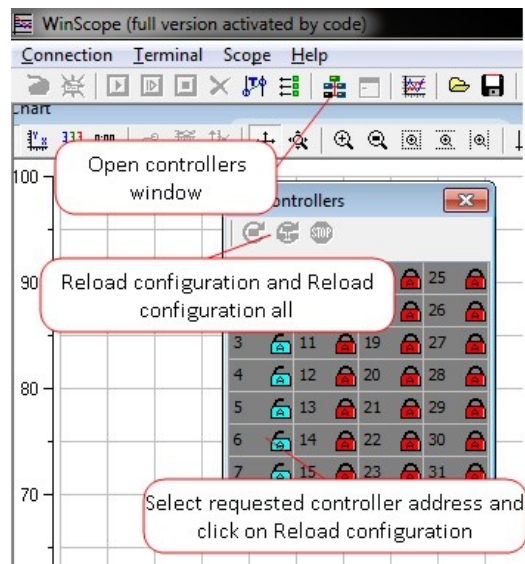
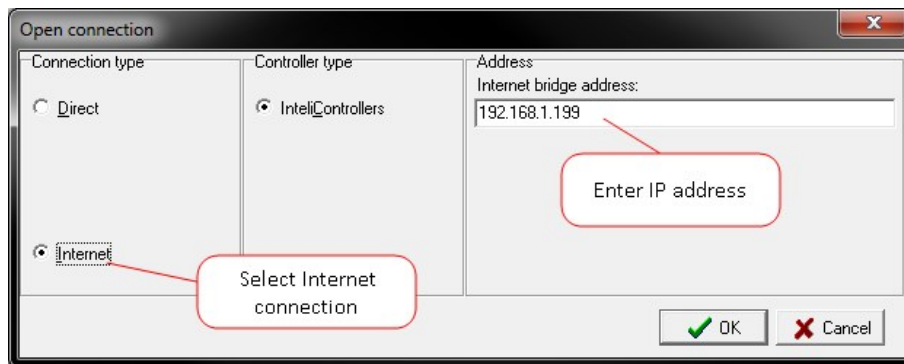


Connection using GenConfig

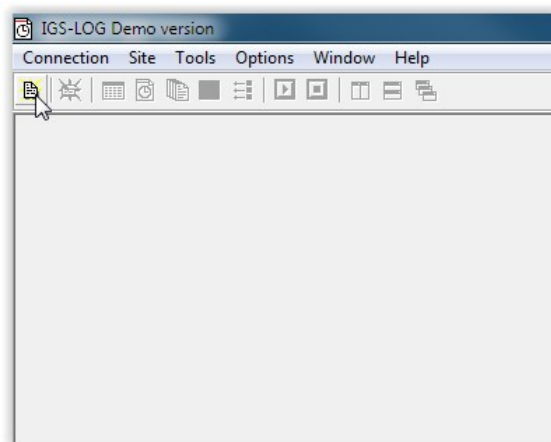


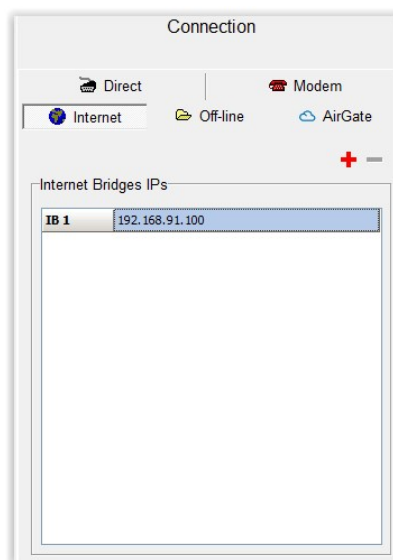
Connection using WinScope





Connection using IGS-LOG





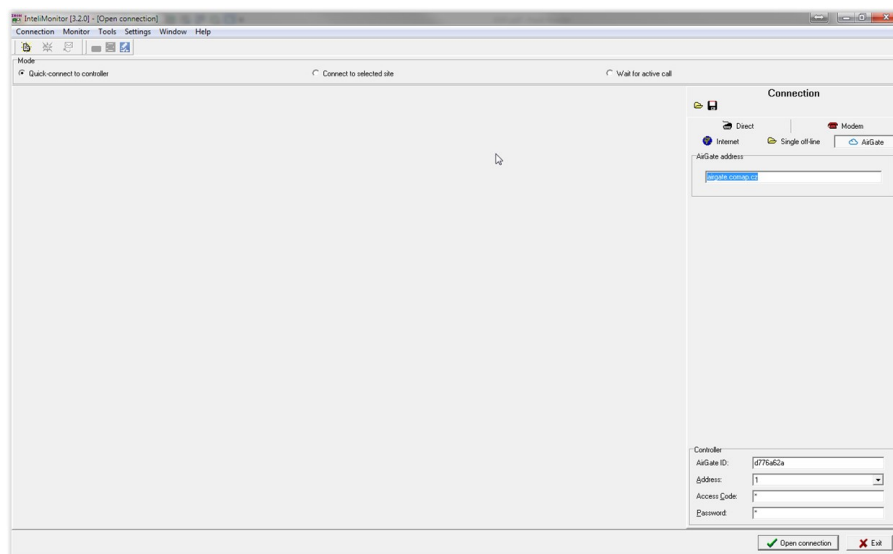
Note: For more information on how user management (access rights, access codes and passwords) works in ComAp controller please visit the chapter (Functions) **User management (page 210)**.

AirGate connection

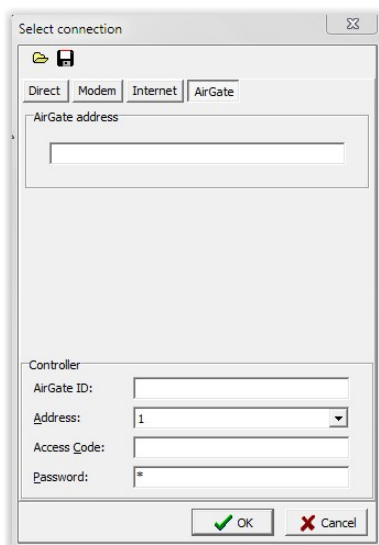
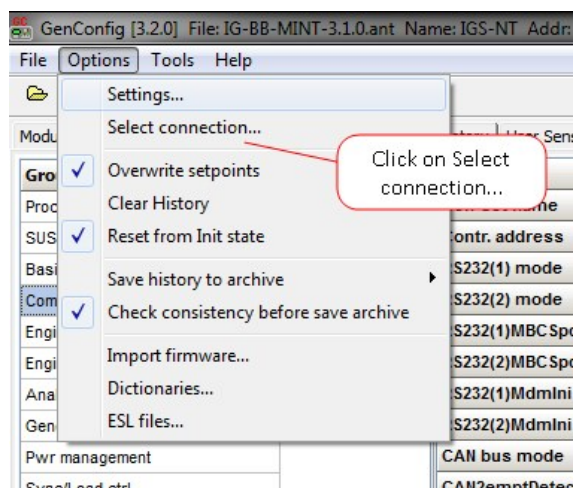
You can use ComAp's AirGate service that allows you to connect to any controller via Internet no matter what are the restrictions of the local network (if the controller can connect to the Internet AirGate service will work). The following setpoints have to be adjusted:

- **Contr. address (page 365)** has to be set to the same value as in the PC tool
- **IP Addr mode (page 372)** – can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED
- **IP address (page 372)** – IP address is either set automatically or it can be adjusted to a specific requested value
- **Net mask (page 373)** – Network mask is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 373)** – IP of a gateway can be set by this setpoint when it is used
- **AirGate (page 374)** needs to be set to ENABLED
- **AirGate IP (page 374)** – currently there is one AirGateserver running at URL airgate.comap.cz (enter this URL into the setpoint)

Connection using IntelliMonitor



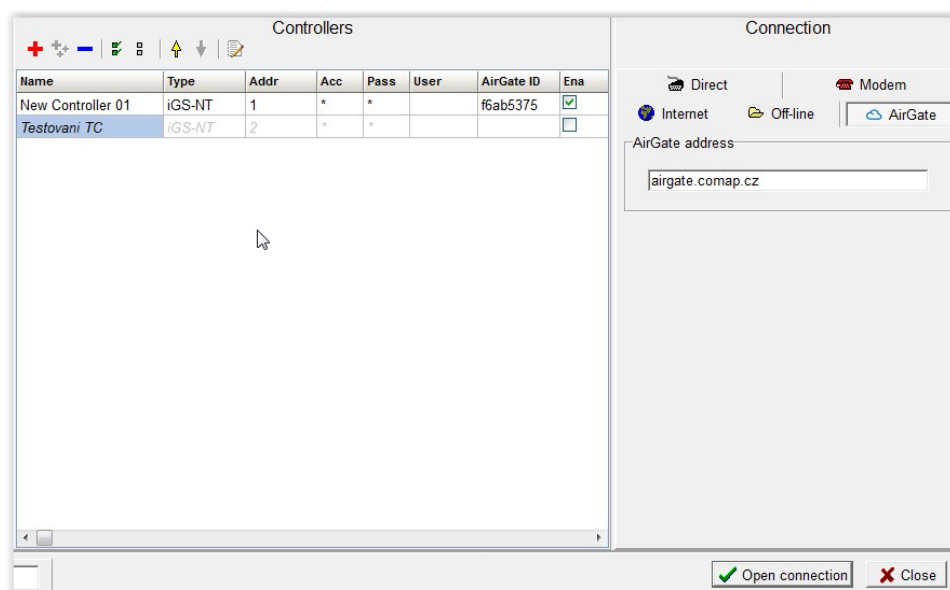
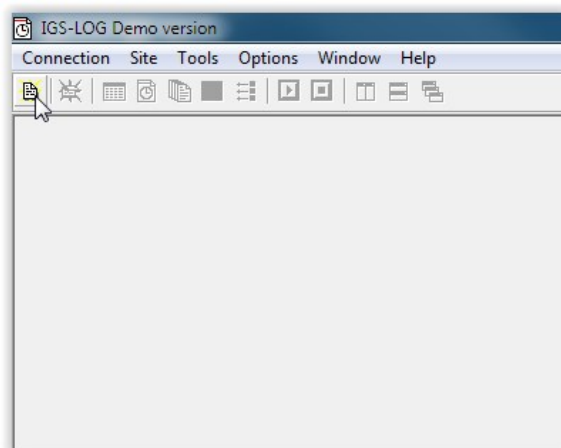
Connection using GenConfig



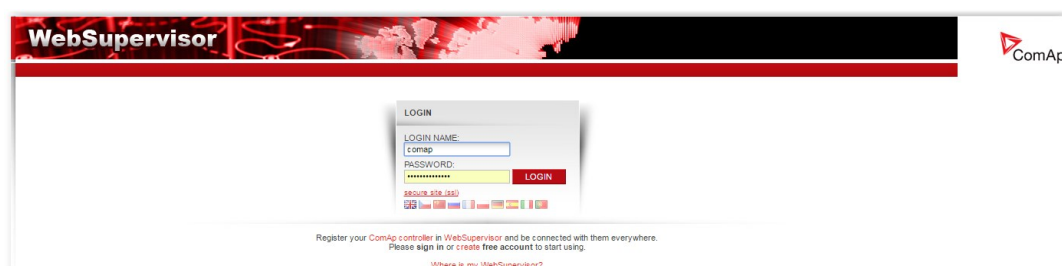
Connection using WinScope

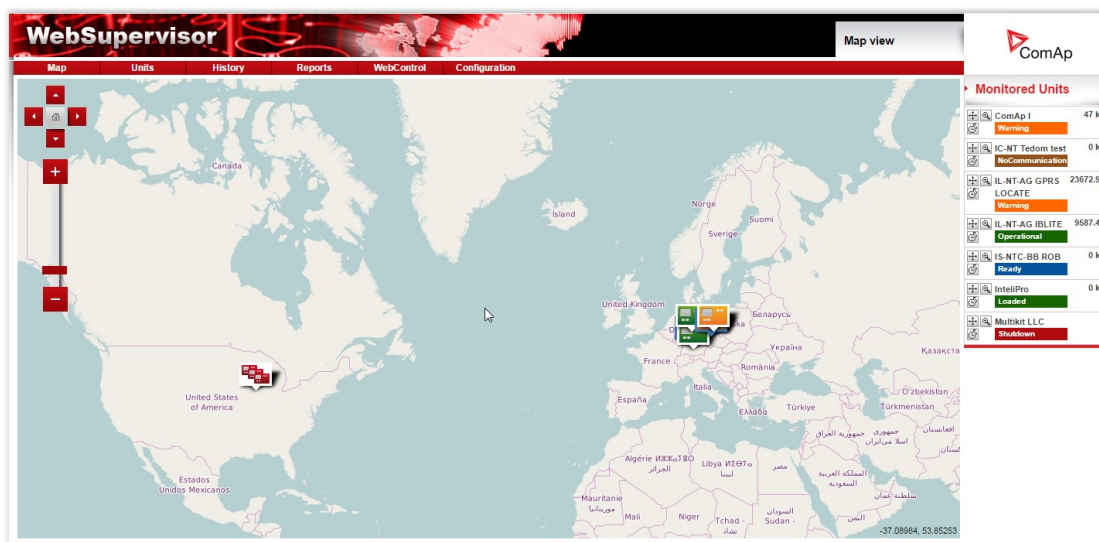
WinScope doesn't support connection via AirGate.

Connection using IGS-LOG



Connection using WebSupervisor mobile





More details about features and setting can you find related reference guides or datasheet presented on the websites [WebSupervisor](#).

Using communication modules

It is possible to use communication modules to connect to the controller. The procedure is similar to the connection directly to the controller.

There are the following communication modules available:

- I-LB+ (for detailed information on this module go to websites [I-LB](#))
- IB-NT (for detailed information on this module go to websites [IB-NT-Config](#))

Note: For controller monitoring via IB-NT use firmware version 2.4.0 or higher. In case of using lower version will not work monitoring via web browser.

Connection to multiple controllers

ComAp controllers and PC tools support connection to the whole site (up to 32 controllers). It is possible to set up such site and connect with one button. To get more information on this option please go to the Help in IntelliMonitor and navigate to the topic Site properties.

5.2.2 Firmware and archive overview

The controller uses ComAp's proprietary firmware and so called archives. Both types of these files come in an installation package with filename extension .igc.

1	[.]	<DIR>	23.10.2015 1
1	IS2GASXX-1.0.0.5	igc	822 169 21.10.2015 1

This installation package will automatically unpack all files to their right location. The default location of these file in Windows 7 and higher is the following:

- For firmware: C:\Users\Public\Documents\ComAp PC Suite\GenConfig\App
- For archives: C:\Users\Public\Documents\ComAp PC Suite\GenConfig\Archives

The controller can be uploaded with different versions of the firmware. These can be updates of existing firmware or they can be different branches of the firmware with different supported functions.

First firmware needs to be uploaded to the controller. It has file extension .mxx. Then archive is uploaded. Archives contain certain applications that are supported by the controller.

Firmware and archive upload

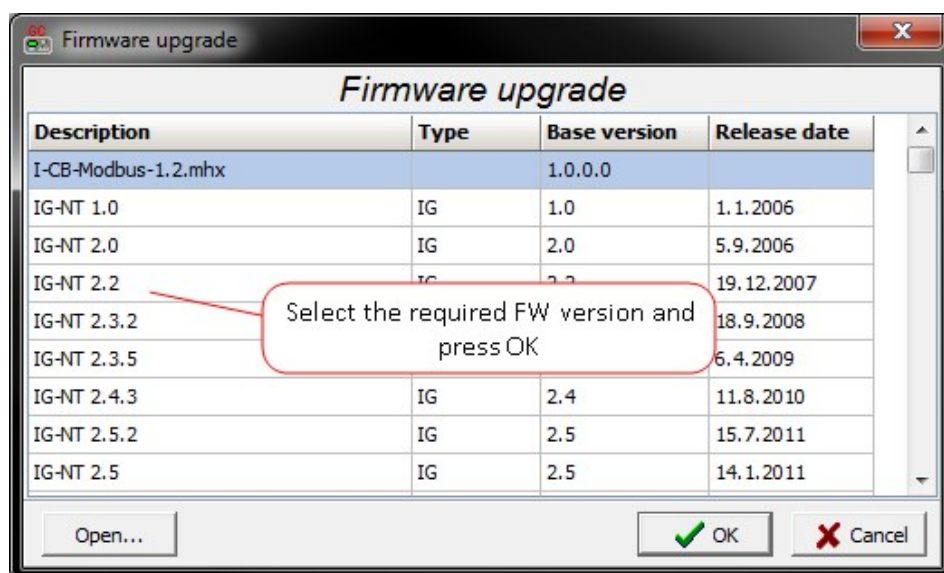
This chapter shows how to upload new firmware and archive into the controller.

Firmware upload

GenConfig is used to upload the firmware in the controller. You can adjust the connection in GenConfig according to the chapter **Controller connections** (page 67).

Once you have adjusted the correct connection, you can select Firmware upgrade (default configuration) from menu File->Firmware upgrade and Cloning...->Firmware upgrade (default configuration).

The following dialog window will appear:

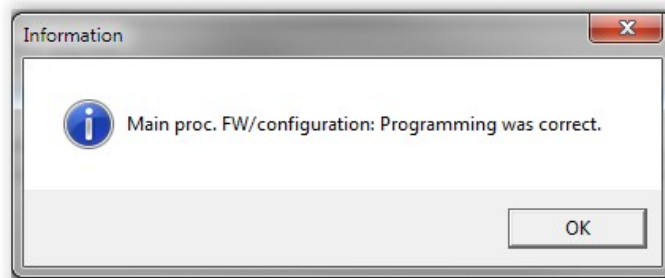


Once this is selected a window with progress bar will appear and firmware upload will commence shortly. GenConfig will check hardware-firmware cross compatibility and may inform you that selected firmware is not supported in the hardware you are connected to. If hardware-firmware compatibility information is missing GenConfig will let you upload the firmware but it will inform you that the controller may not work after the procedure because hardware-firmware compatibility could not be checked.

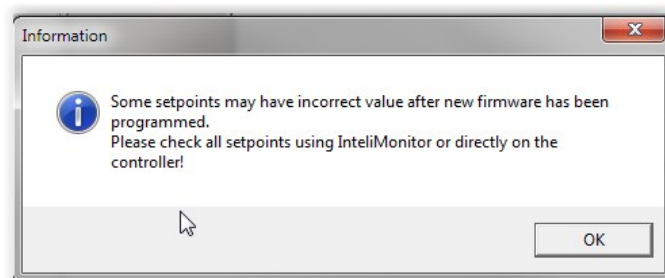


IMPORTANT: If the controller is not responding GenConfig will automatically initiate upload using boot jumper. To get more details on this procedure go to the chapter Troubleshooting (page 273)

Once the controller finishes firmware upload it will let you know that everything went correctly by the following dialog window.



GenConfig will also issue the following warning:



The controller will remain in so called Init state and it will not perform any actions. First archive needs to be uploaded. See the chapter **Archive (page 81)** to get more information on archive upload.

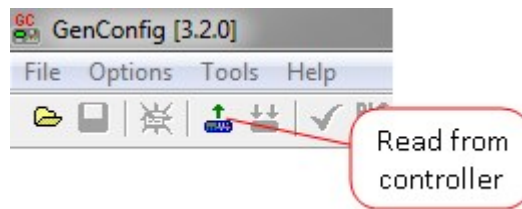
IMPORTANT: If the upload fails for any reason (e.g. connection is severed during the upload) the controller will not usually function and it will not respond to communication attempts. In these cases it is necessary to use boot jumper and upload firmware again. Note that this requires manipulation with controller hardware and therefore upload of the firmware from remote location is recommended only in cases of stable connection. To get more information on the boot jumper procedure see Troubleshooting on page 273.

Archive

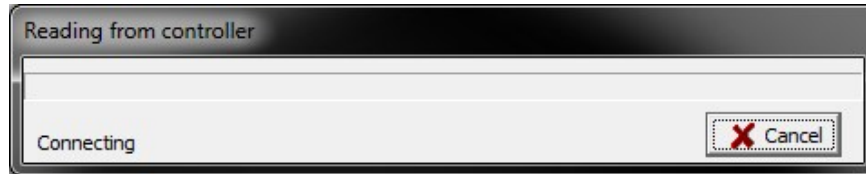
Once the controller is uploaded with the firmware it can be uploaded with a variety of archives that provide you with different application options. To look at the available application overview please go to the chapter **Applications overview (page 14)**.

The archive is uploaded using GenConfig. You can either download and archive from the controller, change its configuration and then re-upload it again or you can open offline archive, modify (or not) the configuration and upload it to the controller.

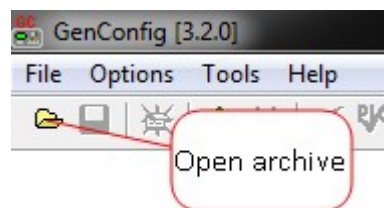
To download the archive from a controller adjust the correct connection settings and then click the Read from controller icon.



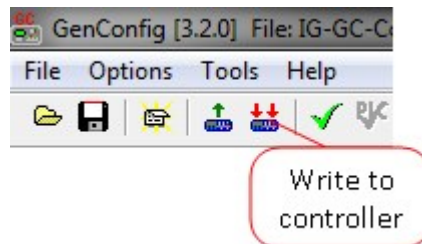
The following dialog will let you know that the download is underway:



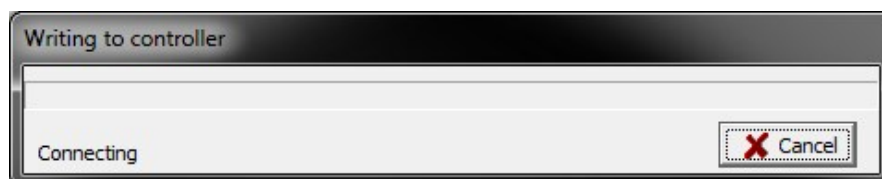
Once it is done the archive will open in GenConfig. You will see mostly the same thing as if opening the archive offline. To open a archive offline click on the Open icon.



Once you have done all the necessary changes in the configuration you can upload the modified archive using the Write to controller icon.



The following dialog will let you know that the upload is under way.



After it is done GenConfig will ask you whether you want to rewrite setpoint values and then the controller will be ready with new configuration (when no setpoint change this dialog is skipped).

5.2.3 How to use PC tool

All the PC tools have build in help which can help you with individual configuration functions. Please refer to these manuals for detailed information on the configuration. Occasionally there are hints how to use PC tool for specific functions in this guide as well.

Note: If you require further information on this topic please contact [ComAp technical support](#). We will gladly assist you and provide you with detailed information based on your specific needs.

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 **back to Controller setup**

5.3.1 Modes overview

There are several modes in the controller that are crucial to overall functions of the controller. The modes influence many functions in the controller but they are mainly related to the engine and generator control functions. E.g. controller itself will not start the engine in MAN mode, but it can be started by pressing START button on a display. Similar basic differences of the modes are described below. Each specific function described in other parts of this manual then contains information if which mode it is active if needed.

Behavior of the controller in different modes is highly dependent on the application that is used. Therefore the following chapters describe behavior of different modes.

Controller modes may be changed either by adjusting the setpoint **ControllerMode** (page 356) or by sending a command from a display, IntelliMonitor, via Modbus etc.

Alternatively it can be changed using LBOs related to the Remote mode function.

MINT modes

OFF mode

OFF mode is usually used when the Gen-set should not run and all main control functions should be disabled. The controller is always switched to OFF mode when it is reprogrammed (this is done automatically by GenConfig).

Outputs **STARTER** (PAGE 844), **GCB CLOSE/OPEN** (PAGE 775) and **FUEL SOLENOID** (PAGE 774) cannot activate. Gen-set cannot be started. If START, STOP, GCB ON/OFF buttons are pressed the controller does not respond. When the Gen-set is running it is not possible to switch directly to OFF mode. First you have to stop the engine.

Note: General functions of the controller remain active. Modes in ComAp controllers are related to engine and generator control. E.g. Built-in PLC remains fully functional and the controller may activate its outputs according to the configured functions.

MAN mode

MAN (manual) mode is usually used when a Gen-set needs to be started by an operator based on his/her will. The Gen-set control sequence is fully manual (i.e. each step – start, stop, circuit breaker closing and opening – needs to be initiated by the operator except for protections that may cause Gen-set to stop or breakers to open).

Button START will start the Gen-set when pressed (and when the controller is in a ready state – i.e. no alarms)

Additional pressing of START button can alter the sequence:

- When the controller is unloading the start button will cause the controller to abort the unloading sequence and return back to Loaded state.
- When the controller is in the process of stopping (e.g. cooling), pressing START button will cause the controller to abort the stopping sequence and go to the Running state.

Pressing GCB ON/OFF button will cause the controller to:

- close GCB to dead bus.
- start GCB synchronizing when bus voltage is OK and MCB is closed or when other Gen-set(s) provide healthy voltage to the bus. Closes the GCB when synchronized and stays running in parallel (Island or MainsParallel).

- open GCB if there is no possibility to unload.
- unload Gen-set and opens the GCB if Gen-set was running in Parallel to the Mains or to other Gen-set(s).

Note: *If generator voltage is out of the limits (adjusted in the setpoint **Group: Gener protect (page 399)** with the exception of the dead bus) controller does not respond to the GCB ON/OFF button.*

Continuous pressing of GCB ON/OFF button can alter the sequence:

- When the Gen-set is unloading the second pushing of the GCB ON/OFF button will cause the controller to open GCB immediately.
- When the controller is synchronizing second pushing of the GCB ON/OFF button will cause the controller to abort the synchronization attempt.

Pressing STOP button will cause the following:

- When Gen-set is running in Parallel: transfers the load to the Mains or to other Gen-set(s), opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running in single island (or in general there is no mains and no other Gen-set(s) to transfer the load to): opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running unloaded (GCB is open): activates cooling sequence and then stops the engine.
- During cooling state causes immediate engine stop.

IMPORTANT: The Gen-set is permitted to run unloaded for unlimited time. This may cause damage to the equipment and it is up to the operator to perform all necessary actions to connect the Gen-set to the load.

Note: *In MAN mode it is possible to start the Gen-set only by pressing a button (on a display, in IntelliMonitor etc.) or by activating LBI **STARTBUTTON (PAGE 745)**. Power management and other functions are not active. Please refer to the rest of this chapter to find out more on individual functions and their functions in different controller modes.*

SEM mode

SEM (semiautomatic) mode is a modification of the MAN mode with the following differences:

- Pressing the START button will activate the whole sequence
 - Controller will start the engine
 - It will close GCB (to the dead bus) or it will synchronize when there is a healthy voltage
- STOP button will perform the whole sequence (this is the same as in MAN mode)
- GCB ON/OFF button has no function

AUT mode

AUT (Automatic) mode is usually used when fully automatic function of the controller is expected without any action from an operator. AUT mode allows many functions in the controller like Power management and others.

All the buttons (and their respective LBOs) have no function.

- The Gen-set can be started by activating LBI **SYS START/STOP (PAGE 747)** (please refer to the chapter **Power Management (page 168)** to get more information of the behavior of this LBI when Power management is activated)
- The controller will close GCB automatically to the dead bus and it will perform synchronization sequence when there is a healthy voltage.
- The controller will perform full stopping sequence (unloading if possible, opening GCB, cooling etc.) when LBI **SYS START/STOP (PAGE 747)** is deactivated

SPtM modes

OFF mode

OFF mode is usually used when the Gen-set should not run and all main control functions should be disabled. The controller is always switched to OFF mode when it is reprogrammed (this is done automatically by GenConfig).

Outputs **STARTER (PAGE 844)**, **GCB CLOSE/OPEN (PAGE 775)** and **FUEL SOLENOID (PAGE 774)** cannot activate. Gen-set cannot be started. If START, STOP, GCB ON/OFF buttons are pressed the controller does not respond. When the Gen-set is running it is not possible to switch directly to OFF mode. First you have to stop the engine.

Note: General functions of the controller remain active. Modes in ComAp controllers are related to engine and generator control. E.g. Built-in PLC remains fully functional and the controller may activate its outputs according to the configured functions.

MAN mode

MAN (manual) mode is usually used when a Gen-set needs to be started by an operator based on his/her will. The Gen-set control sequence is fully manual (i.e. each step – start, stop, circuit breaker closing and opening – needs to be initiated by the operator except for protections that may cause Gen-set to stop or breakers to open).

Button START will start the Gen-set when pressed (and when the controller is in a ready state – i.e. no alarms)

Additional pressing of START button can alter the sequence:

- When the controller is unloading the start button will cause the controller to abort the unloading sequence and return back to Loaded state.
- When the controller is in the process of stopping (e.g. cooling), pressing START button will cause the controller to abort the stopping sequence and go to the Running state.

Pressing GCB ON/OFF button will cause the controller to:

- close GCB to dead bus.
- start GCB synchronizing when bus voltage is OK and MCB is closed or when other Gen-set(s) provide healthy voltage to the bus. Closes the GCB when synchronized and stays running in parallel (Island or MainsParallel).

- open GCB if there is no possibility to unload.
- unload Gen-set and opens the GCB if Gen-set was running in Parallel to the Mains or to other Gen-set(s).

Note: *If generator voltage is out of the limits (adjusted in the set point **Group: Gener protect (page 399)** with the exception of the dead bus) controller does not respond to the GCB ON/OFF button.*

Continuous pressing of GCB ON/OFF button can alter the sequence:

- When the Gen-set is unloading the second pushing of the GCB ON/OFF button will cause the controller to open GCB immediately.
- When the controller is synchronizing second pushing of the GCB ON/OFF button will cause the controller to abort the synchronization attempt.

Pressing MCB ON/OFF will cause the controller to:

- close MCB to dead bus (even if the Mains voltage is out of limits).
- start MCB synchronizing when Gen-set is running and GCB is closed. Then it closes the MCB when synchronized and stays running in Parallel.
- unload Gen-set and open the MCB if Gen-set was running in Parallel to the Mains.

Continuous pressing of MCB ON/OFF button can alter the sequence:

- When the controller unloads to open MCB the second pressing on MCB ON/OFF button will cause MCB to open immediately
- When the controller is synchronizing second pushing of the MCB ON/OFF button will cause the controller to abort the synchronization attempt.

Pressing STOP button will cause the following:

- When Gen-set is running in Parallel: transfers the load to the Mains or to other Gen-set(s), opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running in single island (or in general there is no mains and no other Gen-set(s) to transfer the load to): opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running unloaded (GCB is open): activates cooling sequence and then stops the engine.
- During cooling state causes immediate engine stop.

IMPORTANT: The Gen-set is permitted to run unloaded for unlimited time. This may cause damage to the equipment and it is up to the operator to perform all necessary actions to connect the Gen-set to the load.

Note: *In MAN mode it is possible to start the Gen-set only by pressing a button (on a display, in InteliMonitor etc.) or by activating LBI **STARTBUTTON (PAGE 745)**. Automatic Mains fail function and other functions are not active. Please refer to the rest of this chapter to find out more on individual functions and their functions in different controller modes.*

SEM mode

SEM (semiautomatic) mode is a modification of the MAN mode with the following differences:

- Pressing the START button will activate the whole sequence
 - Controller will start the engine
 - It will close GCB (to the dead bus) or it will synchronize when there is a healthy voltage
- The controller will automatically close and open (with synchronization if applicable) MCB based on the state of the Mains voltage
- STOP button will perform the whole sequence (this is the same as in MAN mode)
- GCB and MCB ON/OFF buttons have no function

AUT mode

AUT (Automatic) mode is usually used when fully automatic function of the controller is expected without any action from an operator. AUT mode allows many functions in the controller like Automatic Mains fail function, Peak shaving and others.

All the buttons (and their respective LBOs) have no function.

There are various reasons for the Gen-set start:

- The Gen-set can be started by activating **LBI REM START/STOP (PAGE 738)**
- The Gen-set can be started by Peak shaving function (**Peak shaving (page 145)**)
- The Gen-set can be started by Automatic Mains fail function (**AMF operation (page 148)**)

The controller will also perform the following actions:

- The controller will close GCB automatically to the dead bus and it will perform synchronization sequence when there is a healthy voltage.
- The controller will perform full stopping sequence (unloading if possible, opening GCB, cooling etc.) when there is no reason for run (e.g. **LBI REM START/STOP (PAGE 738)** is deactivated).
- The controller will close MCB automatically to the Mains when the voltage is within limits.
- The controller will open MCB automatically when the Mains voltage goes out of the limits (Mains fails) .

TEST mode

The TEST mode is used to test the Gen-set capability to start in the combination with the Test on Load function it can be used to simulate AMF and test the whole sequence. Please refer to the chapter **Test on Load (page 126)** to get more information on TEST mode and Test on Load sequences.

All the buttons (and their respective LBOs) have no function with the exception of activation of Test on Load sequence (see the chapter **Test on Load (page 126)** to get more information).

SPI modes

OFF mode

OFF mode is usually used when the Gen-set should not run and all main control functions should be disabled. The controller is always switched to OFF mode when it is reprogrammed (this is done automatically by GenConfig).

Outputs **STARTER (PAGE 844)**, **GCB CLOSE/OPEN (PAGE 775)** and **FUEL SOLENOID (PAGE 774)** cannot activate. Gen-set cannot be started. If START, STOP, GCB ON/OFF buttons are pressed the controller does not respond. When the Gen-set is running it is not possible to switch directly to OFF mode. First you have to stop the engine.

Note: General functions of the controller remain active. Modes in ComAp controllers are related to engine and generator control. E.g. Built-in PLC remains fully functional and the controller may activate its outputs according to the configured functions.

MAN mode

MAN (manual) mode is usually used when a Gen-set needs to be started by an operator based on his/her will. The Gen-set control sequence is fully manual (i.e. each step – start, stop, circuit breaker closing and opening – needs to be initiated by the operator except for protections that may cause Gen-set to stop or breakers to open).

Button START will start the Gen-set when pressed (and when the controller is in a ready state – i.e. no alarms)

Additional pressing of START button can alter the sequence:

- When the controller is unloading the start button will cause the controller to abort the unloading sequence and return back to Loaded state.
- When the controller is in the process of stopping (e.g. cooling), pressing START button will cause the controller to abort the stopping sequence and go to the Running state.

Pressing GCB ON/OFF button will cause the controller to:

- close GCB to dead bus.
- start GCB synchronizing when bus voltage is OK and MCB is closed or when other Gen-set(s) provide healthy voltage to the bus. Closes the GCB when synchronized and stays running in parallel (Island or MainsParallel).
- open GCB if there is no possibility to unload.
- unload Gen-set and opens the GCB if Gen-set was running in Parallel to the Mains or to other Gen-set(s).

Note: If generator voltage is out of the limits (adjusted in the set point **Group: Gener protect (page 399)** with the exception of the dead bus) controller does not respond to the GCB ON/OFF button.

Continuous pressing of GCB ON/OFF button can alter the sequence:

- When the Gen-set is unloading the second pushing of the GCB ON/OFF button will cause the controller to open GCB immediately.
- When the controller is synchronizing second pushing of the GCB ON/OFF button will cause the controller to abort the synchronization attempt.

Pressing STOP button will cause the following:

- When Gen-set is running in Parallel: transfers the load to the Mains or to other Gen-set(s), opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running in single island (or in general there is no mains and no other Gen-set(s) to transfer the load to): opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running unloaded (GCB is open): activates cooling sequence and then stops the engine.
- During cooling state causes immediate engine stop.

IMPORTANT: The Gen-set is permitted to run unloaded for unlimited time. This may cause damage to the equipment and it is up to the operator to perform all necessary actions to connect the Gen-set to the load.

Note: In MAN mode it is possible to start the Gen-set only by pressing a button (on a display, in IntelliMonitor etc.) or by activating LBI **STARTBUTTON** (PAGE 745). Automatic Mains fail function and other functions are not active. Please refer to the rest of this chapter to find out more on individual functions and their functions in different controller modes.

SEM mode

SEM (semiautomatic) mode is a modification of the MAN mode with the following differences:

- Pressing the START button will activate the whole sequence
 - Controller will start the engine
 - It will close GCB (to the dead bus) or it will synchronize when there is a healthy voltage
- STOP button will perform the whole sequence (this is the same as in MAN mode)
- GCB ON/OFF button has no function

AUT mode

AUT (Automatic) mode is usually used when fully automatic function of the controller is expected without any action from an operator. AUT mode allows many functions in the controller like Automatic Mains fail function, Peak shaving and others.

All the buttons (and their respective LBOs) have no function.

There are various reasons for the Gen-set start:

- The Gen-set can be started by activating LBI **REM START/STOP** (PAGE 738)
- The Gen-set can be started by Peak shaving function (**Peak shaving** (page 145))
- The Gen-set can be started by Automatic Mains fail function (**AMF operation** (page 148))

The controller will also perform the following actions:

- The controller will close GCB automatically to the dead bus and it will perform synchronization sequence when there is a healthy voltage.
- The controller will perform full stopping sequence (unloading if possible, opening GCB, cooling etc.) when there is no reason for run (e.g. LBI **REM START/STOP** (PAGE 738) is deactivated).

COX modes

OFF mode

OFF mode is usually used when the Gen-set should not run and all main control functions should be disabled. The controller is always switched to OFF mode when it is reprogrammed (this is done automatically by GenConfig).

Outputs **STARTER** (PAGE 844), **GCB CLOSE/OPEN** (PAGE 775) and **FUEL SOLENOID** (PAGE 774) cannot activate. Gen-set cannot be started. If START, STOP, GCB ON/OFF buttons are pressed the controller does not respond. When the Gen-set is running it is not possible to switch directly to OFF mode. First you have to stop the engine.

Note: General functions of the controller remain active. Modes in ComAp controllers are related to engine and generator control. E.g. Built-in PLC remains fully functional and the controller may activate its outputs according to the configured functions.

MAN mode

MAN (manual) mode is usually used when a Gen-set needs to be started by an operator based on his/her will. The Gen-set control sequence is fully manual (i.e. each step – start, stop, circuit breaker closing and opening – needs to be initiated by the operator except for protections that may cause Gen-set to stop or breakers to open).

Button START will start the Gen-set when pressed (and when the controller is in a ready state – i.e. no alarms)

Additional pressing of START button can alter the sequence:

- When the controller is unloading the start button will cause the controller to abort the unloading sequence and return back to Loaded state.
- When the controller is in the process of stopping (e.g. cooling), pressing START button will cause the controller to abort the stopping sequence and go to the Running state.

Pressing GCB ON/OFF button will cause the controller to:

- Close GCB to dead bus.
- Start GCB synchronizing when bus voltage is OK and MCB is closed or when other Gen-set(s) provide healthy voltage to the bus. Closes the GCB when synchronized and stays running in parallel (Island or Mains Parallel).
- Open GCB if there is no possibility to unload.
- Unload Gen-set and opens the GCB if Gen-set was running in Parallel to the Mains or to other Gen-set(s).

Note: *If generator voltage is out of the limits (adjusted in the set point **Group: Gener protect (page 399)** with the exception of the dead bus) controller does not respond to the GCB ON/OFF button.*

Continuous pressing of GCB ON/OFF button can alter the sequence:

- When the Gen-set is unloading the second pushing of the GCB ON/OFF button will cause the controller to open GCB immediately.
- When the controller is synchronizing second pushing of the GCB ON/OFF button will cause the controller to abort the synchronization attempt.

Pressing STOP button will cause the following:

- When Gen-set is running in Parallel: transfers the load to the Mains or to other Gen-set(s), opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running in single island (or in general there is no mains and no other Gen-set(s) to transfer the load to): opens GCB, goes into cooling state and stops the engine.
- When Gen-set is running unloaded (GCB is open): activates cooling sequence and then stops the engine.
- During cooling state causes immediate engine stop.

IMPORTANT: The Gen-set is permitted to run unloaded for unlimited time. This may cause damage to the equipment and it is up to the operator to perform all necessary actions to connect the Gen-set to the load.

Note: *In MAN mode it is possible to start the Gen-set only by pressing a button (on a display, in IntelliMonitor etc.) or by activating LBI **STARTBUTTON (PAGE 745)**. Power Management and other functions are not active. Please refer to the rest of this chapter to find out more on individual functions and their functions in different controller modes.*

AUT mode

AUT (Automatic) mode is usually used when fully automatic function of the controller is expected without any action from an operator. AUT mode allows many functions in the controller like Power management and others.

All the buttons (and their respective LBOs) have no function.

- The Gen-set can be started by activating LBI **SYS START/STOP (PAGE 747)** (please refer to the chapter **Power Management (page 168)** to get more information of the behavior of this LBI when Power management is activated)
- The controller will close GCB automatically to the dead bus and it will perform synchronization sequence when there is a healthy voltage.
- The controller will perform full stopping sequence (unloading if possible, opening GCB, cooling etc.) when **LBI SYS START/STOP (PAGE 747)** is deactivated

Combi

Combi application modes behave according to the currently activated application.

If you want to know more about the modes in SPI, SPtM and MINT applications please go to the chapters **SPI modes (page 88)**, **SPtM modes (page 86)**, **MINT modes (page 84)**.

If you want to learn more on Combi application functions please go to the chapter **Combi mode activation (page 32)**.

5.3.2 Process control operation settings

Operation settings have different possibilities in various applications.

SPtM operation

There are several settings that are used to set the functions and types of operation that are allowed. Mainly these setpoints are considered:

- **Island enable (page 337)**
- **ParallelEnable (page 337)**
- **Synchro enable (page 338)**
- **MFStart enable (page 338)**

The main combinations of these setpoints are shown below. There are other possible combinations but these combinations below should provide you with all possible combination of functions and other settings are just redundant.

Number	Island enable (page 337)	ParallelEnable (page 337)	Synchro enable (page 338)	MFStart enable (page 338)	Description
1	YES	YES	BOTH	YES	Both Island and Parallel is enabled and AMF start is enabled
2	YES	YES	BOTH	NO	Both Island and Parallel is enabled and AMF start is disabled
3	YES	NO	NONE	YES	Only Island is enabled. Parallel is disabled and therefore Synchronization is disabled. AMF start is enabled.
4	YES	NO	NONE	NO	Only Island is enabled. AMF start is disabled.
5	YES	YES	REVERSE	YES	Both Island and Parallel is enabled. AMF start is enabled. Synchronization via MCB only is enabled.
6	YES	YES	REVERSE	NO	Both Island and Parallel is enabled. AMF start is disabled. Synchronization via MCB only is enabled.
7	YES	YES	FORWARD	YES	Both Island and Parallel is enabled. AMF start is enabled. Synchronization via GCB only is enabled.
8	YES	YES	FORWARD	NO	Both Island and Parallel is enabled. AMF start is disabled. Synchronization via GCB only is enabled.
9	NO	YES	FORWARD	NO	Only Parallel is enabled. AMF start and Island are disabled. Synchronization via GCB only is enabled.

Based on the needs of your installation you can choose one of the combinations above. You can also choose any different combination. In some cases when the controller detects that the setting will not permit the Gen-

Oper conflict. This will inform you that the setting may not be correct and the combination of the setpoints above should be checked.

In some cases the controller blocks the start of the Gen-set based on the settings above (e.g. Island is not enabled and the Mains voltage is out of the limits). In this case the controller activates LBO **START BLOCKED** (PAGE 843). This is normal state of the operation since it is based on the settings. Use this LBO to inform the operator about the blocked start.

SPI operation

There are several settings that are used to set the functions and types of operation that are allowed. Mainly these setpoints are considered:

- Island enable (page 337)
- ParallelEnable (page 337)
- Synchro enable (page 338)

The main combinations of these setpoints are shown below. There are other possible combinations but these combinations below should provide you with all possible combination of functions and other settings are just redundant.

Number	Island enable (page 337)	Synchro enable (page 338)	ParallelEnable (page 337)	Description
1	YES	NO	NONE	Only Island is enabled. Parallel is disabled and therefore Synchronization is disabled.
2	YES	NO	NONE	Only Island is enabled.
3	YES	YES	FORWARD	Both Island and Parallel is enabled. Synchronization via GCB only is enabled.
4	YES	YES	FORWARD	Both Island and Parallel is enabled. Synchronization via GCB only is enabled.
5	NO	YES	FORWARD	Only Parallel is enabled. Island is disabled. Synchronization via GCB only is enabled.

Based on the needs of your installation you can choose one of the combinations above. You can also choose any different combination. In some cases when the controller detects that the setting will not permit the Gen-set start at all it will issue an alarm Oper conflict. This will inform you that the setting may not be correct and the combination of the setpoints above should be checked.

In some cases the controller blocks the start of the Gen-set based on the settings above (e.g. Island is not enabled and the Mains voltage is out of the limits). In this case the controller activates LBO **START BLOCKED** (PAGE 843). This is normal state of the operation since it is based on the settings. Use this LBO to inform the operator about the blocked start.

MINT operation

There are several settings that are used to set the functions and types of operation that are allowed. Mainly these setpoints are considered:

> #SysLdCtrl PtM (page 324)

> #SysPFCtrl PtM (page 324)

The MINT application is used usually in combination with InteliMainsNT controllers when multiple Gen-sets are to be connected to the Parallel to Mains operation. Therefore the settings of Process control are limited to synchronization only in MINT. Synchronization can be either disabled or enabled.

In some cases the controller blocks the start of the Gen-set based on the settings above (e.g. Island is not enabled and the Mains voltage is out of the limits). In this case the controller activates **LBO START BLOCKED (PAGE 843)**. This is normal state of the operation since it is based on the settings. Use this LBO to inform the operator about the blocked start.

COX operation

There are no relevant settings for Process control in COX application. This is because the controller in COX application is set to slave position (control of Gen-set only) and awaits commands regarding the Process control from a master system (e.g. PLC).

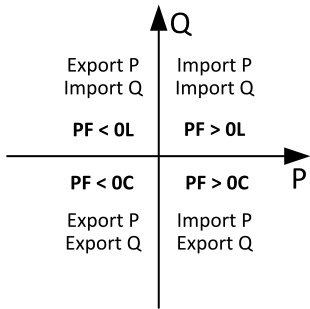
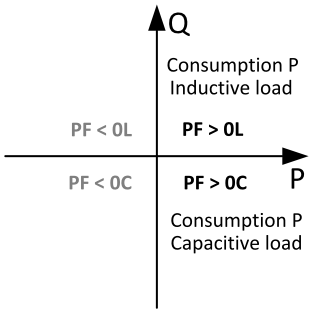
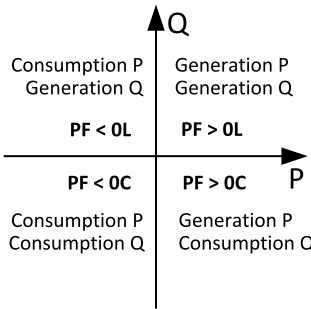
Combi operation

In the Combi application the controller can be switched to several different applications. The Process control options in Combi depend on which application is selected. The settings in Combi are divided to two groups, ProcCtrlMulti (Process control when switched to MINT) and ProcCtrlSingle (Process control when switched to SPI or SPtM).

To get more information on Combi application please go to the chapter **Combi overview (page 31)**.

5.3.3 Power control

Active and reactive power terminology

Values / Measured at	Mains	Load	Gen-set
$P > 0$	Import	Consumption	Generation
$P < 0$	Export	-(Generation)	Consumption (Reverse power)
$Q > 0$	Import	Inductive load	Generation
$Q < 0$	Export	Capacitive load	Consumption
			

Mains

- > Exported active power is supplied to the mains. It is displayed in negative numbers e.g. -20 kW.
- > Imported active power is consumed from the mains. It is displayed in positive numbers e.g. +20 kW.

- When reactive power is imported (>0) IntelliSys Gas displays L (inductive) character of the load.
- When reactive power is exported (<0) IntelliSys Gas displays C (capacitive) character of the load.

Load

- Active power consumed by Load is displayed in positive numbers e.g. 20 kW.
- When reactive power is positive (>0) IntelliSys Gas displays L (inductive) character of the load.
- When reactive power is negative (<0) IntelliSys Gas displays C (capacitive) character of the load.

Gen-set

- Generated active power is displayed in positive numbers e.g. 20 kW.
- When reactive power is positive (>0) IntelliSys Gas displays L (inductive) character of the generated power.
- When reactive power is negative (<0) IntelliSys Gas displays C (capacitive) character of the generated power.

Power control options are dependent on which application is selected.

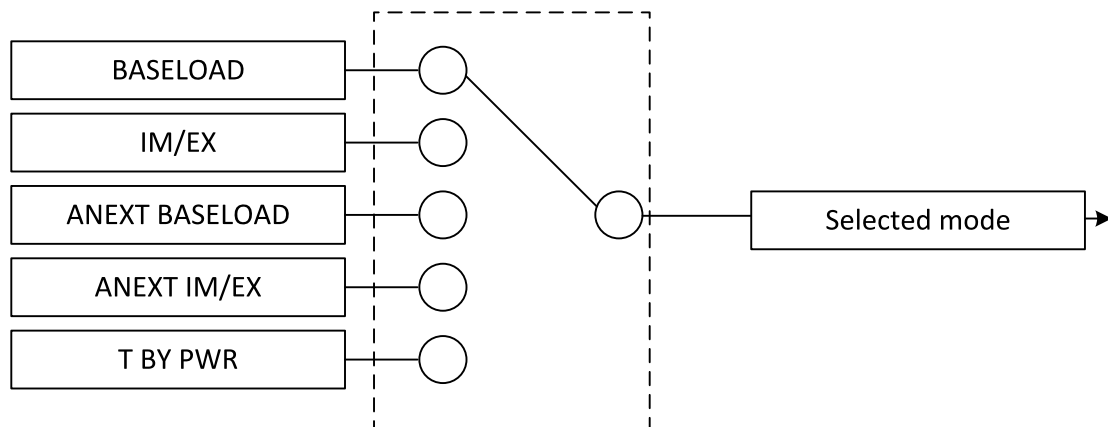
SPtM power control

It is possible to set active and reactive power control in Parallel to Mains operation to different modes in SPtM application.

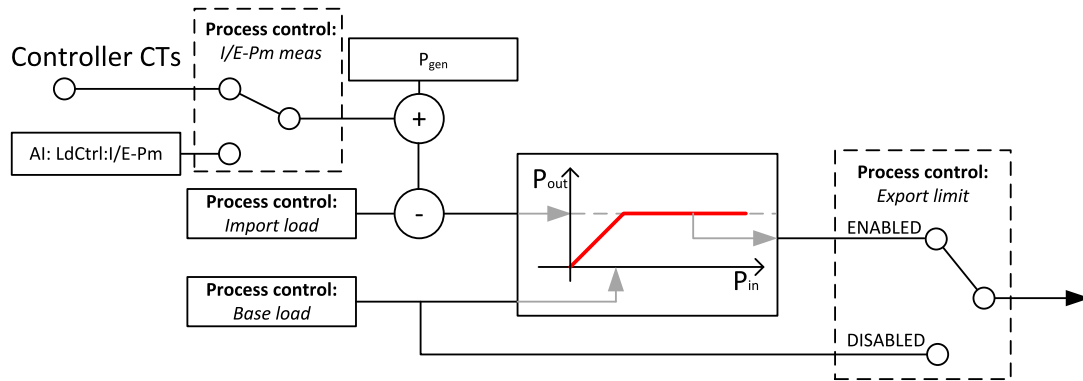
Note: In Island operation the controller does not control power. It regulates on frequency and voltage. In case of several Gen-set sets in Island operation running in Parallel to each other, Load sharing regulation is active.

SPtM active power control

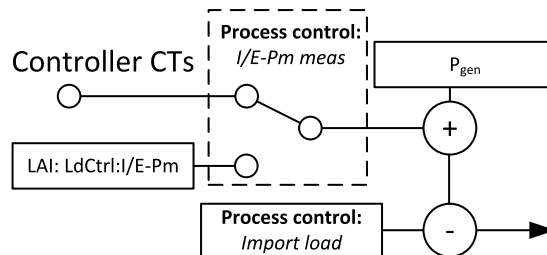
The following diagram shows all the available options for active power control. The selection is done using setpoint **Load ctrl PtM** (page 328).



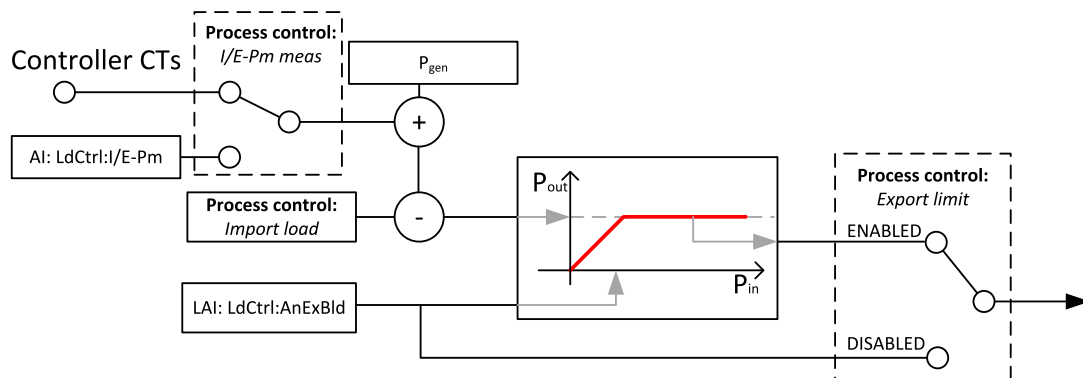
Base load power control



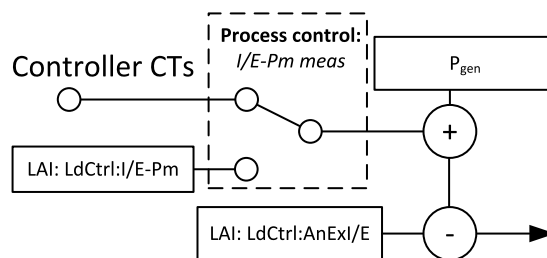
Import/Export power control



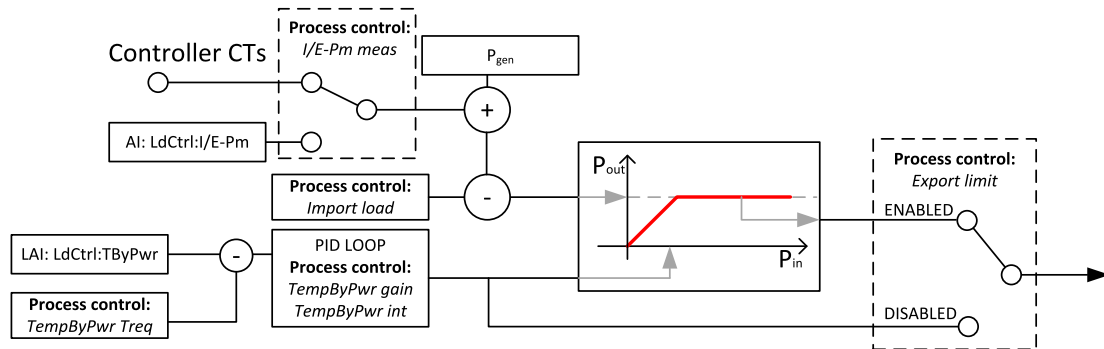
Base load from analog value



Import/export from analog value



Temperature regulation by active power



SPtM reactive power control

The reactive power control recognizes few main modes which could be switched via setpoint **PF/Qctrl PtM** (page 328).

PF control mode

The power factor of generator is controlled according to adjusted setpoint **Base PF** (page 326). The required value **Required PF3dc** (page 636) should be equal to actual value **Pwr factor** (page 596).

PF/Pm mode

Grid codes specific functionality where the power factor depends on the actual power of the generator.

Q control mode

The reactive power of generator is controlled according to adjusted setpoint **Base Q** (page 326). The required value **Required Q** (page 635) should be equal to actual value **React power** (page 594).

Q(Um) mode

Grid codes specific functionality where the **Required Q** (page 635) depends on the actual mains voltage.

Q(P) mode

Grid codes specific functionality where the **Required Q** (page 635) depends on the actual power of the generator.

Qref/Ulim mode

Grid codes specific functionality where the **Required Q** (page 635) depends on the actual mains voltage with a modified behavior than Q(Um) mode.

Reactive power control – analog extern control

The above mentioned modes except PF(Pm) and Q(P) could be also controlled via analog signal. For that reason there is a new setpoint **PF/Qctrl ANEXT** (page 329).

In case the required mode is chosen and setpoint **PF/Qctrl ANEXT** (page 329) is switched to ENABLED the correct LAI must be configured otherwise the alarm message is activated.

Reactive power control – import/export

The setpoint **PF/Qctrl PtM** (page 328) activates the regulation of import/export.

In case the required mode is chosen and setpoint **PF/Qctrl IM/EX** (page 329) is switched to ENABLED the correct condition for import/export measurement must be fulfilled:

- Setpoint **I/E-Qm meas** (page 330) switched to IM3 CT INPUT and the CT must be wired on the 3.phase of ma

➤ Setpoint I/E-Qm meas (page 330) switched to ANALOG INPUT and the correct LAI must be configured

Mode	Description
PF control mode	The power factor of generator is controlled according to adjusted setpoint Import PF (page 327) . The required value Required PF3dc (page 636) should be equal to actual value Mains PF (page 606) .
PF/Pm mode	Grid codes specific functionality where the power factor of the mains depends on the actual power of the generator.
Q control mode	The reactive power of generator is controlled according to adjusted setpoint Import Q (page 327) . The required value Required Q (page 635) should be equal to actual value Q mains (page 606) .
Q(Um) mode	Grid codes specific functionality where the Q mains (page 606) depends on the actual mains voltage.
Q(P) mode	Grid codes specific functionality where the Q mains (page 606) depends on the actual power of the generator.
Qref/Ulim mode	Grid codes specific functionality where the Q mains (page 606) depends on the actual mains voltage with a modified behavior than Q(Um) mode.

SPI power control

It is possible to set active and reactive power control in Parallel to Mains operation to different modes in SPI application.

Note: In Island operation the controller does not control power. It regulates on frequency and voltage. In case of several Gen-set sets in Island operation running in Parallel to each other, Load sharing regulation is active.

The SPI control modes are the same as in SPtM application. Please refer to the chapter **SPtM power control (page 96)**.

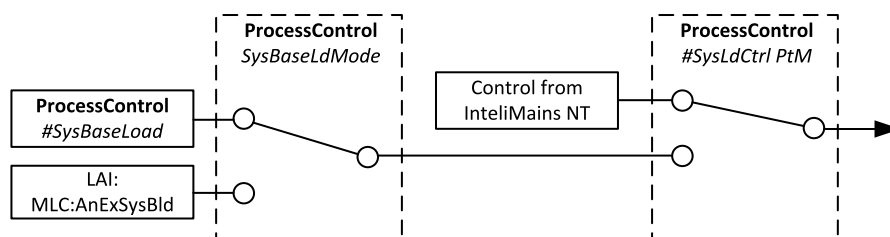
MINT power control

It is possible to set active and reactive power control in Parallel to Mains operation to different modes in MINT application.

Note: In Island operation the controller does not control power. It regulates on frequency and voltage. In case of several Gen-set sets in Island operation running in Parallel to each other, Load sharing regulation is active.

MINT active power control

The following diagram shows all the available options for active power control. The selection is done using setpoints **#SysLdCtrl PtM (page 324)** and **SysBaseLdMode (page 324)**.



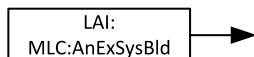
Note: Control from InteliMainsNT allows controlling import/export for the whole group of Gen-sets and it is described in the manual for InteliMainsNT.

System base load power control



Note: The requested value is used for the whole group of Gen-sets and split based on Load sharing or VAR sharing.

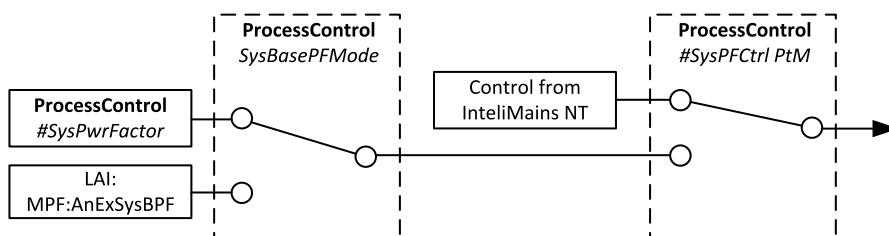
System base load from analog value



Note: The requested value is used for the whole group of Gen-sets and split based on Load sharing or VAR sharing.

MINT reactive power control

The following diagram shows all the available options for reactive power control. The selection is done using setpoints **#SysPFCtrl PtM** (page 324) and **SysBasePFQMode** (page 325).



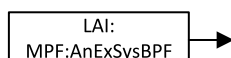
Note: Control from InteliMainsNT allows controlling import/export for the whole group of Gen-sets and it is described in the manual for InteliMainsNT.

System base PF control



Note: The requested value is used for the whole group of Gen-sets and split based on Load sharing or VAR sharing.

System base PF from analog value



Note: The requested value is used for the whole group of Gen-sets and split based on Load sharing or VAR sharing.

COX power control

It is possible to set active and reactive power control in Parallel to Mains operation to different modes in COX application.

Note: In Island operation the controller does not control power. It regulates on frequency and voltage. In case of several Gen-set sets in Island operation running in Parallel to each other, Load sharing regulation is active.

The COX control modes are the same as in MINT application. Please refer to the chapter **MINT power control** (page 99).

Combi power control

It is possible to set active and reactive power control in Parallel to Mains operation to different modes in Combi application. It depends on which actual mode is selected in Combi.

Note: In Island operation the controller does not control power. It regulates on frequency and voltage. In case of several Gen-set sets in Island operation running in Parallel to each other, Load sharing regulation is active.

The Combi control modes are the same as in SPI, SPtM or MINT application. Please refer to the chapters **SPI power control (page 99)**, **SPtM power control (page 96)** or **MINT power control (page 99)**.

5.3.4 Regulation loops

Regulation loops overview

There are following regulation loops built-in in the controller. All of them are PI type except angle loop, which is P type.

Loop Type	Related Applications	Description
Frequency loop	ALL	The frequency loop is active in the first phase of synchronization when the generator frequency is regulated to match the mains/bus frequency. This loop can be also active while the Gen-set is running without load at nominal speed and/or in single-island operation. See the setpoint Freq reg loop / RPM reg loop (page 448)
Angle loop	ALL	The differential angle control loop is active during the synchronization when the "near to zero" slip frequency has been successfully achieved and then the differential angle between generator and mains/bus voltage shall be controlled to the value adjusted by the setpoint GtoM AngleReq (page 445) .
Load control loop	ALL	This regulation loop is active when single Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple Gen-sets are running in parallel with Mains.
Temperature By Power control loop	SPtM, SPI, Combi	This regulation loop is active when single Gen-set is running in parallel with mains and Load ctrl PtM (page 328) is set to T BY PWR. The Gen-set power is controlled to maintain constant engine temperature. Since temperature changes slowly, this regulation is evaluated in 20 seconds loop. For more information, see the setpoint TempByPwr Treq (page 335) .
Load sharing loop	MINT, COX, Combi	The load sharing loop is active in multiple-island operation (while the input MCB feedback is not active). This loop is also active (using P,I factors multiplied by 0.1)

Loop Type	Related Applications	Description
Voltage loop	ALL	on the "background" while load sharing is being performed (multiple-island operation) to maintain the group frequency at nominal value.
		<p>This regulation loop is also active if the Gen-set is running in multiple island mode, however it is running in local baseload mode instead of load sharing.</p> <p>The voltage control loop is active during synchronization (the generator voltage is matched to the mains/bus voltage - see the example below) and during the island operation in SPtM (the Gen-set voltage is maintained at the nominal voltage).</p> <p>Example: GenNomV (page 351) is set to 220 V and MainsNomV (page 352) is set to 230 V. During the synchronization measured voltage on Mains/Bus is 235 V. Controller regulates the generator voltage to the following value: $235/230 = 1.02174 \cdot 220 = 225$ V. This enables usage of transformers between the measurement terminals.</p> <p>This loop is also active in the controller with the lowest CAN address in the control group (using P,I factors multiplied by 0.1) on the "background" while VAr sharing is being performed (multiple-island operation) to maintain the group voltage at nominal value.</p>
Cos-phi loop	ALL	<p>This regulation loop is active when single Gen-set is running in parallel with the mains.</p> <p>This regulation loop is also active when multiple Gen-sets are running in parallel with mains in BASEPF mode i.e. there is no IM-NT in charge of cos phi regulation (e.g. import/export control).</p>
VAr sharing loop	COX, MINT, Combi	The VAr sharing loop is active in multiple-island operation (while the input MCB feedback is not active) or in multiple-parallel operation if the cos phi is controlled from an IM-NT (i.e. the setpoint #SysPFCtrl PtM is in VSHARING position).

PI regulation adjustment

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 influences the steady-state error as well as the settling time. See the picture below for typical responses of a PI regulation loop.

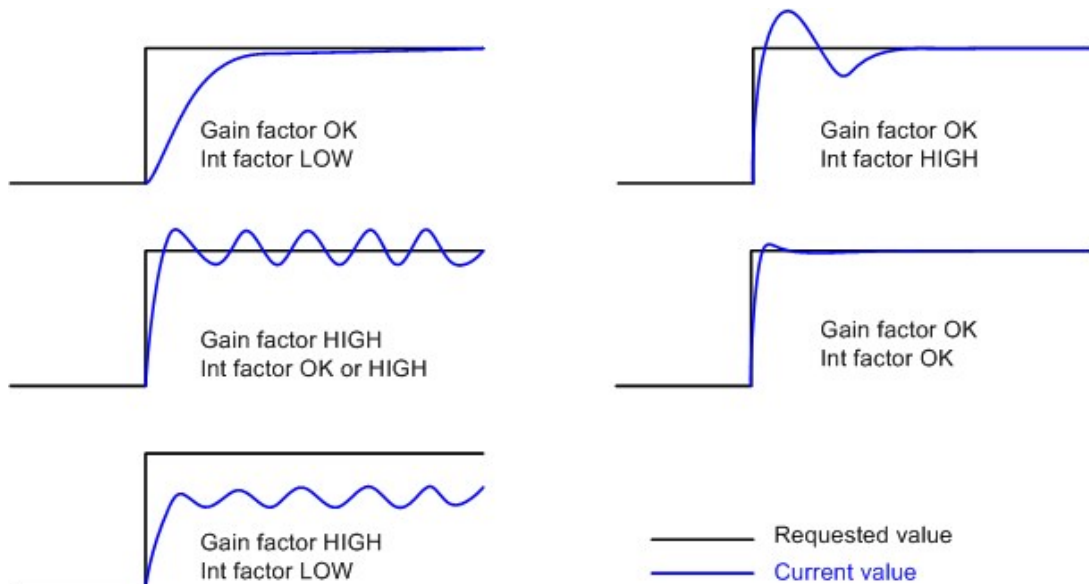


Image 5.1 Typical responses of PI regulator

For manual tuning of a control loop use following method:

1. Set both the I-factor and P-factor to 0.
2. Increase the P-factor slightly until the system starts to oscillate.
3. Adjust the P-factor back to approx. one half of the value where the oscillations started.
4. Increase the I-factor slightly to achieve optimal resulting response.

Note: It may be helpful to disable issuing the GCB close command when adjusting synchronization loops. Adjust the setpoint Phase window to 0 to disable it. Adjust the setpoint back to it's original value after the adjustment is finished.

IMPORTANT: Be ready to press emergency stop button in case the regulation loop would start to behave unacceptable while it is being adjusted.

5.3.5 Synchronization

Phase match

The phase match synchronizing consists of voltage matching and frequency/angle matching. The maximum duration of synchronizing is given by the setpoint **Sync timeout / RPM match TOut (page 452)**. If the synchronizing is not successful within this period of time, the Sync Timeout alarm will be issued.

Voltage matching

The gen-set voltage is regulated to match the mains/bus voltage with tolerance given by the setpoint **Voltage window (page 445)**. The regulation is adjusted by the setpoints **Voltage gain (page 497)** and **Voltage Int (page 498)**.

Frequency/angle matching

The gen-set frequency is regulated to match the mains/bus frequency first. The frequency regulation loop is active (setpoints **Freq gain / RPM gain (page 447)** and **Freq int / RPM int (page 447)**). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint **Angle Gain (page 448)**). When the angle is matched with tolerance \pm **Phase window (page 446)** for a time given by the setpoint **Dwell time (page 446)** and the voltage is matched too, then the GCB is closed.

Note: The matching loops will continue to run even if the GCB close command has been already issued until the controller receives **GCB FEEDBACK (PAGE 707)** or a GCB fail alarm occurs. After the feedback has been received, the control loops are switched to load and power factor loops or load and power factor sharing respectively.

Slip synchronization

The slip synchronizing is based on frequency/angle matching. The maximum duration of synchronizing is given by the setpoint **Sync timeout / RPM match TOut (page 452)**. If the synchronizing is not successful within this period of time, the Sync Timeout alarm will be issued.

The Gen-set frequency is regulated to match the mains/bus frequency + **Slip Frequency (page 454)** value and the window is set by setpoint **Slip Freq Win / RPM window (page 455)**. When the generator frequency reaches (Mains/Bus Frequency + Slip frequency) value regulation loop is stopped (output is frozen at the actual value). If the generator frequency remains inside the window for the time longer than setpoint **Dwell time (page 446)** the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip freq (page 601)** and CB closing delay given by the setpoint **CB Latency**). 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).

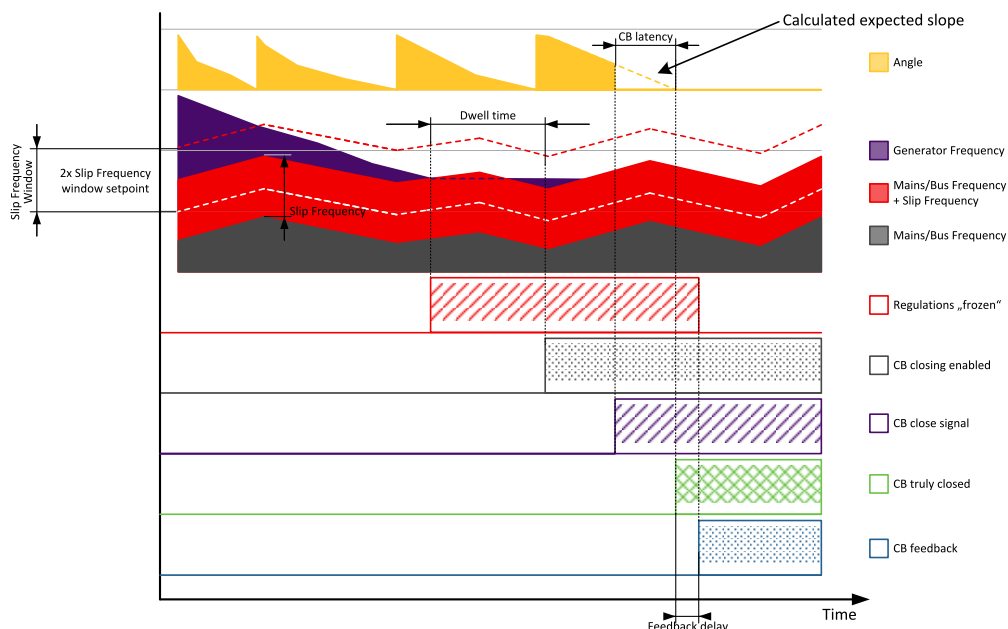


Image 5.2 Slip synchronization

If the generator frequency goes out of the window (either because generator frequency changes or Mains/Bus frequency changes or setpoint **Slip Freq Win / RPM window (page 455)** changes) the controller will reactivate regulation loop and try to reach the target value again. The sync timeout timer runs regardless of this. If the generator frequency reaches the target frequency again the regulations are frozen and if the

generator frequency remains in the window for the time longer than setpoint **Dwell time** (page 446) the controller will continue in the standard sequence as seen in the previous case. *If the sync timeout elapses the controller will immediately stop synchronization – should be described in standard function Synchronization timeout.

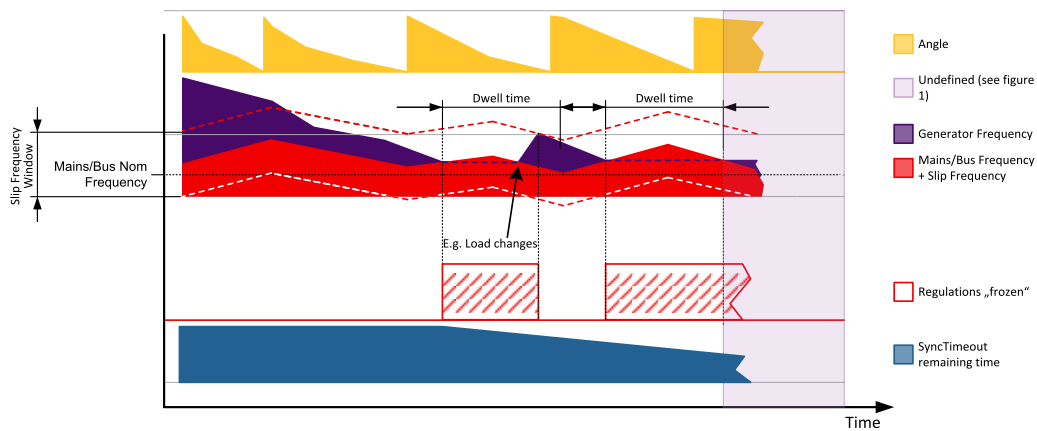


Image 5.3 Slip synchronization

The window is limited by the actual measured Mains/Bus frequency if one of the window limits is below this value (e.g. for setting where setpoint **Slip Frequency** (page 454) is set to 0.1 Hz and setpoint **Slip Freq Win / RPM window** (page 455) is set to 0.5 Hz).

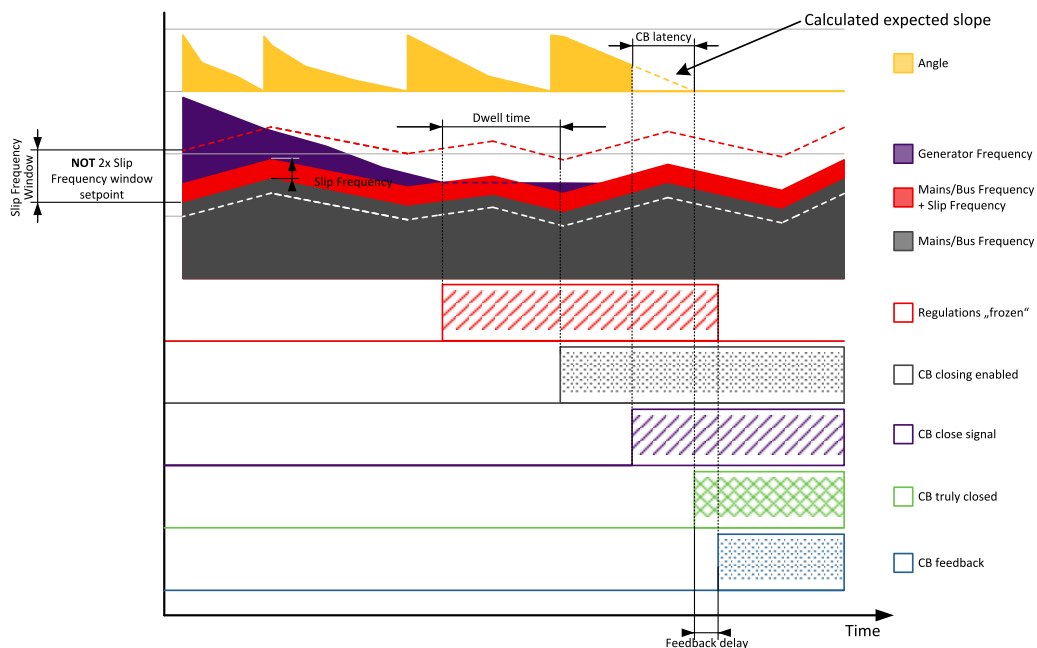


Image 5.4 Slip synchronization

There is an acceptable "band" around the calculated preclosing angle. This band is under normal circumstances no bigger than 2° on both sides (for limit conditions value **Slip freq** (page 601) =0.5 Hz and value Gen f=49 Hz).

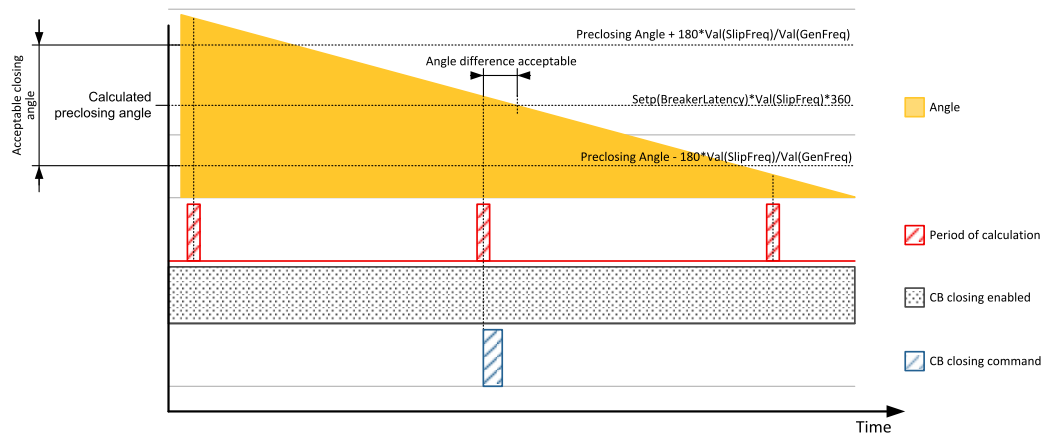


Image 5.5 Slip synchronization – acceptable angle difference

If the preclosing angle window is not sampled in one run the controller will wait for sampling of the angle from within the window before issuing closing command.

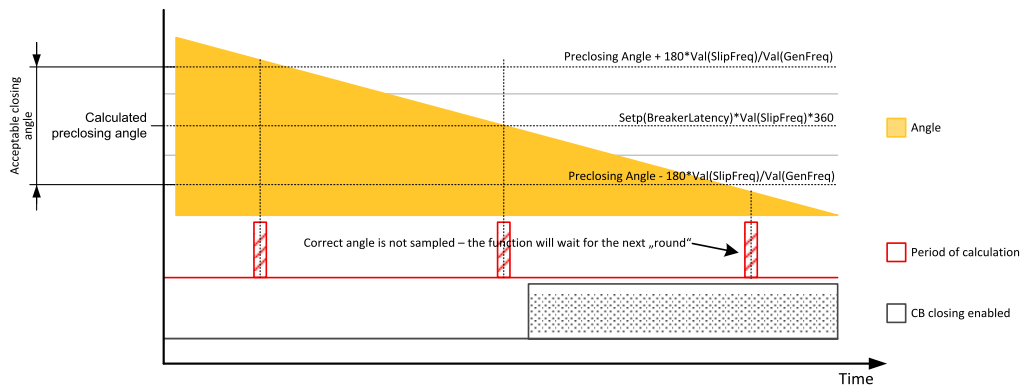


Image 5.6 Slip synchronization – not acceptable angle

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.

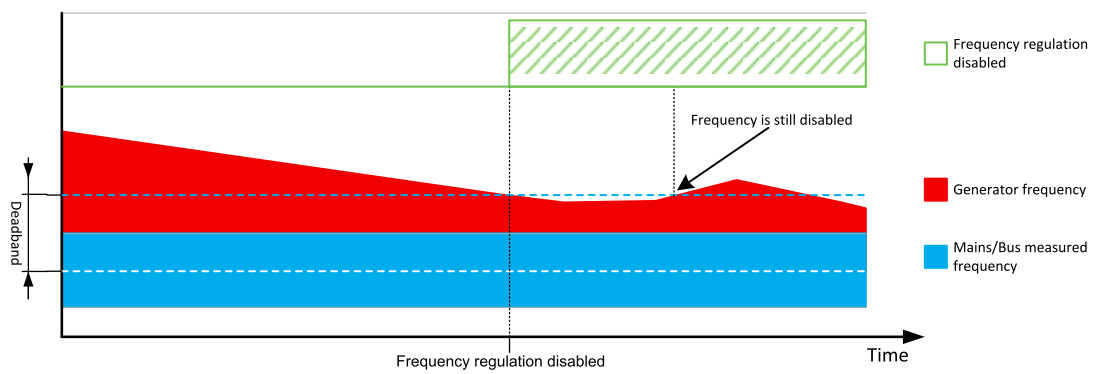
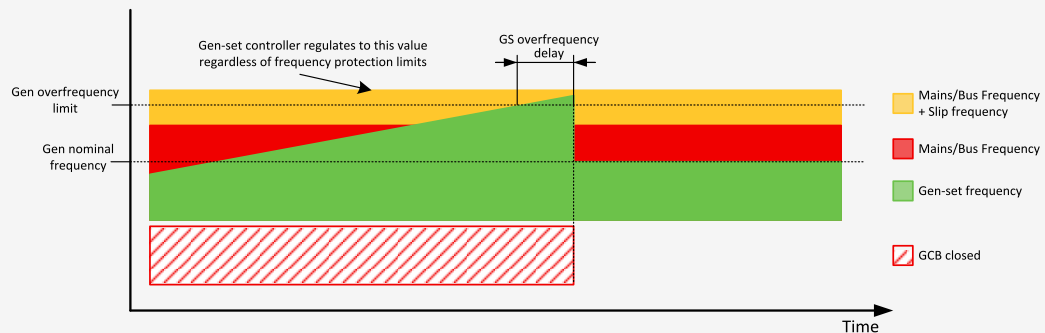


Image 5.7 Slip synchronization – deadband

Note: Due to the nature of this function it is possible that in limit cases the gen-set controller will regulate the generator frequency outside of protection limits. Example: Mains/Bus frequency is high but within its protection limits (e.g. 50.9 Hz, limit is 51 Hz). **Slip Frequency (page 454)** is set to 0.5 Hz. This will cause regulation loop of the gen-set controller to push the gen-set frequency to 51.4 Hz and eventually the controller will issue overfrequency delay. It is recommended to set the setpoint **Slip Frequency (page 454)** 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/Bus Frequency protection limits to more rigid values than the generator frequency protection limits. In this case the setpoint **Slip Frequency (page 454)** can be set to 0.1 Hz and the Mains/Bus Frequency overfrequency protection limit is set to 50.9 Hz instead of 51 Hz. This will ensure that problematic state cannot be reached.



Startup Synchronization

Conditions when Startup Synchronization can be used

- Setpoint **SUS sequence (page 341)** = ENABLED
- RPM pick-up is connected (i.e. RPM is not calculated from the measured frequency)
- No voltage (voltage < 5 V) on the bus
- MCB is opened (applicable where MCB is controlled)
- LBI **GCB DISABLE (PAGE 706)** is not activated
- LBI **SUS EXCIT BLCK (PAGE 746)** is activated before Start command if setpoint **ExcitationCtrl (page 345)** = EXTERNAL
- In case of enabled power management – the Gen-sets are started based on actual Load reserves.
- GCB feedback must activate during **Prestart time (page 379)**. If it does not activate during **Prestart time (page 379)**, then the Gen-set is switched to standard start sequence.

Soft magnetising of a transformer

SPtM or SPI is usually used for this function.

In cases where the load is a huge transformer and standard application is used, there may be a situation where the Gen-set is started and it is about to close GCB to a transformer.

During first energizing of a transformer, a transient inrush current is up to 10 to 15 times larger than the rated transformer current (this inrush current can flow for several cycles.)

For elimination of this high current (inrush current) – Startup synchronization (or SUS) sequence can be used.

The principal is to energize the transformer at lower voltage.

Gen-set is started with closed GCB at will therefore connect to the transformer with no voltage and no current flows.

In first step the Gen-set is started without excitation (without voltage), when the RPM reaches a limit the excitation is started.

AVR with possibility to set voltage ramp is recommended for use to customize the voltage ramping.

Transformer is in this case energized slowly from lower voltage which causes lower inrush current.

Detailed description of the process

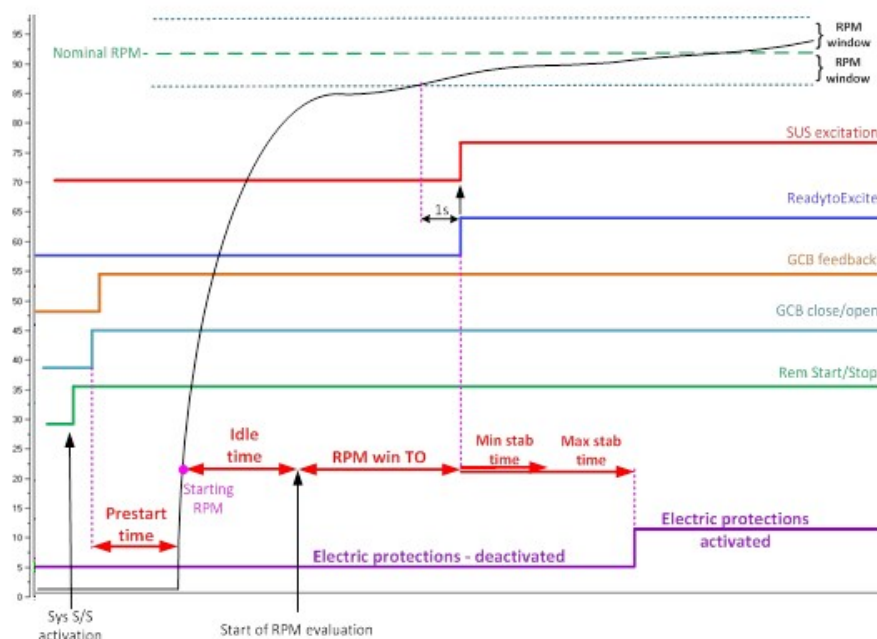
For configuration of SUS sequence please refer to the setpoints from group SUS control setpoint group.

The following settings are the most important:

- **ExcitationCtrl (page 345)**: for configuration of internal or external excitation on/off control.
- **SUS sequence (page 341)**: for activation and deactivation of SUS sequence.
- **RPM window (page 342)**: it defines the RPM window, where a Gen-set can be excited.
- **RPM win TO (page 344)**: it defines RPM window Time Out i.e. the maximum time for achieving RPM window and activating LBO **ReadyToExcite (page 837)**, if the controller does not activate LBO **READYTOEXCITE (PAGE 837)** in this time, the GCB is opened and Gen-set is started the standard way.

Examples

Example: SPtM or SPI application, **ExcitationCtrl** (page 345) = INTERNAL
RPM reaches **RPM window** (page 342) in time of **RPM win TO** (page 344).



After **SYS START/STOP** (PAGE 747) activation the delay **Prestart time** (page 379) is counted, then the Gen-set is started.

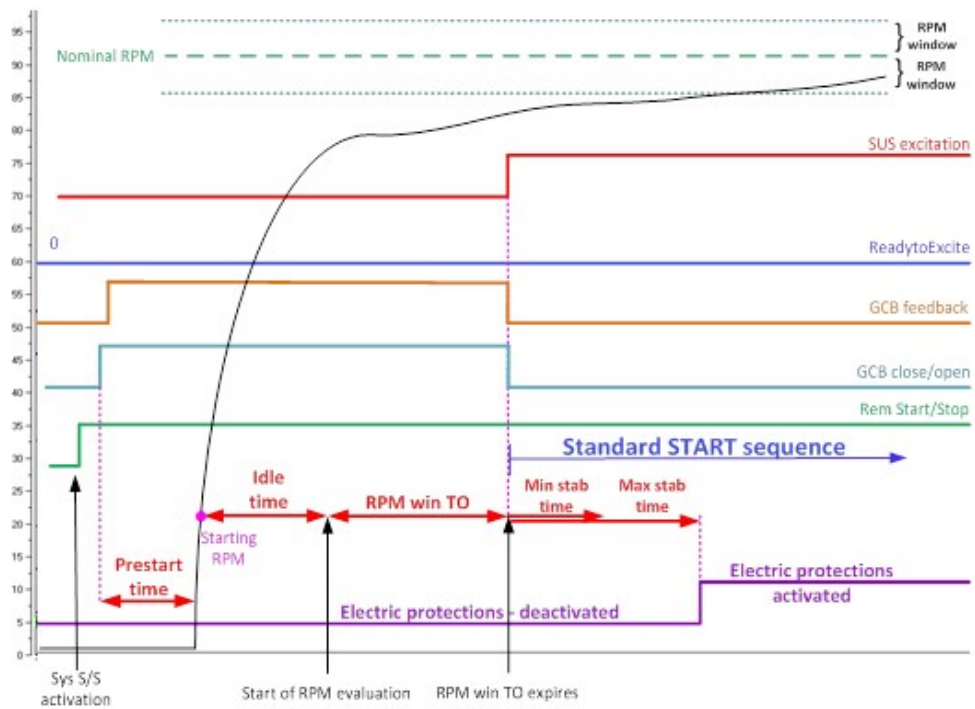
If the start command comes from AMF function, the delay **EmergStart del** (page 424) is counted before the start sequence is initiated.

After achieving starting RPM (**Starting RPM** (page 378)) the time **Idle time** (page 381) is counted. When the Idle time is up the evaluation of RPM in **RPM window** (page 342) is activated. When the RPM are in the RPM window for 1s LBO **READYToEXCITE** (PAGE 837) is activated (for correct SUS sequence LBO **READYToEXCITE** (PAGE 837) has to come in time **RPM win TO** (page 344)). LBO **READYToEXCITE** (PAGE 837) causes activation of LBO **SUS EXCITATION** (PAGE 846) which activates AVRi and its excitation. After activation of LBO **SUS EXCITATION** (PAGE 846) the delays **Min stab time** (page 382) and **Max Stab Time** (page 382) are activated.

Electric protections (for more information on this type of protections **see Protections and Alarm management on page 194**) are activated when voltage and frequency are within limits (during **Max Stab Time** (page 382)) or when **Max Stab Time** (page 382) is up.

Example: SPtM or SPI application, **ExcitationCtrl (page 345) = INTERNAL**

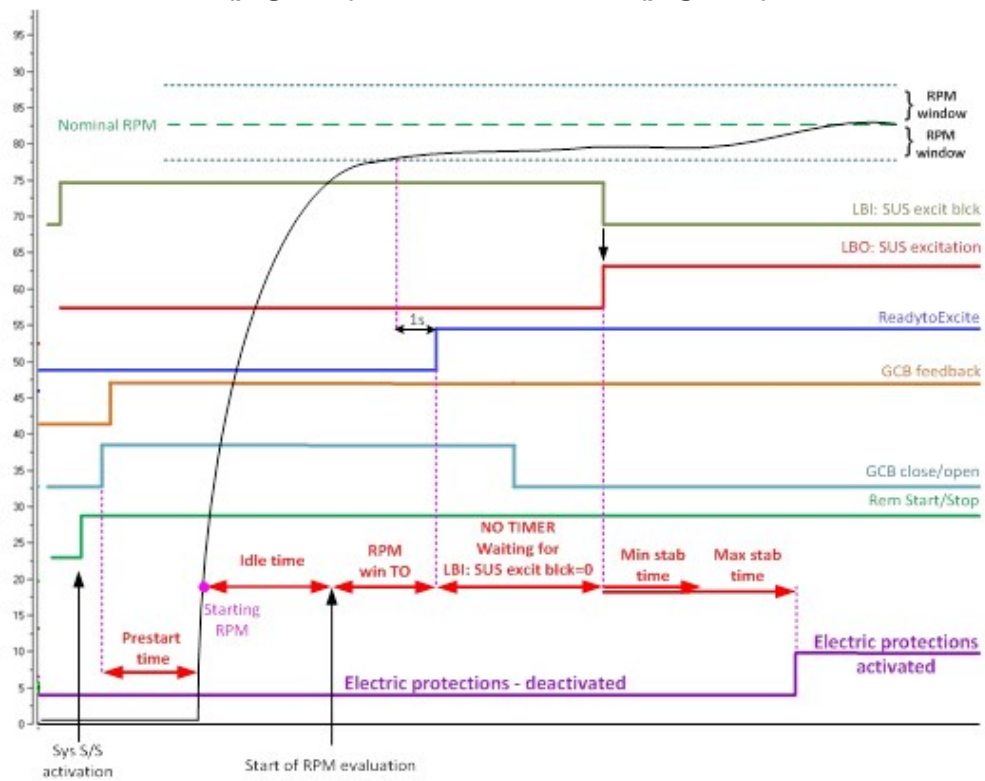
RPM does not reach **RPM window (page 342)** in time of **RPM win TO (page 344)**.



The picture shows the situation when RPM does not reach **RPM window (page 342)** and LBO **READYTOEXCITE (PAGE 837)** is not activated in delay **RPM win TO (page 344)**. This causes opening of the GCB and standard start sequence when **RPM win TO (page 344)** delay is up.

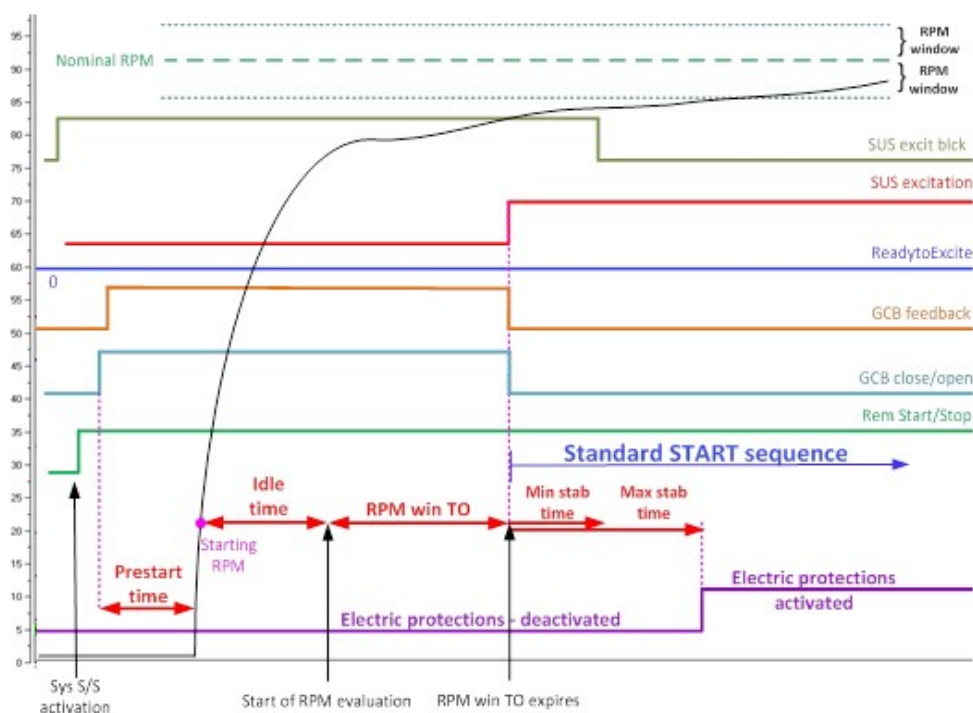
Example: SPtM or SPI application, **ExcitationCtrl (page 345) = EXTERNAL**

RPM reaches **RPM window (page 342)** in time of **RPM win TO (page 344)**.



Picture shows process of starting the Gen-set achieving the **RPM window (page 342)** and activation LBO **READYTOEXCITE (PAGE 837)** in **RPM win TO (page 344)**. After this there is no timer and controller/system waits for activation of excitation (deactivation of LBI **SUS EXCIT BLCK (PAGE 746)**). After activation of excitation the **Min stab time (page 382)** and **Max Stab Time (page 382)** follow.

Example: SPtM or SPI application, **ExcitationCtrl (page 345) = EXTERNAL**
RPM does not reach **RPM window (page 342)** in time of **RPM win TO (page 344)**.



When timer **RPM win TO (page 344)** is up and LBO **READYToExcITE (PAGE 837)** is not activated the system is switched over to standard start sequence. This causes GCB to open and the controller activates excitation (LBI **SUS EXCIT BLK (PAGE 746)** is ignored from this moment and excitation is controlled INTERNALLY).

Simultaneous start and synchronization of several Gen-sets

MINT is usually used for this function.

Several Gen-set may start and synchronize simultaneously. This provides a great advantage because the Gen-sets are ready to provide full power of the group at once.

All Gen-sets are started with closed GCBs and without excitation (no voltage), when the required number of Gen-sets (according to their nominal power and condition **#SUS min power (page 344)**) are in the RPM window (given by setpoints shown in the detailed description of the process) with active LBO **READYToExcITE (PAGE 837)**, then all rest of Gen-sets are disconnected (GCBs are opened) and Gen-sets in the RPM window with active LBO **READYToExcITE (PAGE 837)** are excited.

Because the Gen-sets are rotating and they are connected together on the bus – and they are excited in the same moment – they are synchronized during the voltage ramping.

It is strongly recommended to use exactly the same Gen-set for this application (the same engines, generators, AVRIs etc.) to eliminate currents flowing among Gen-sets (it is necessary to have the same characteristic of starting RPM curves and voltage ramps).

Detailed description of the process

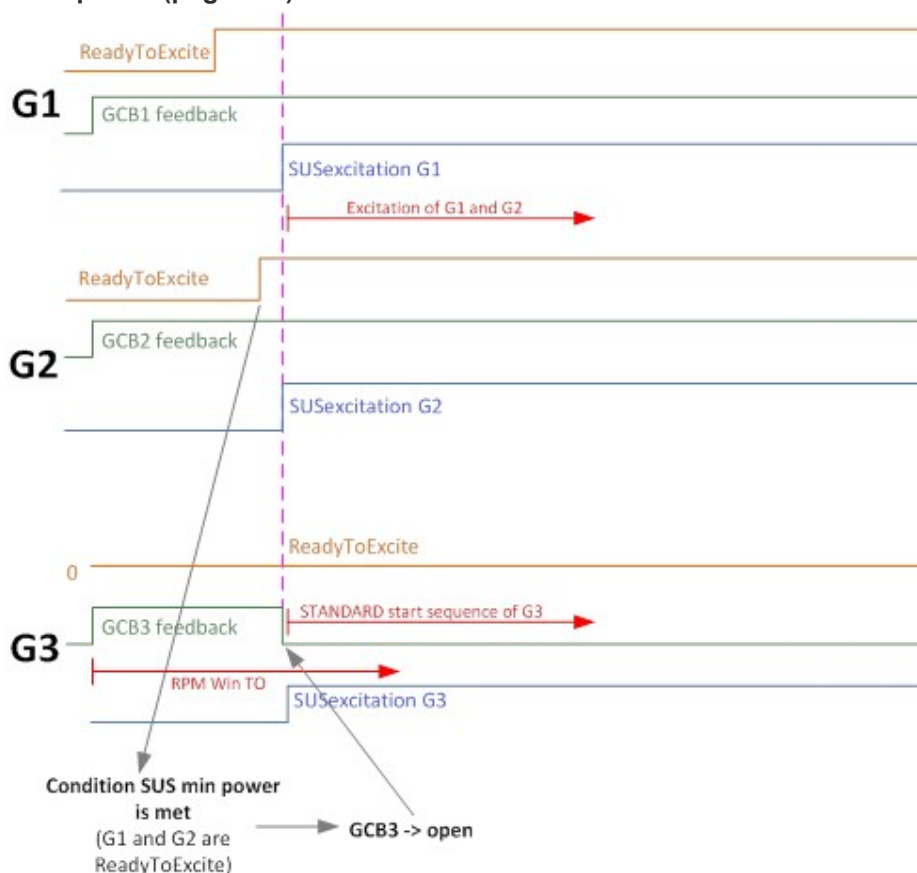
For configuration of SUS sequence please refer to the setpoints from group SUS control setpoint group.

The following settings are the most important:

- **ExcitationCtrl (page 345)**: for configuration of internal or external excitation on/off control.
- **SUS sequence (page 341)**: for activation and deactivation of SUS sequence.
- **RPM window (page 342)**: it defines the RPM window, where a Gen-set can be excited.
- **RPM win TO (page 344)**: it defines RPM window Time Out i.e. the maximum time for achieving RPM window and activating LBO **READYTOEXCITE (PAGE 837)**, if the controller does not activate LBO **READYTOEXCITE (PAGE 837)** in this time, the GCB is opened and Gen-set is started the standard way.
- **#ExcitationDel (page 342)**: it sets time for which Gen-sets that are ready to excite wait before activating their excitation.
- **#SUS min power (page 344)**: it sets minimum power that is needed for the Gen-set that are ready to excite to activate their excitation.

Examples

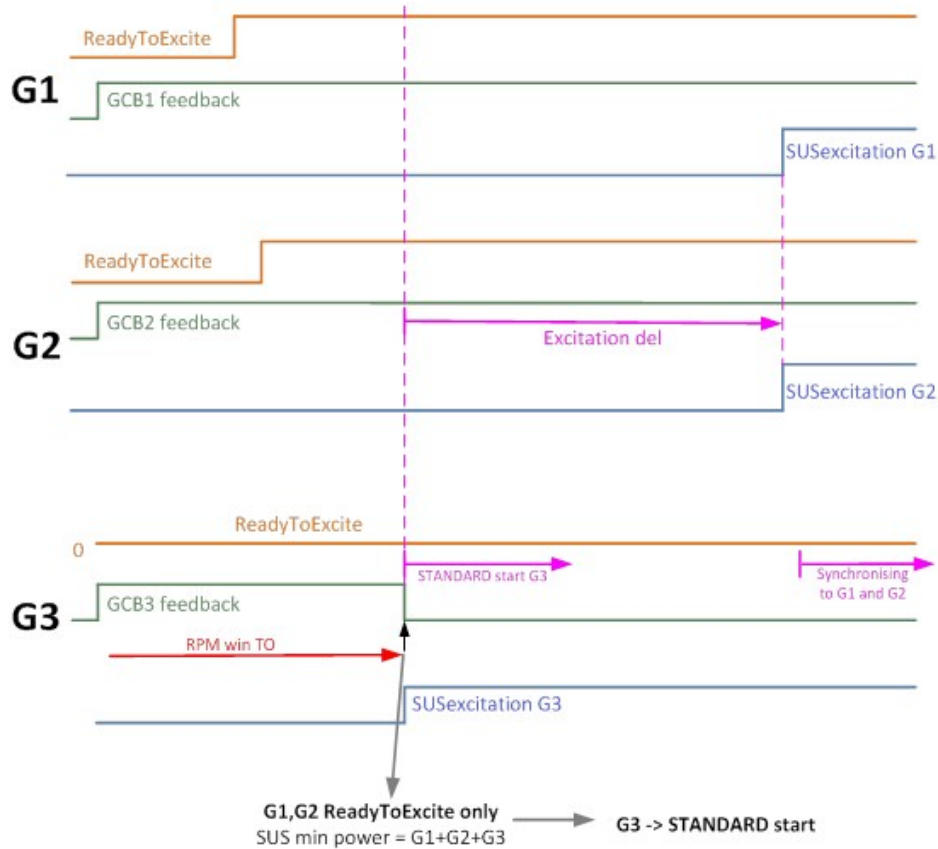
Example: MINT application, **ExcitationCtrl (page 345)** = INTERNAL, **#SUS min power (page 344)** = 2x Gen-set nominal power
Condition **#SUS min power (page 344)** is met.



The picture shows states of three Gen-sets in SUS sequence.

First two Gen-sets (G1 and G2) are in RPM window and with active LBO **READYTOEXCITE (PAGE 837)** – so the condition **#SUS min power (page 344)** is met -> G3 opens the GCB3 and G1 and G2 are excited (LBO **SUS EXCITATION (PAGE 846)** is activated). (G3 opens the GCB, it is switched to standard start and then will be synchronized to the bus in the standard way).

Example: MINT application, **ExcitationCtrl (page 345)** = INTERNAL, **#SUS min power (page 344)** = 3x Gen-set nominal power
Condition **#SUS min power (page 344)** is not met.



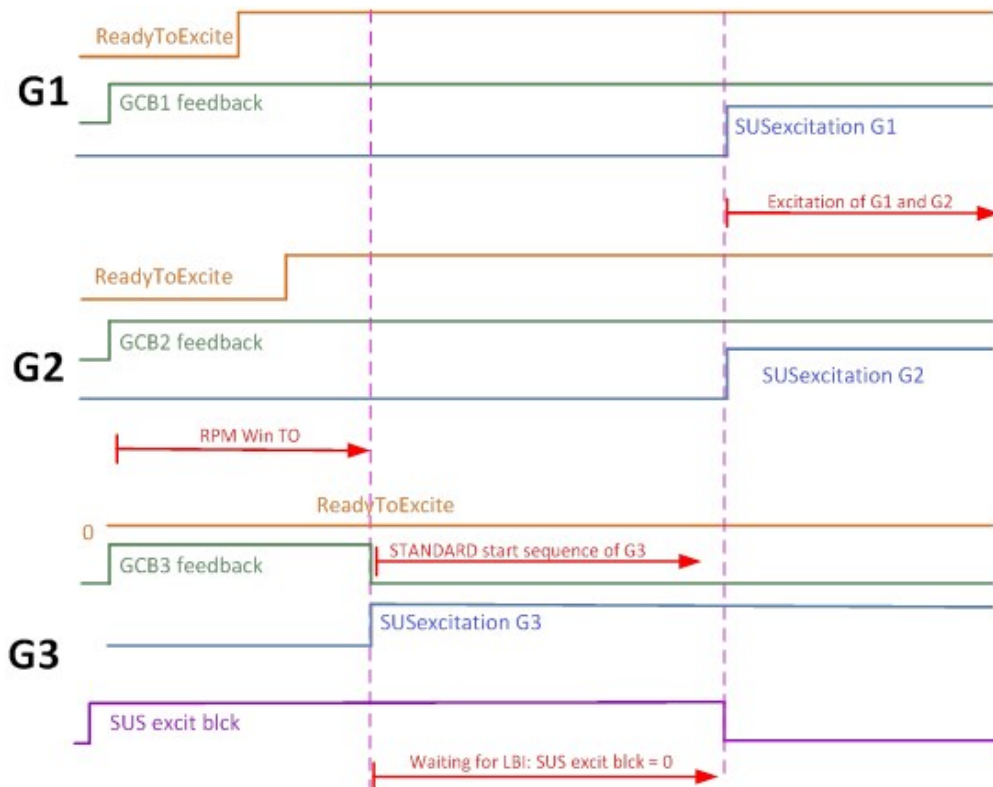
The picture shows states of three Gen-sets in SUS sequence.

First two Gen-sets (G1 and G2) are in RPM window and with active LBO **READYTOEXCITE (PAGE 837)**.

#SUS min power (page 344) is equal to the nominal power of 3 Gen-sets, but G3 does not activate LBO **READYTOEXCITE (PAGE 837)** in time of the setpoint **RPM win TO (page 344)** → G3 opens the GCB3 and it is switched over to standard start.

From opening the GCB3 the timer **#ExcitationDel (page 342)** is counted. When the timer is up, G1 and G2 are excited, then G3 can be synchronised to the bus the standard way.

Example: MINT application, **ExcitationCtrl** (page 345) = EXTERNAL, **#SUS min power** (page 344) = ignored when EXTERNAL is selected



In the case of EXTERNAL control of excitation all Gen-sets start in the SUS sequence (based on the Load reserves).

Gen-sets which activate LBO **READYTOEXCITE** (PAGE 837) in time **RPM win TO** (page 344) stay non-excited and wait for deactivation of LBI **SUS EXCIT BLCK** (PAGE 746). Then they are excited.

Gen-sets which do not active LBO **READYTOEXCITE** (PAGE 837) in time **RPM win TO** (page 344) are switched to standard start and open their GCB. Then they wait for voltage on the bus (excitation of group of Gen-sets started in SUS sequence). When there is healthy voltage they synchronize to the bus.

5.3.6 AFR

AFR control functionality is dedicated for gas engines only.

Overview

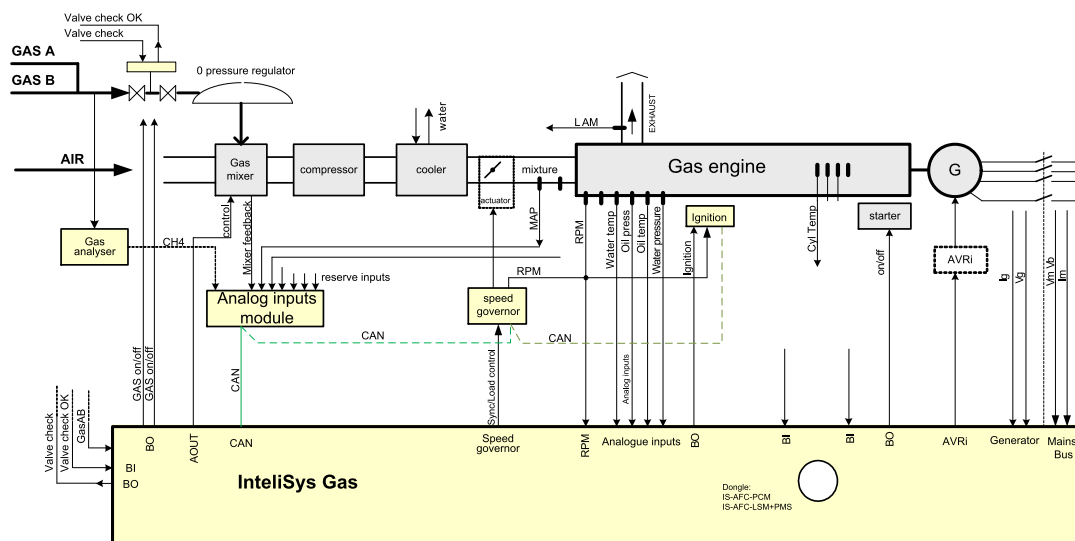


Image 5.8 AFR overview

Configuration

AFR functionality can be added as virtual extension module in GenConfig card Modules.

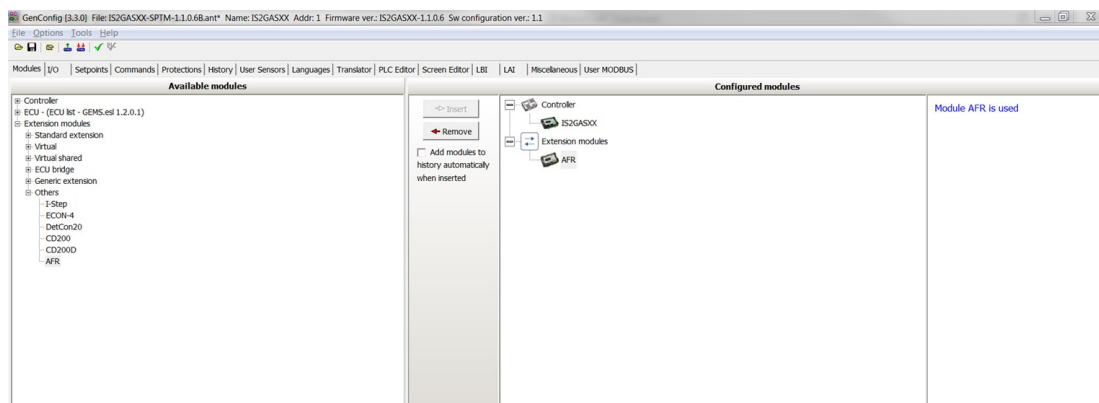


Image 5.9 AFR module configuration

After the AFR module is added, new setpoints and values for adjusting AFR functionality will be automatically opened.

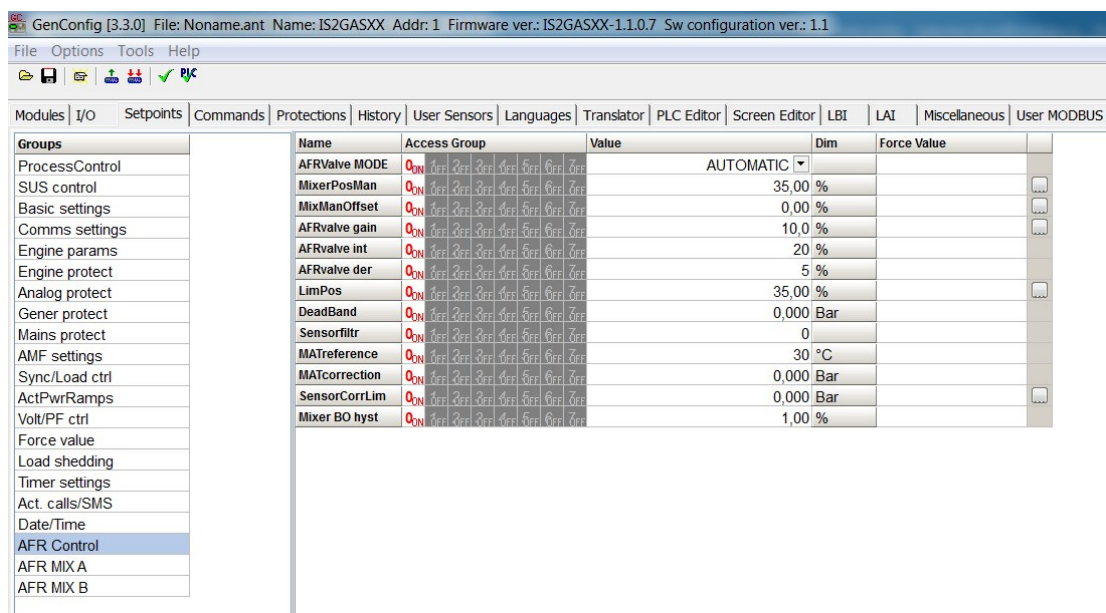


Image 5.10 AFR setpoints

Logical analog inputs, Logical binary inputs and Logical binary outputs are presented in configuration even if the AFR module is not configured but the function is locked.

Dongle

AFR control functionality is locked by special Dongle.

There are following types of Dongle:

IS-AFC-PCM or IGS-NT-AFR-PCM – for SPtM, SPI applications.

IS-AFC-LSM+PMS or IGS-NT-AFR-LSM+PMS – for MINT, Combi applications.

While the required Dongle is not present in controller when the AFR module is configured (**see Configuration on page 116**), then all values are placed in *AFR control* group and are fixed at zero value and the alarm message "*Dongle incomp*" is initiated.

Sensor configuration

For correct AFR functionality is required to chose the type of sensor, which will have influence for the mixer position.

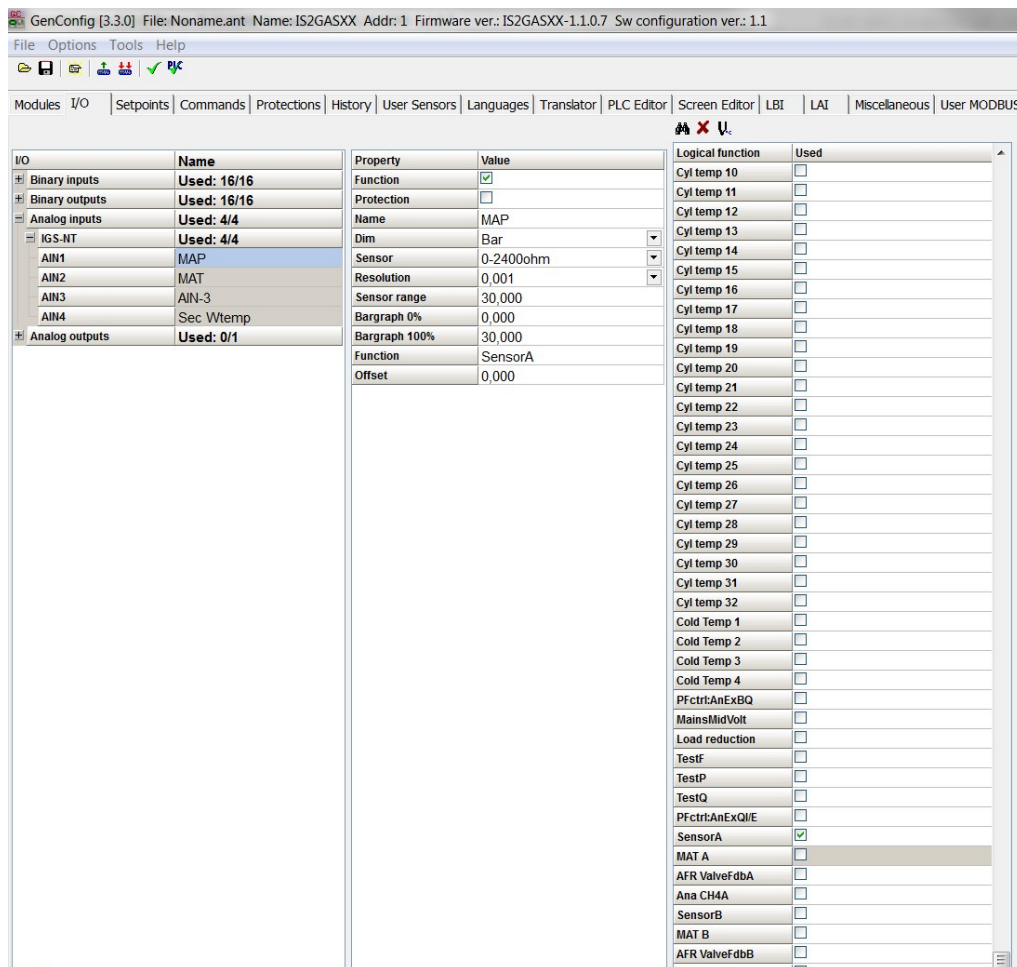


Image 5.11 AFR Sensor configuration

First of the required sensors is LAI: **SENSOR A (PAGE 895)**.

Note: Mostly is used MAP (Manifold air pressure), LAM (Lambda sonde) or Cylinder Temperature.

Second required sensor is LAI: **MAT A (PAGE 886)** (Manifold air temperature).

Range, dimension and resolution of these analog inputs are used as reference Values for dedicated setpoints.

IMPORTANT: If one of these sensors is not configured or have invalid value, the shut down is initiated and alarm message "AFRcontrolFLS" is displayed.

The LAI: **SENSORB (PAGE 895)** and **MAT B (PAGE 887)** are as optional used for control of second mixer.

LAI: **AFR VALVEFDBA (PAGE 869)** and **AAFR VALVEFDBB (PAGE 869)** serves as indicative value of mixer feedback.

For better correction of mixer position due to variable gas quality can be used the LAI: **ANA CH4A (PAGE 869)** resp. **ANA CH4B (PAGE 870)** which is connected with setpoints **MxPos40%CH4A (page 563)**, **MxPos60%CH4A (page 563)** resp. **MxPos40%CH4B (page 574)**, **MxPos60%CH4B (page 574)**.

Control

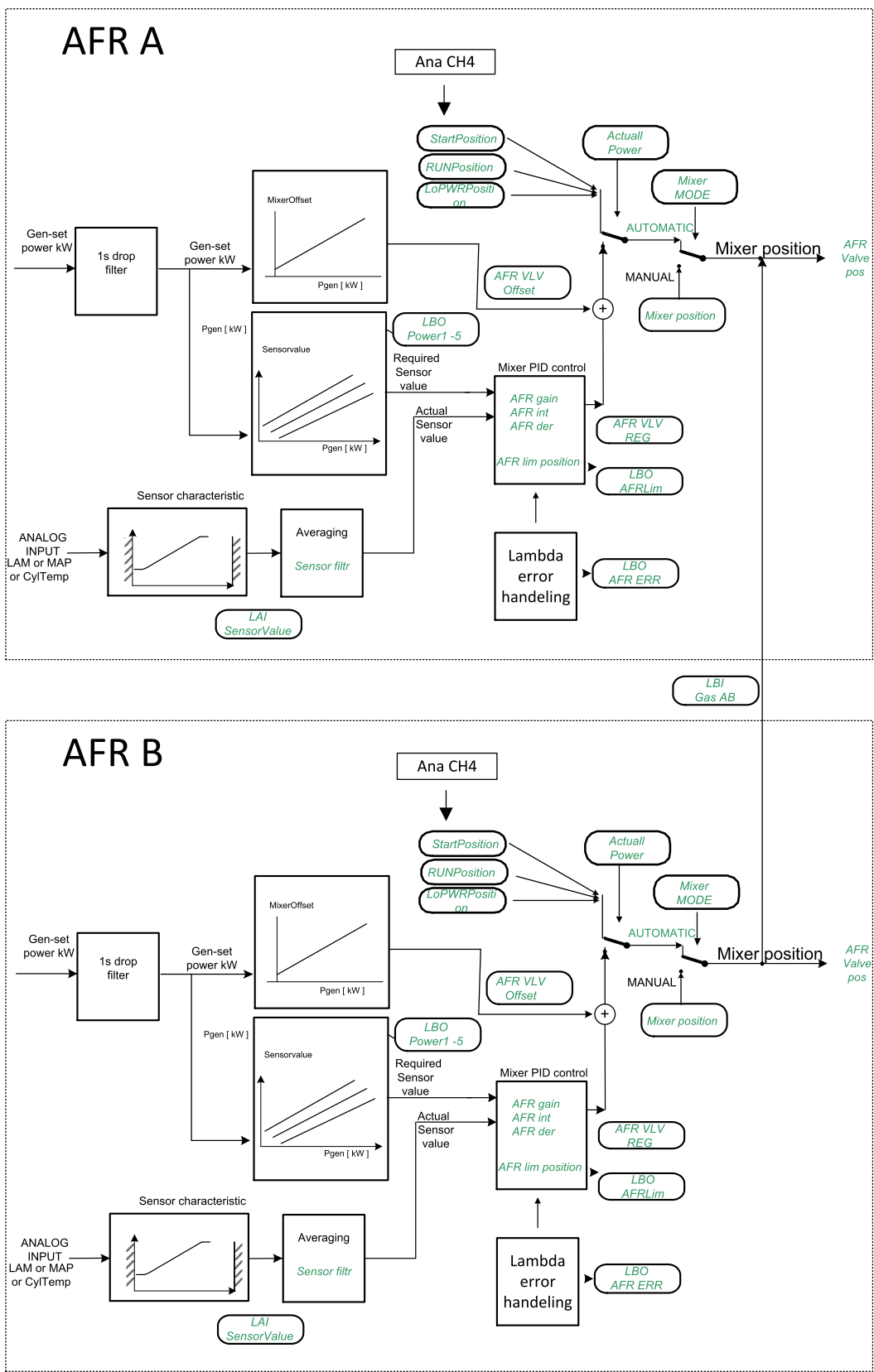


Image 5.12 AFR control

Mixer modes

Mixer can be operated in two modes AUTOMATIC or MANUAL and only the combinations listed below are possible:

- One Mixer, one fuel
- One mixer, two fuels
- Two mixers, one fuel

Configured					Alarm	Type of configuration	Description
LBI	LAI						
GasAB	SensorB	MATB	SensorA	MATA			
NO	NO	NO	NO	NO	YES	invalid	
NO	NO	NO	NO	YES	YES	invalid	
NO	NO	NO	YES	NO	YES	invalid	
NO	NO	NO	YES	YES	NO	One Mixer, One Gas	One Mixer using table A only
NO	NO	YES	NO	NO	YES	invalid	
NO	NO	YES	NO	YES	YES	invalid	
NO	NO	YES	YES	NO	YES	invalid	
NO	NO	YES	YES	YES	YES	invalid	
NO	YES	NO	NO	NO	YES	invalid	
NO	YES	NO	NO	YES	YES	invalid	
NO	YES	NO	YES	NO	YES	invalid	
NO	YES	NO	YES	YES	YES	invalid	
NO	YES	YES	NO	NO	YES	invalid	
NO	YES	YES	NO	YES	YES	invalid	
NO	YES	YES	YES	NO	YES	invalid	
NO	YES	YES	YES	YES	NO	Two Mixers, One Gas	Mixer A using table A, Mixer B using table B
YES	NO	NO	NO	NO	YES	invalid	
YES	NO	NO	NO	YES	YES	invalid	
YES	NO	NO	YES	NO	YES	invalid	
YES	NO	NO	YES	YES	NO	One Mixer, Two Gases	Mixer A using table A or B based on value in LBI GasAB
YES	NO	YES	NO	NO	YES	invalid	
YES	NO	YES	NO	YES	YES	invalid	

Configured					Alarm	Type of configuration	Description
LBI	LAI						
GasAB	SensorB	MATB	SensorA	MATA			
YES	NO	YES	YES	NO	YES	invalid	
YES	NO	YES	YES	YES	YES	invalid	
YES	YES	NO	NO	NO	YES	invalid	
YES	YES	NO	NO	YES	YES	invalid	
YES	YES	NO	YES	NO	YES	invalid	
YES	YES	NO	YES	YES	YES	invalid	
YES	YES	YES	NO	NO	YES	invalid	
YES	YES	YES	NO	YES	YES	invalid	
YES	YES	YES	YES	NO	YES	invalid	
YES	YES	YES	YES	YES	YES	invalid	

Note: When SensorX is configured, MAT X has to be configured also.
When GasAB is configured, just SensorA and MAT A has to be configured, No SensorB, No MAT B.
When SensorA and SensorB are configured, GasAB cannot be configured.

Mixer manual mode

Mixer is operated in manual mode if the required setpoint: **AFRValve MODE (page 546)** is in position MANUAL.

In this case the setpoint: **MixerPosMan (page 547)** is overwritten with actual position of Mixer, to keep the Mixer stable. After that is possible to move the mixer to various position.

Mixer automatic mode

In automatic mode has mixer fixed positions for starting procedure and then is mixer automatically controlled with PID regulation loop.

Automatic control of mixer is defined by up to 5 points of required Sensor value, actual Power and required Mixer position.

In general it means, that for current power is defined required sensor value and to reach required sensor value, there should be required mixer position.

In fact the mixer position oscillates around the required position and the limit of the oscillation value can be adjusted via setpoint: **LimPos (page 549)**.

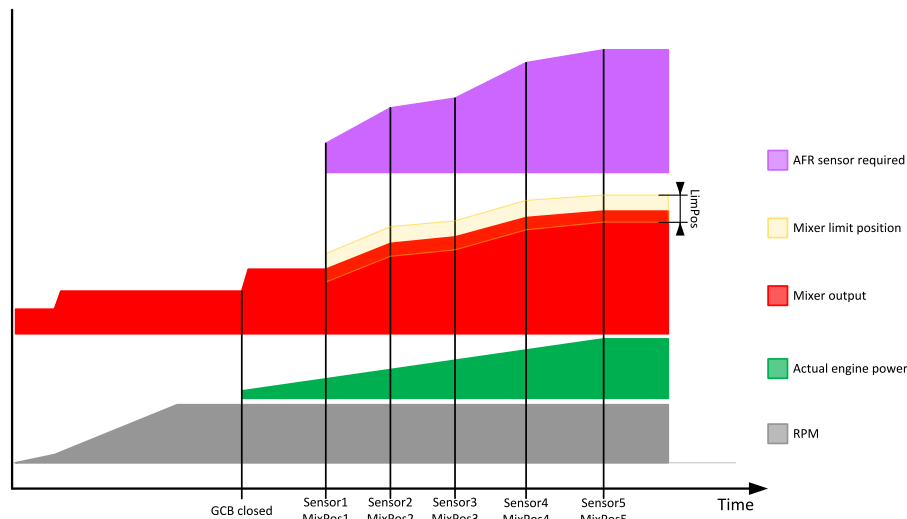


Image 5.13 AFR control automatic mode

Starting procedure

During start request in automatic mode (**AFRValve MODE (page 546) = AUTOMATIC**) is mixer position on the fixed level adjusted by setpoint: **StartPositionA (page 553)** this position adjust the correct amount of gas mixture for ignition in the Gen-set.

Starting position of mixer can be adjusted manually with changing of the setpoint or there can be adjusted starting ramp of the mixer. This ramp can be modified by setpoints **EndStrtPosA (page 553)** and **MixStartRampA (page 554)**. Mixer starts on **StartPositionA (page 553)** and during cranking phase moves to the **EndStrtPosA (page 553)**.

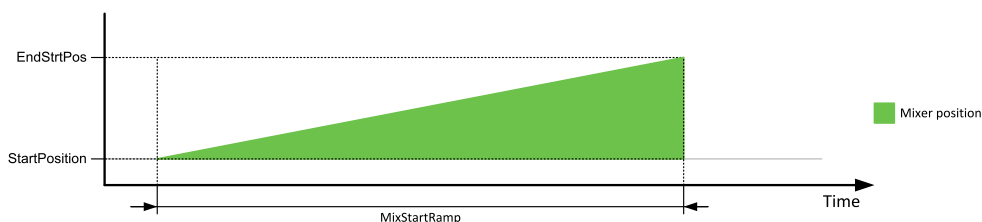


Image 5.14 Mixer start ramp

Another possibility how to change the position of the mixer is with gas quality analyzer, which can measure the CH₄ content in the gas and in depend on this can move the position of mixer.

Note: This feature is mostly used in situations where is very various gas quality and the solution with fixed positions is not sufficient.

Gas analyzer has to be connected to LAI: **ANA CH4A (PAGE 869)**.

For activation of the CH₄ function has to be switched the setpoint: **Ana CH4A (page 563)** to position either ENA-FIX or ENA-STEP.

Dependence of the mixer on the CH₄ is defined by setpoints: **MxPos40%CH4A (page 563)** and **MxPos60%CH4A (page 563)**.

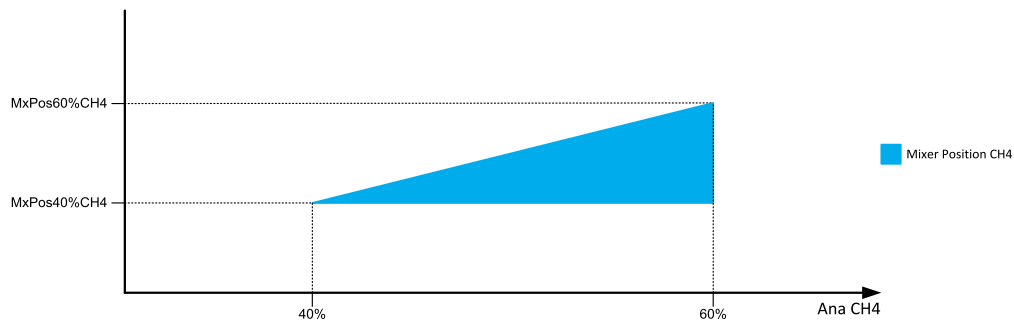


Image 5.15 CH4 dependence on the mixer position

Starting position is active until the timer **Idle time** (page 381) is counted down and Gen-set needs to reach the **Nominal RPM** (page 355).

In that time activates the second fixed position of the mixer **RunPositionA** (page 554).

After the GCB is closed the third fixed position **LoPwrPositionA** (page 555) is active.

With correct adjustment of this setpoint, has Gen-set be able to start the ramping on the load.

LoPwrPositionA (page 555) is active till the Gen-set across the first point of Power characteristic (**Power1A** (page 555)).

Note: **LoPwrPositionA** (page 555) is back activated by undergoing of the **Power1A** (page 555) value.

Note: When the fixed positions of the mixer are active, the value **AFRSensReqA** (page 669) is disabled and shows invalid value.

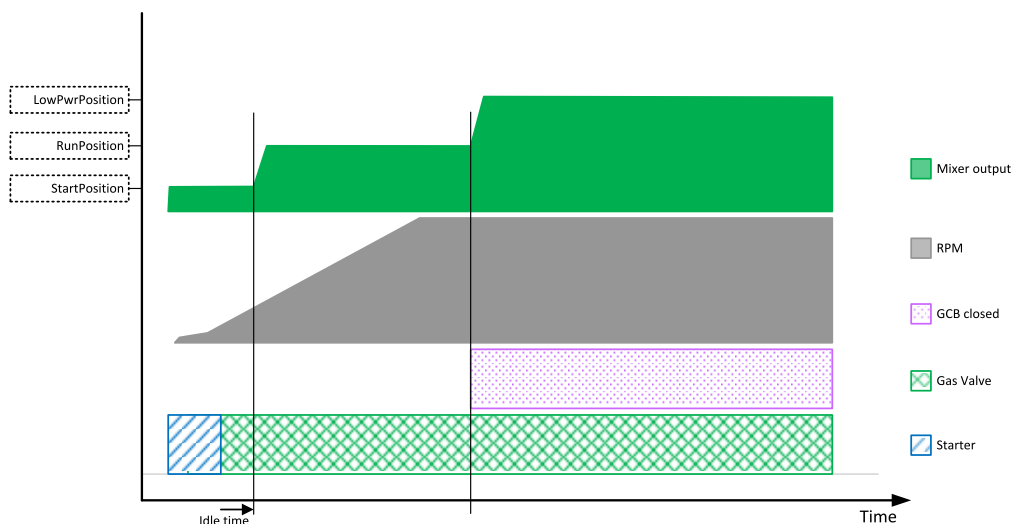


Image 5.16 Mixer starting procedure

Regulation

When the Gen-set active power across the value **Power1A** (page 555), then is activated the AFR PID control loop which starts to regulate the mixer position.

Principal is, that there is primarily defined power characteristic, for each power value is defined Mixer position. This position is ideal setting for to reach required Sensor Value.

Note: Calculated position of mixer is visible in values: **AFRVlvOffsetA** (page 669).

In that case will be visible value **AFRSensReqA** (page 669) which is calculated value from the characteristic adjusted by setpoints **Sensor1A** (page 555), **Sensor2A** (page 556), **Sensor3A** (page 558), **Sensor4A** (page 559) and **Sensor5A** (page 560).

If the actual sensor value **AFRSensActA** (page 669) is different from the required sensor value **AFRSensReqA** (page 669) the AFR PID loop represented by setpoints **AFRvalve gain** (page 547), **AFRvalve int** (page 548), **AFRvalve der** (page 548) starts to regulate and the output from the PID control loop is visible as value **AFRVlvRegA** (page 669).

Value **AFRSensReqA** (page 669) is regulated as long as the regulation reach the regulation limit position **LimPos** (page 549).

The output for mixer position **MIXPOSA** (page 668) is sum of the values **AFRVlvOffsetA** (page 669) and **AFRVlvRegA** (page 669).

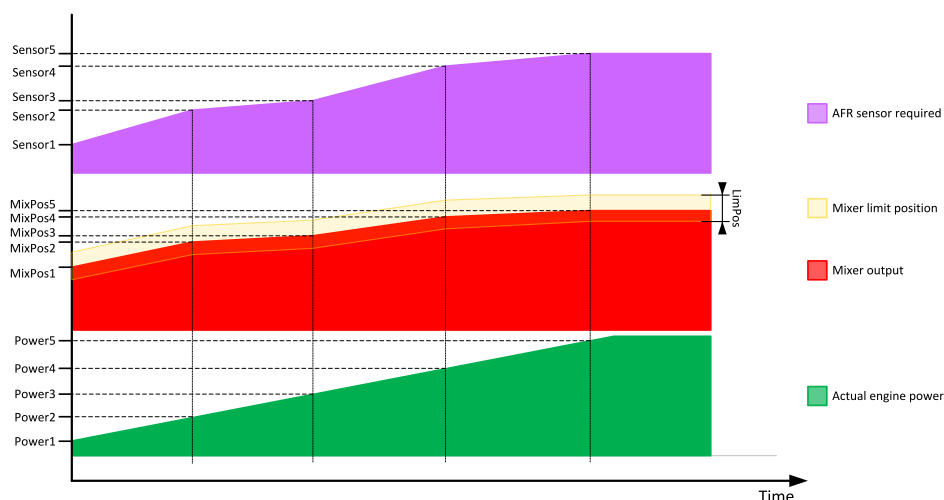


Image 5.17 Dependence of Power, MixPos and Sensor

Example: For the first setting of the whole characteristics is used **Mixer manual mode** (page 121). Operator changes the Gen-set power (e.g. via **Base load** (page 326)) to the value **Power1A** (page 555) and watches the actual value of emissions. With manual adjusting of the mixer position reaches the required value of emissions. In that case write the actual value of sensor and mixer to the **Sensor1A** (page 555) and **MixPos1A** (page 556). The same will be repeated for other points of characteristic. After that can be mixer switched to AUTOMATIC mode.

Correction of the required sensor value based on rising temperature

For correct AFR function is important to keep the temperature of the mixture represented by **MATreference** (page 550) constant.

If it is not possible and the temperature rises from the reference value, there is possibility to automatically adjust the sensor characteristic.

Each step above the **MATreference** (page 550) means one step of **MATcorrection** (page 550).

The **MATcorrection** (page 550) is point of change for Sensor characteristic.

The sensor characteristic is changed as long as the **SensorCorrLim** (page 550) is reached.

AFR Sensor failure function

It may happen, that the sensor starts to indicate different value even the Gen-set runs on stable power with stable mixer position.

Note: This situation happens mostly by using lambda sonde sensor with measuring in mV. Every defect of the sensor may have bigger influence to output mV value.

For that reason is there tolerance level of the measured value from required value.

If the measured value of the sensor across the tolerance level defined by setpoint **SensorValToIA** (page 562), then starts to be counted the timer **TAFROFFA** (page 560), after which is set the value **AFRVivRegA** (page 669) (output from AFR PID loop) to 0.

And simultaneously is counted the timer **TAFRERRA** (page 561). When is this time counted down, the LBO **AFR ERRA** (PAGE 760) is set.

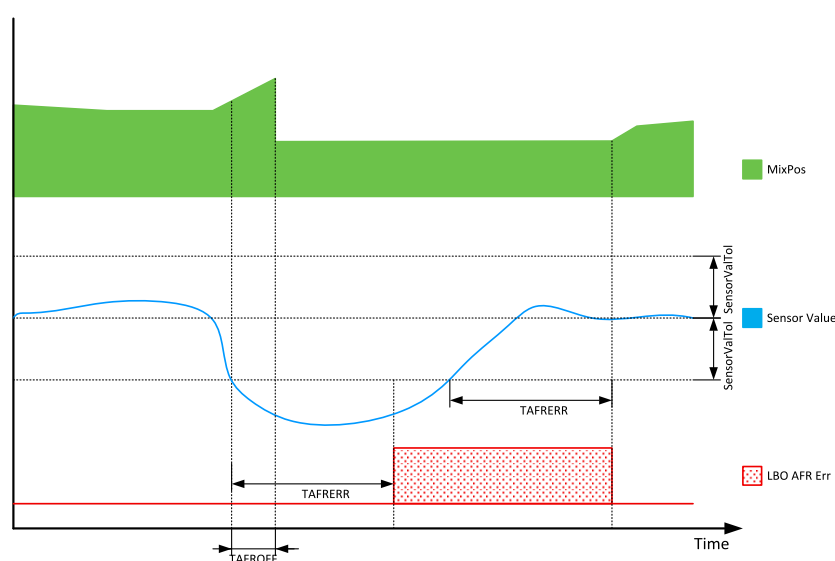


Image 5.18 Sensor tolerance value

5.3.7 Gas Valve Test

Test is based on the external automatic unit that put pressure between two closed Gas Valves and measures pressure value stability.

Gas Valve Test procedure can be enabled with adjusting of the setpoint **GasVTest** (page 387) = ENABLED.

Test is activated prior to engine start by LBO **GASVTEST RUN** (PAGE 775).

Controller waits for adjustable delay for test result. Dedicated LBI **GASVTESTOK** (PAGE 706) must be closed within this time.

Engine starts at any time during Gas Valve Test procedure when LBI **GASVTESTOK** (PAGE 706) is closed.

Engine shut down is detected and alarm message activated "Sd GasVTest" when no positive feedback is received during the adjustable delay **GasVTest del** (page 387).

Gas Valve Test procedure is skipped during Automatic Mains fail Gen-set start to short black-out time.

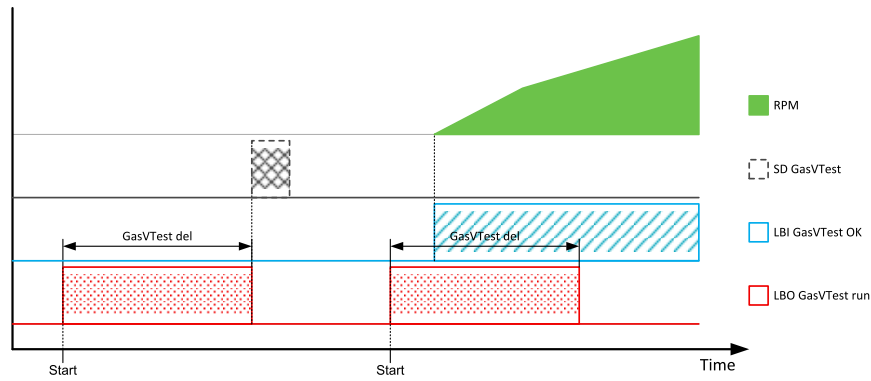


Image 5.19 Gas Valve Test

5.3.8 Test on Load

Test on Load function is only present in SPtM application.

This function affects the behavior in TEST mode only. Before the activation of this function:

1. Adjust setpoint AMF settings: **ReturnTo mains (page 427)** = DISABLED.
2. Adjust Process control: **MFStart enable (page 338)** = YES.
3. Switch controller to TEST mode and activate **LBI TEST ON LOAD (PAGE 747)** (you can activate the function by one binary input by configuring both **TEST ON LOAD (PAGE 747)** and **REMOTE TEST (PAGE 739)** to one physical Binary input).

Transfer of load from Mains to Gen-set

Behavior of function depends on settings of the setpoint **I/E-Pm meas (page 329)**. If the mains import is measured (IM3 CT INPUT or ANALOG INPUT) then the MCB is opened when the Import/Export goes below $0 \pm 5\%$ of **Nomin power (page 345)**. The duration of this transfer can be restricted by the settings of the setpoint **BreakerOverlap (page 426)**. If the setpoint **I/E-Pm meas (page 329)** = NONE then the MCB is opened after delay given by the setpoint **BreakerOverlap (page 426)**.

If the load transfer was not finished until the timer Sync/Load ctrl: **Load Ramp (page 451)** + 10% elapsed, the alarm **WrnTstOnLdFail** is issued.

Transfer of power from Gen-set to Mains

GCB is opened when the power of the Gen-set drops under the level given by the setpoint **GCB open level (page 452)** at the least after the delay given by the setpoint **BreakerOverlap (page 426)**.

Transfer of power from Mains to Gen-set with Open transition

The transfer of the load in TEST mode can be performed with Open transition in case that the Parallel to Mains operation is undesirable. Set setpoints **ParallelEnable (page 337)** = NO or = NONE or REVERSE, **Island enable (page 337)** = YES: If the **TEST ON LOAD (PAGE 747)** gets active the load is passed from the Mains to the Gen-set with Open transition. Controller opens MCB and closes GCB after delay given by **FwRet break (page 428)**.

Transfer of power from Gen-set to Mains with Open transition

After deactivation of **LBI TEST ON LOAD (PAGE 747)** GCB is opened and MCB is closed after delay given by **FwRet break (page 428)**.

5.3.9 Power derating

This function linearly decreases Gen-set nominal power according to analog input value.

Gen-set power starts decreasing when temperature measured by LAI **POWERDERATING1** (PAGE 891) exceeds **Derating1 strt** (page 333) (or the second setpoint respectively).

Gen-set power is at **Derated1 pwr** (page 335) when temperature measured by LAI **POWERDERATING1** (PAGE 891) is equal or higher than **Derating1 end** (page 334) (or the second setpoint respectively).

IMPORTANT: When Power derating function is active, the Gen-set overload protection is based on the actual value of the derated nominal power.

IMPORTANT: When Power derating function is active, the value **Act pwr rel** (page 593) is based on the actual value of the derated nominal power.

Derated power value **ActPwrReq** (page 618) is visible in the controller measure screen.

When derating function is not active the derated nominal power is equal to Nominal power.

Example: Nomin power (page 345) = 200 kW, **Derating1 strt** (page 333) = 70 °C, **Derating1 end** (page 334) = 100 °C, **Derated1 pwr** (page 335) = 70 %. Gen-set is running at Nominal power 200 kW. When temperature reaches 70 °C the Gen-set power starts decreasing. When temperature reaches 100 °C Gen-set runs at 70 % of Nominal power = 140 kW. When temperature increased above **Derating1 end** (page 334) temperature level, Gen-set power stays at **Derated1 pwr** (page 335) level 140 kW.

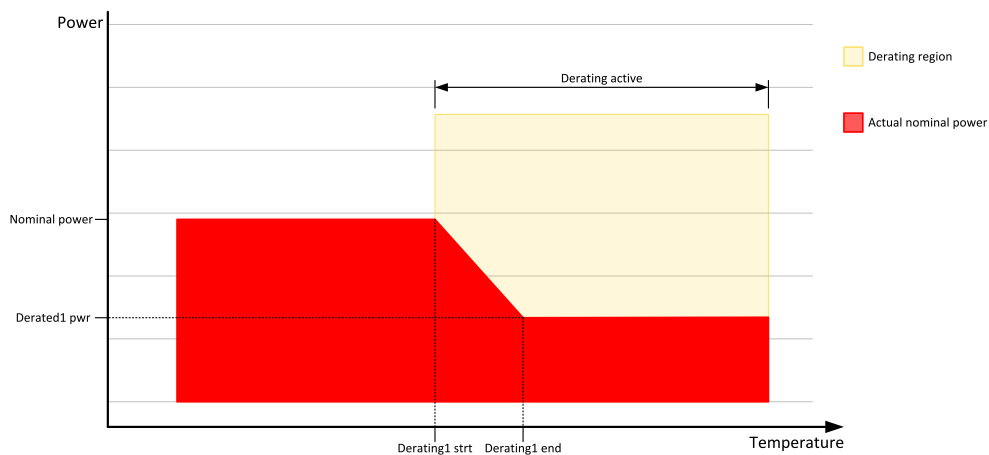


Image 5.20 Power derating

5.3.10 Power reduction

This function is used to limit power request based on the input value LAI **DESCRIPTION (PAGE 891)**.

The function is defined by a power reduction curve. This curve is given by 6 setpoints:

- > [InputValue1A \(page 481\)](#)
- > [InputValue2A \(page 1\)](#)
- > [InputValue3A \(page 484\)](#)
- > [PwrReduction1A \(page 480\)](#)
- > [PwrReduction2A \(page 482\)](#)
- > [PwrReduction3A \(page 483\)](#)

Power reduction is triggered by:

- > Increase of LAI DESCRIPTION (PAGE 891) over InputValue1A (page 481) - when the setpoint InputValueChA (page 485) = RISING
- > Fall of LAI DESCRIPTION (PAGE 891) below InputValue3A (page 484) - when the setpoint InputValueChA (page 485) = FALLING

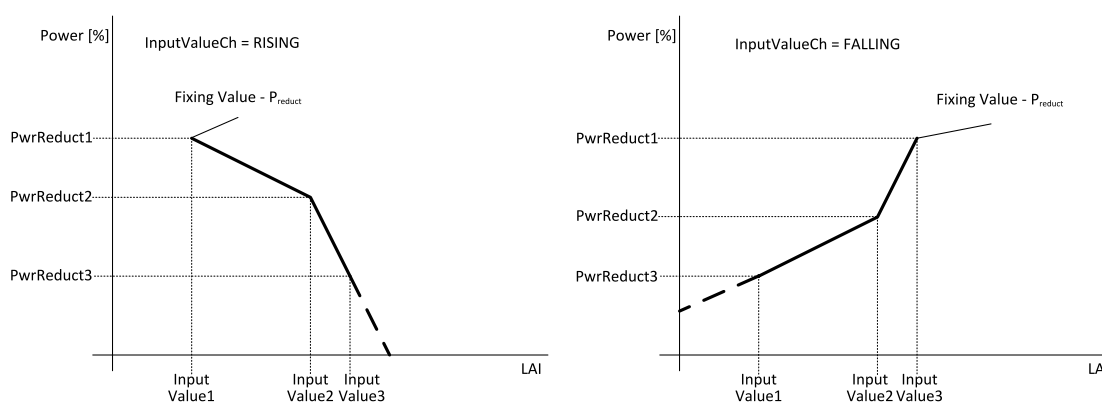


Image 5.21 Power reduction

Setpoint **PwrReductBaseA** (page 486) defines whether the reduction should be based from **Act power** (page 592) or from **InstalledPower** (page 346). This is then considered as a reference value (value **P RedMem A** (page 623)). Power reduction is always relative to this value.

The reduced power (value **P Reduct A (page 622)**) is given by interpolation of the power reduction curve. Extrapolation of this curve is used when:

- > LAI DESCRIPTION (PAGE 891) exceeds the InputValue3A (page 484) - when the setpoint InputValueChA (page 485) = RISING
- > LAI DESCRIPTION (PAGE 891) falls below the InputValue1A (page 481) - when the setpoint InputValueChA (page 485) = FALLING

The power reduction is deactivated when LAI: **PWRREDUCTIONA** (PAGE 891):

- Falls below (<) **InputValue1A (page 481)** - when the setpoint **InputValueChA (page 485)** = RISING
- Exceeds (>) **InputValue3A (page 484)** - when the setpoint **InputValueChA (page 485)** = FALLING

Change of the parameters does not require reset of the function, i.e. when setpoints change the function reacts immediately.

- > When Y-axis values change the interpolated/extrapolated limit changes immediately
- > When X-axis values change the interpolated/extrapolated limit changes immediately and furthermore the activation of the function is reevaluated (i.e. if the function is active and the X-axis point changes its position and actual value gets out of the active area the function will deactivate)

- Change of the function type (RISING/FALLING) or the reference base (ACTIVE PWR/INSTALLED PWR) requires function reset (i.e. when RISING is selected and the value goes above **InputValue1A (page 481)** the function activates and user changes it to FALLING the function will deactivate when the value gets below **InputValue1A (page 481)** regardless of changed setting – it continues seamlessly in the function and the saved 100 % value remains the same)

Example:

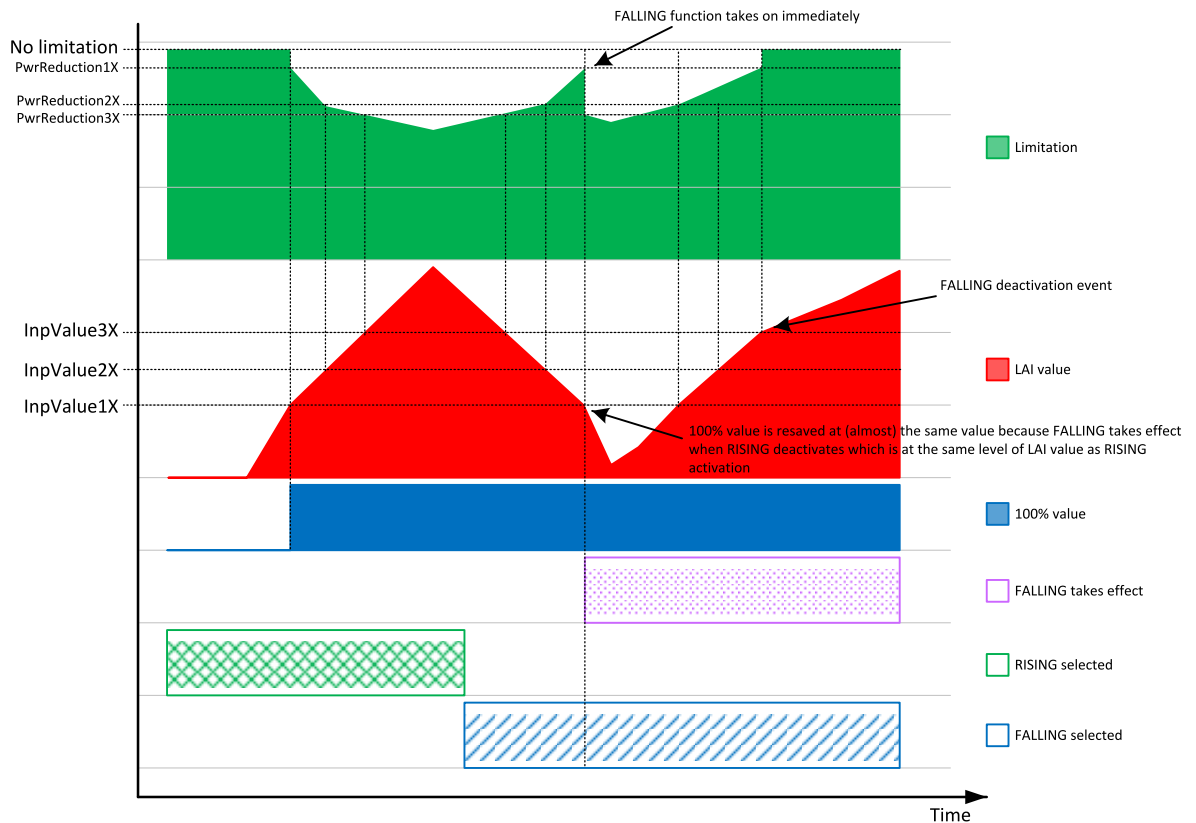


Image 5.22 Power reduction example

5.3.11 Engine control

The controller performs sequences that control the engine. There can be different states in which to controller perform specific actions.

Conditions

There are several conditions that are evaluated. Based on these conditions the controller decides if the controller is successfully started, running, or if it successfully stopped.

Successful start conditions

➤ Values **RPM** (page 591) > **Starting RPM** (page 378)

OR

➤ **LAI OIL PRESS** (PAGE 888) > **Starting POil** (page 379)

OR

➤ D+ terminal is active for minimum of 1 s

OR

➤ **LBI RUNINDICATION 1** (PAGE 739) or **RUNINDICATION 2** (PAGE 739) or **RUNINDICATION 3** (PAGE 740) gets active

OR

➤ Values **Gen V** (page 599) > 25% of **GenNomV** (page 351) (any phase)

Engine running conditions

➤ Values **RPM** (page 591) > **Starting RPM** (page 378)

OR

➤ **LAI OIL PRESS** (PAGE 888) > **Starting POil** (page 379)

OR

➤ D+ terminal is active and **D+ Function** (page 388) = ENABLED

OR

➤ **LBI RUNINDICATION 1** (PAGE 739) or **RUNINDICATION 2** (PAGE 739) or **RUNINDICATION 3** (PAGE 740) is active

OR

➤ Values **Gen V** (page 599) > 15 V (any phase)

Successful stop conditions

➤ **RPM** (page 591) < 2

AND

➤ **LAI OIL PRESS** (PAGE 888) > **Starting POil** (page 379)

AND

➤ D+ terminal is not active

AND

➤ **LBI RUNINDICATION 1** (PAGE 739) or **RUNINDICATION 2** (PAGE 739) or **RUNINDICATION 3** (PAGE 740) is active

AND

➤ Values **Gen V** (page 599) < 15 V (all phases)

AND

➤ Values **Gen freq** (page 598) = 0 Hz

IMPORTANT: If all above conditions are fulfilled, additional 2s delay is necessary to confirm still engine.

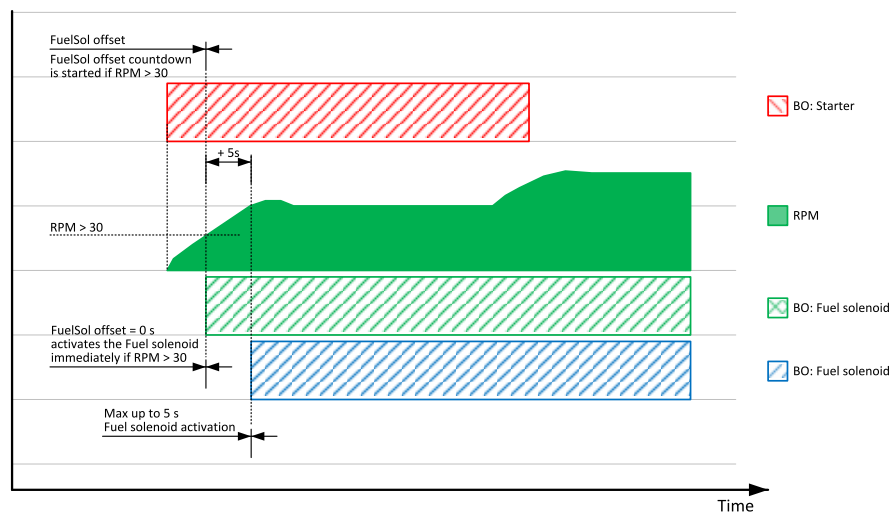
IMPORTANT: If the engine is stopped and any of the conditions above is not fulfilled the controller will consider the engine to run spontaneously and it will initiate stop sequence and activate LBO WRN STOP FAIL (PAGE 866).

Note: If some of the conditions are not configured (e.g. LBI RUNINDICATION 1 (PAGE 739) is not configured) it is not taken into account. On the other hand RPM comparison is always considered.

Start sequence

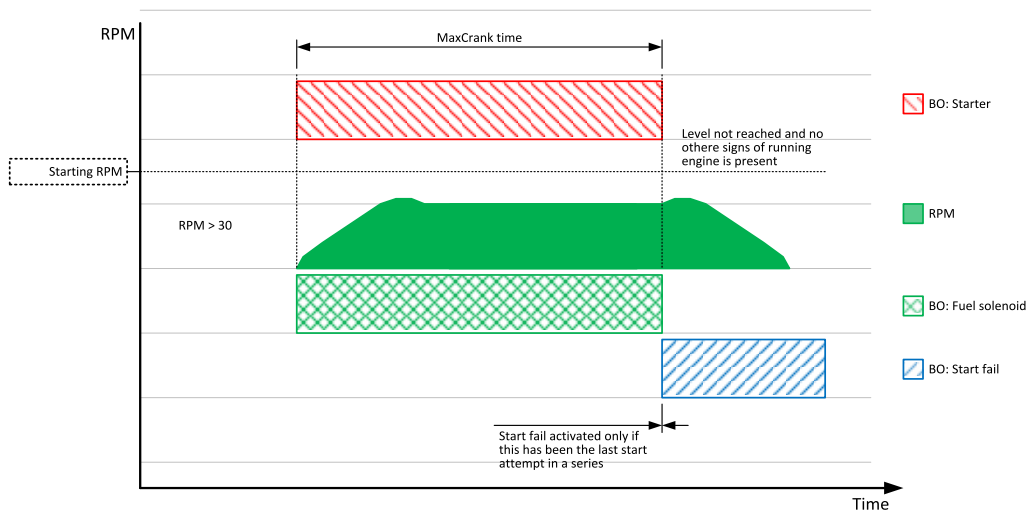
Successful start sequences – GAS

Activation of the LBO FUEL SOLENOID (PAGE 774) can be delayed with the setpoint FuelSol offset (page 386). This delay starts to be counted when the Gen-set reaches 30 RPM. The LBO FUEL SOLENOID (PAGE 774) is activated immediately when any of the successful start conditions mentioned in the chapter Conditions (page 130) is fulfilled.

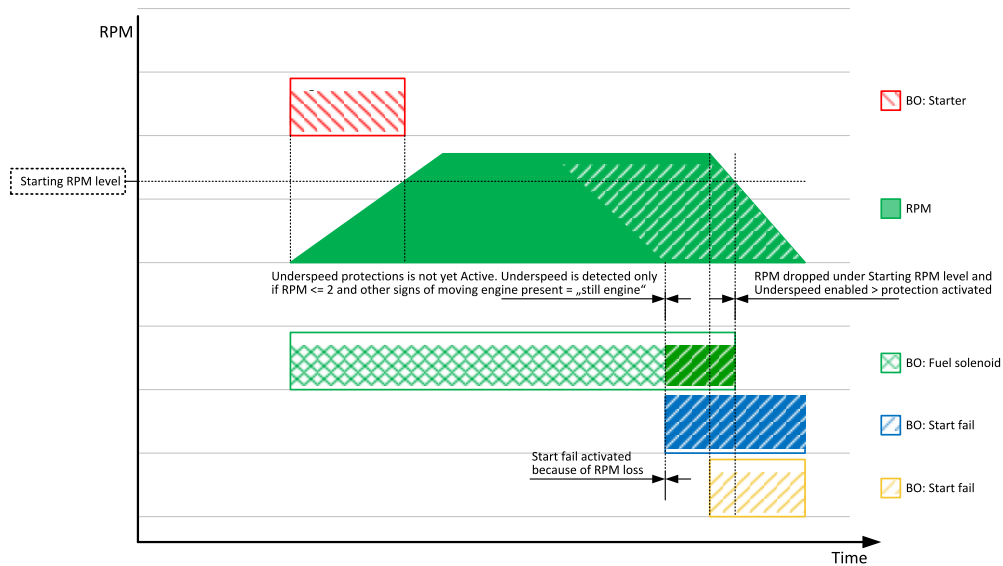


Unsuccessful start sequences

When Starting RPM (page 378) is not reached within MaxCrank Time (page 380):



When RPM goes to zero before / after Underspeed protection gets active:

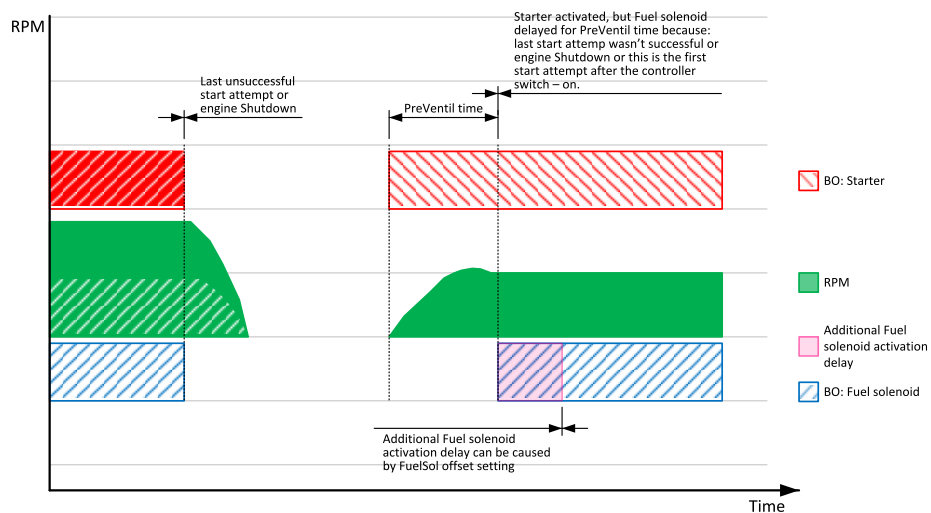


IMPORTANT: The Underspeed protection is activated regardless of the setpoint Idle time (page 381) 5 seconds after reaching Starting RPM (page 378) level. To get more information on when other protections get activated please refer to the chapter Protections and Alarm management (page 194).

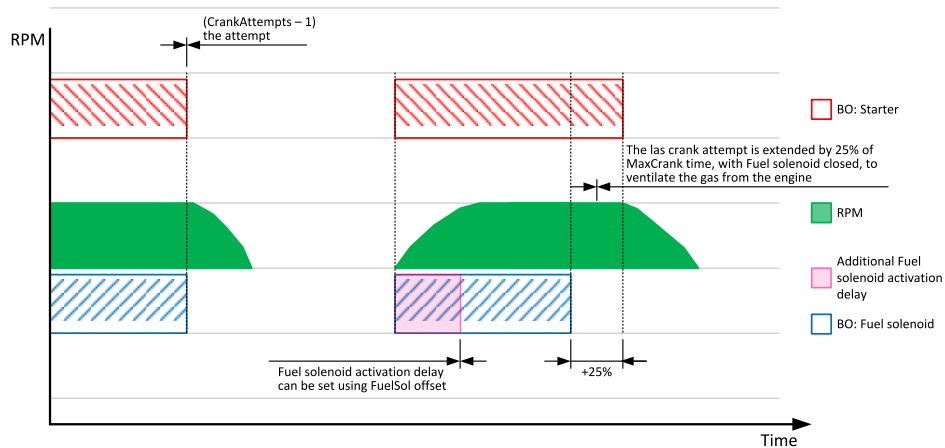
Ventilation sequence

The controller performs Preventilation and Ventilation sequences.

Preventilation



Ventilation



Other engine states

This chapter describes engine states expect the states that are part of the start sequence. To get more information on the start sequence **see Start sequence on page 131**.

Prelubrication

When the prelubrication is activated (**Prelubr time (page 380)** is set to none zero value and the controller is not in the OFF mode) the controller cycles according to the settings and periodically prelubricates the engine (activates LBO **PRELUBR PUMP (PAGE 832)**). There are pauses between prelubrication that are set by the setpoint **Prelubr pause (page 380)**. The prelubrication cycle start when:

- The controller DC power is switched on
- The controller is switched from OFF mode to other modes
- The alarm *Alarm Type Level 2* is reset

Alarm *Not lubricated* is shown when the engine is being lubricated (only during the first lubrication cycle).

Warming

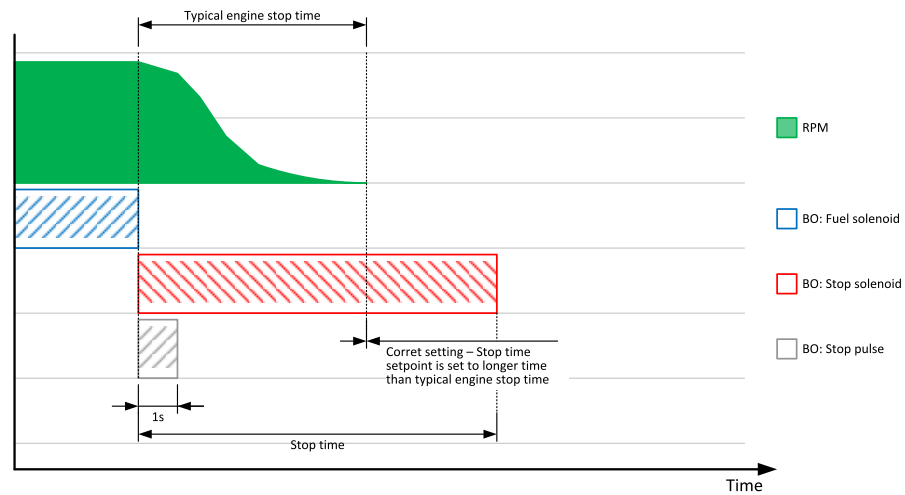
The controller enters the state of Engine Warming when there is lower temperature on the LAI **WARMING TEMP (PAGE 897)** than the limit given by the setpoint **Warming temp (page 383)**. In the state of Warming the controller will reduce the maximum power of the Gen-set to the percentage of the **Nomin power (page 345)** given by the setpoint **Warming load (page 383)**. The warming is limited by the time as well by adjusting the setpoint **Max warm time (page 384)**.

Cooling

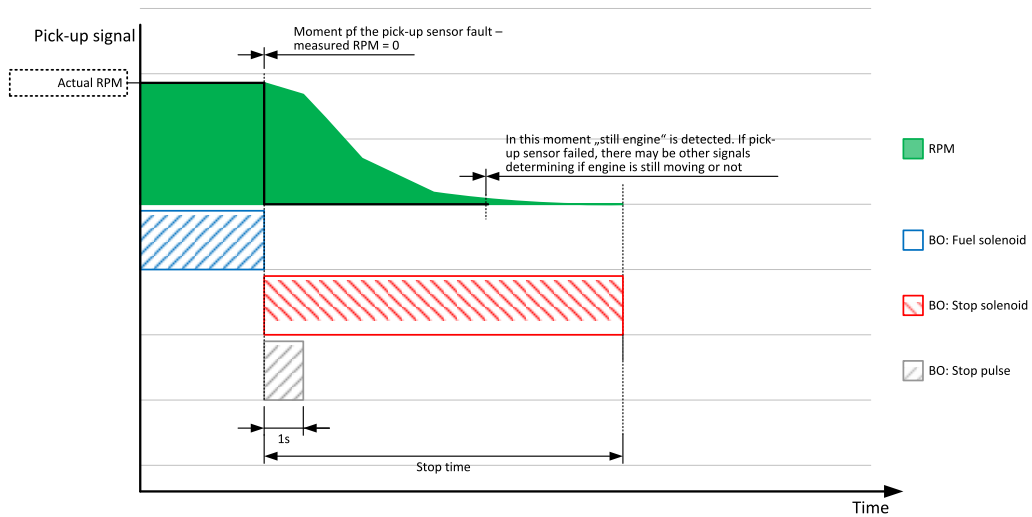
The controller enters the state of Cooling when the engine is to be stopped (i.e. normal stop sequence). The time of the cooling is set by the setpoint **Cooling time (page 384)**. The cooling speed of the engine can be set by the setpoint **Cooling speed (page 384)**. There is optimization of the cooling time available. This can be enabled or disabled by the setpoint **Cooldown optim (page 385)**. The cooling sequence may continue (i.e. the LBO **COOLING PUMP (PAGE 768)** remains active) after the engine is stopped. To set this time the setpoint **AfterCool time (page 385)** is used. The controller behavior in cooling phase after a BOC alarm can be selected by the setpoint **CoolDnAfterBOC (page 385)**.

Stop sequence

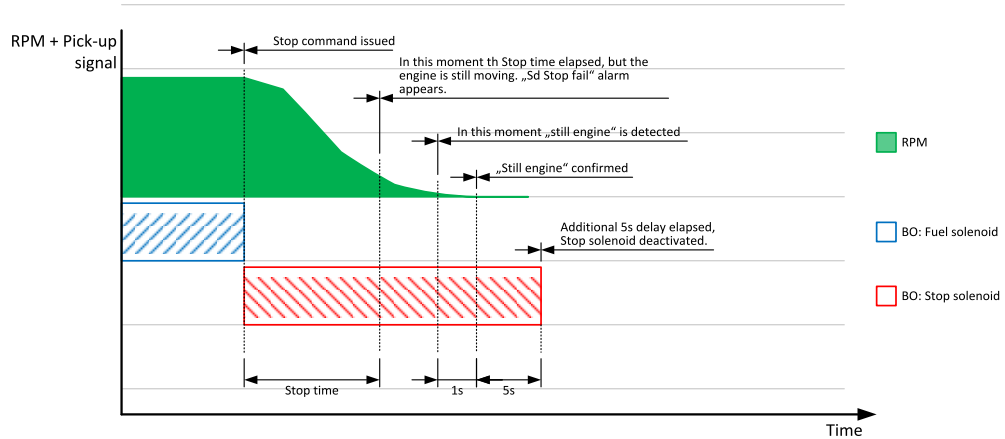
When the engine stops normally:



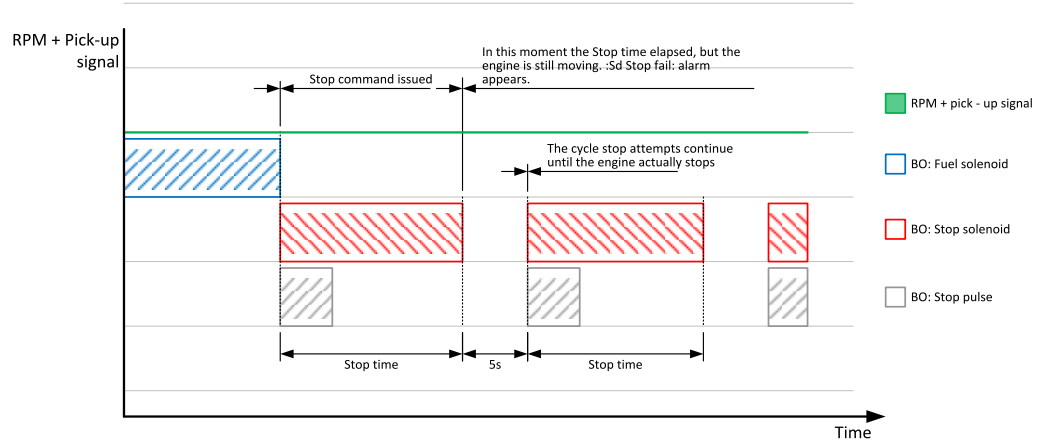
When the pick-up sensor fails:



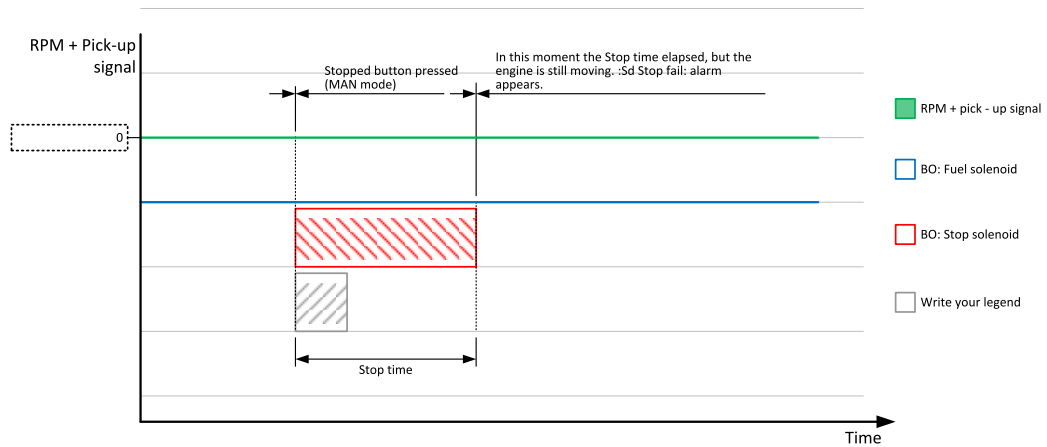
When the engine does not stop in time:



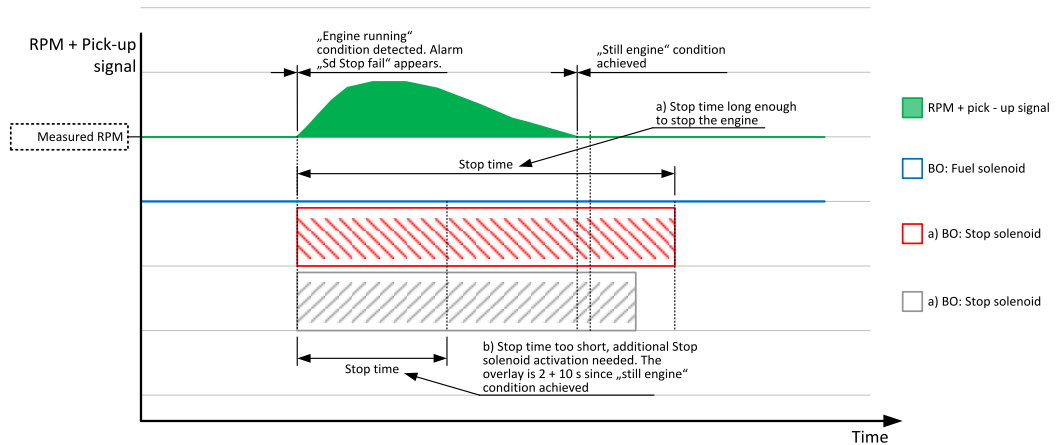
When the engine does not stop:



When stopped engine is commanded to stop again:



When the engine starts spontaneously and the controller stops it:



5.3.12 Breaker control

The breaker control sequences are general for applications. The following texts refers to CB (Circuit breaker) and stands both for GCB and MCB (MCB relevant only to the applications where it is controlled).

Related LBIs:

- Circuit breaker feedback is a standard feedback for a Circuit breaker. When it is active the controller considers the breaker to be closed.
- Circuit breaker feedback negative is logically opposite feedback to the one above. When it is active the controller considers breaker to be opened. Use this function when higher reliability of the system is required.

IMPORTANT: It is not necessary to use negative feedback. If it is not configured the controller does not consider it at all.

- Secondary Circuit breaker feedback is a feedback that is used in the case that there is a redundant breaker for higher reliability of the system. The function of this breaker duplicates the primary breaker (i.e. the controller will consider the line open when at least one of the breakers is opened and it will consider it closed when both breakers are closed).
- Secondary Circuit breaker feedback negative is a logically opposite feedback to the one above.

IMPORTANT: It is not necessary to secondary circuit breakers and negative version of the feedback. If they are not configured the controller does not consider them at all.

Related LBOs:

Circuit breaker close/open – output for circuit breaker. It gets active during the time when CB is requested to be closed.

Circuit breaker ON coil – output for closing coil of the CB. 2s pulse (5s if synchronising is not provided by the particular CB) is used for closing the CB.

Circuit breaker OFF coil – output for opening coil of the CB. 2s pulse (5s if synchronising is not provided by the particular CB) is used for opening the CB.

Circuit breaker UV coil – output for undervoltage coil of the CB. Permanently active, 2s negative pulse (5s if synchronising is not provided by the particular CB) is used for CB opening request

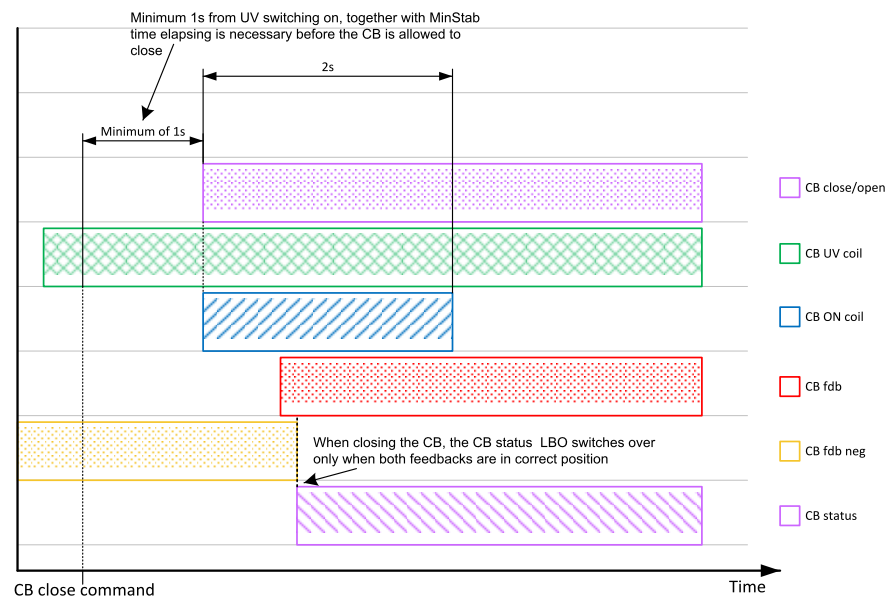
Circuit breaker status – output indicating CB status as evaluated by the controller. This signal is used for lighting LEDs on the panel, switching the regulations, CB fail evaluation, etc.

Note: The same set of breaker LBOs is available for the secondary breaker with the exception of the status. The status of the breaker is resolved from the feedback both of primary and secondary Circuit breakers (i.e. logical AND function). If you want to know more about secondary Circuit breakers please refer to the chapter *Grid Codes specific functions* (page 215).

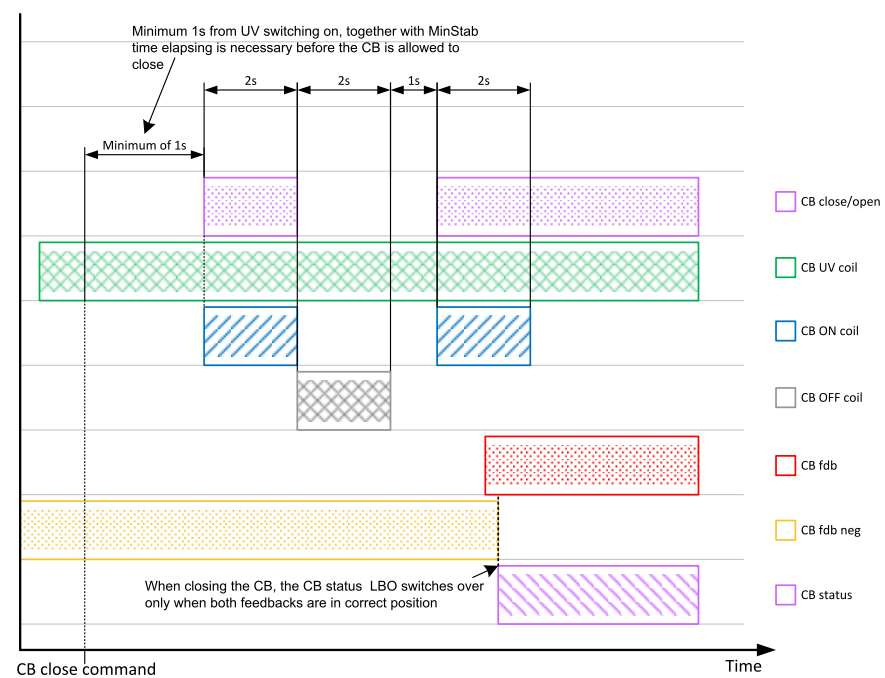
Possible Circuit breaker sequences

There are many possible Circuit breaker sequences. You can find time diagrams below.

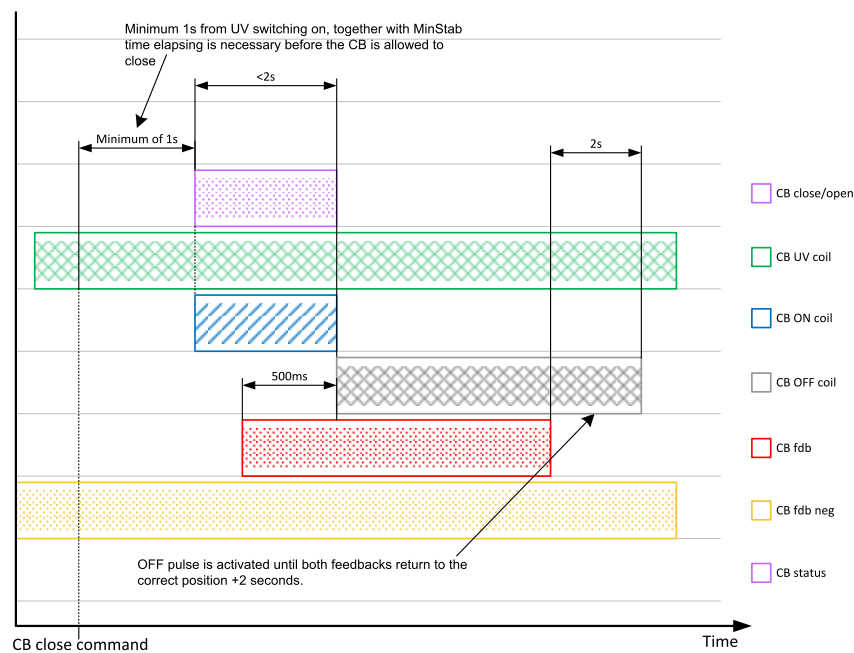
Circuit breaker close command



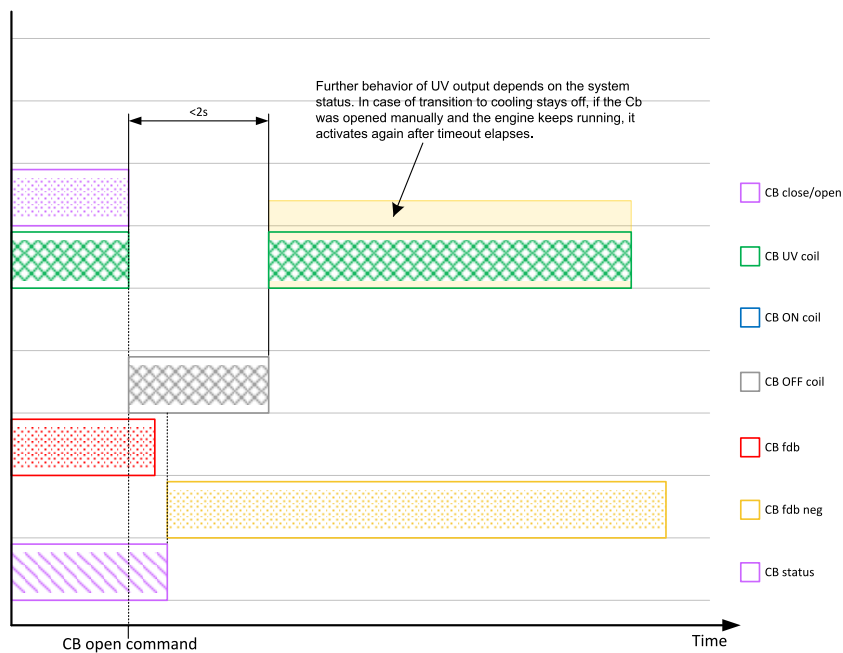
Repeated Circuit breaker breaker close command



Circuit breaker fail - feedback mismatch

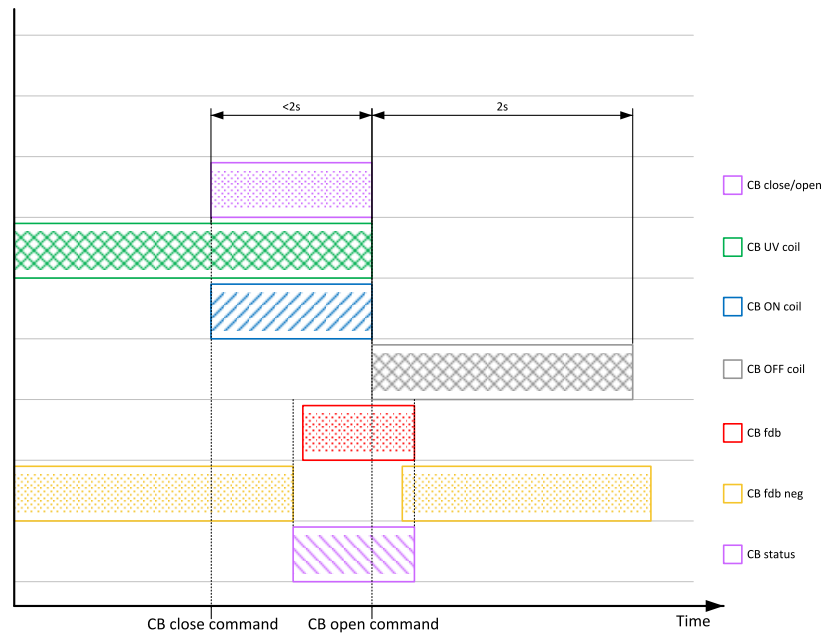


Circuit breaker open command



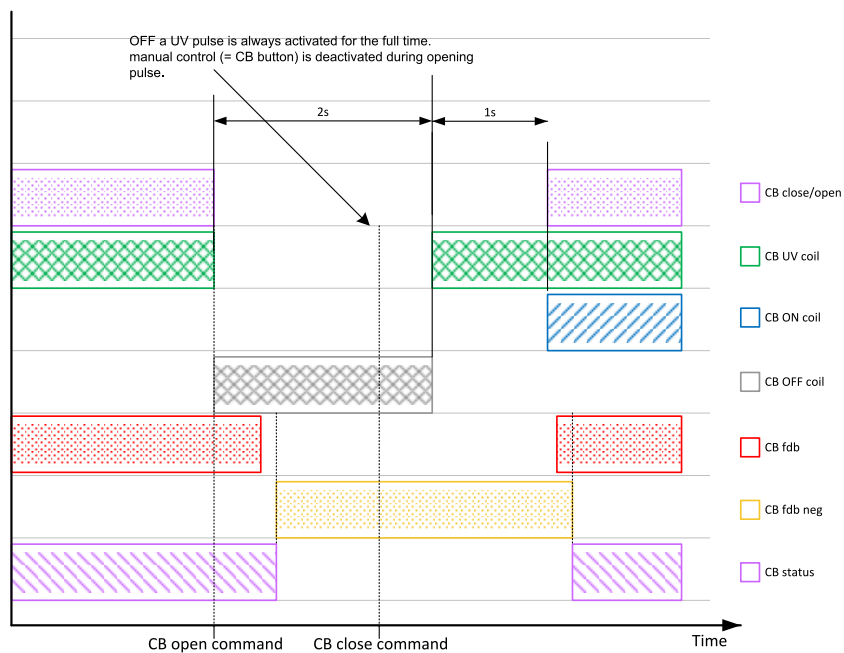
Transition from closing sequence to opening

Opening command is issued during the closing pulse



Transition from opening sequence to closing

Closing command is issued during the opening pulse



Other Circuit breaker fail reasons

- The controller will issue the alarm CB fail immediately when the breaker is in a steady state and there are no commands issued and feedback changes (e.g. Circuit breaker is opened and suddenly without any command the feedback closes). This applies both for feedback and feedback negative.
- The reaction time of the breakers is fixed in the controller. It is set to 2 s on breakers with synchronization and 5 s on breakers without synchronization. When the feedback does not change within this time the CB fail alarm is issued immediately.
- When the controller is powered on and it detects closed Circuit breaker the CB OFF coil is activated immediately and the CB fail alarm is issued.

IMPORTANT: If the breaker closes during synchronization (closed externally) even though the synchronism has not been reached the controller will accept this state and it will not issue any alarm.

MCB fail confirmation

This relevant for SPtM and Combi applications only.

In case that MCB feedback is active (MCB is expected as closed) and MCB fail is reported due to previous incorrect manipulation of MCB, in the moment of Fault reset, the MCB fail is cleared and the controller internally goes to closed state. I.e. MCB fdb status is confirmed and the output MCB close/open is energized.

MCB fail information

This relevant for SPtM and Combi applications only.

Opening of the MCB externally is allowed because external protection device may open it based on its protections. The controller will try to reclose the breaker if Mains protect type protection is not configured accordingly (e.g. external protection device/relay does not allow user to send this type of signal or such wiring is impractical). After failed attempt to close the breaker, the controller issues standard alarm and in AUT mode starts the engine and consequently closes GCB breaker.

IMPORTANT: In this case, if the supposed opening of the MCB is caused merely by MCB feedback failure and the actual position of the MCB is still closed, the controller will close GCB to the Mains voltage directly without synchronizing because it cannot be distinguished what exactly happened. This situation can be possibly harmful to the personnel or the equipment. Should this be the case, the following solution is proposed:

The screenshot shows the I/O configuration interface with the following components:

- IO Table:**

IO	Name	Property	Value
Binary inputs	Used: 12/20	Source	Wrn MCB fail
IGS-NT	Used: 12/12	Name	L2 MCB fail
VPIO (1)	Used: 0/8	Inverted	No
BI1	L2 MCB fail		
BI2	VPIO-1 2		
BI3	VPIO-1 3		
BI4	VPIO-1 4		
BI5	VPIO-1 5		
BI6	VPIO-1 6		
BI7	VPIO-1 7		
BI8	VPIO-1 8		
Binary outputs	Used: 13/20		
IGS-NT	Used: 12/12		
VPIO (1)	Used: 1/8		
BO1	L2 MCB fail		
BO2	VPIO-1 2		
BO3	VPIO-1 3		
BO4	VPIO-1 4		
BO5	VPIO-1 5		
BO6	VPIO-1 6		
BO7	VPIO-1 7		
BO8	VPIO-1 8		
Analog inputs	Used: 3/3		
- Annotations:**
 - Red arrow pointing to the 'Name' property of the 'L2 MCB fail' VPIO input: "Rename the VPIO to suitable name (e.g. L2 MCB fail, which indicates that it is Level 2 alarm)"
 - Red arrow pointing to the 'Wrn MCB fail' source in the 'Source' column: "Choose Wrn MCB fail from Prg. States group on any VPIO output"
- Protection Settings:**
 - Red arrow pointing to the 'Protection' checkbox: "Toggle on the protection for the interconnected VPIO input (e.g. BI VPIO-1 1 is interconnected with BO VPIO-1 1)"
 - Red arrow pointing to the 'Protection' dropdown: "Set the type of the protection to Off load"
 - Red arrow pointing to the 'Delay' dropdown: "Adjust the delay if required (since the start of the engine can take up considerable time, 0.5s should be sufficient)"

Circuit breakers control modes

Internal mode

Circuit breaker is controlled only from controller side. **see Breaker control on page 136**

Setpoint **CB ctrl mode** (page 341) is set to INTERNAL.

Follow mode

In this mode is expected, that the GCB breaker could be opened from external (e.g. protection) device. Controller does not generate the alarm message in case of losing GCB feedback.

MCB behavior is same as in **Internal mode**.

Setpoint **CB ctrl mode** (page 341) is set to FOLLOW.

Note: Closing of GCB can be protected with any standard configured protection.

OFF mode

Controller doesn't accept any external closing of GCB. Closing of GCB activates immediately red alarm message.

Note: Opening of the GCB is not needed to solve, because OFF mode can be activated only for stopped engine.

MAN mode

Controller doesn't accept any external closing of GCB. Closing of GCB activates immediately red alarm message.

External opening of GCB is accepted, controller will not try to close the breaker until the GCB button is pressed.

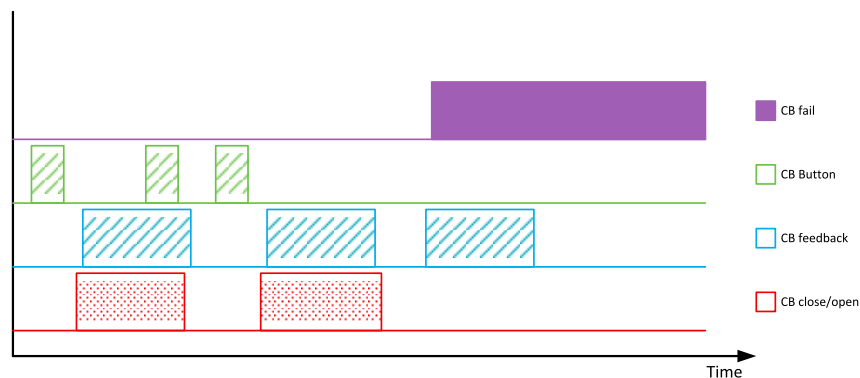


Image 5.23 CB control Follow MAN mode

SEM mode

Controller doesn't accept any external closing of GCB. Closing of GCB activates immediately red alarm message.

External opening of GCB is accepted, controller try to close the breaker:

- Island operation – breaker is automatically closed after delay given by setpoint **FwRet break (page 428)**
- Paralel operation – synchronisation starts immediately

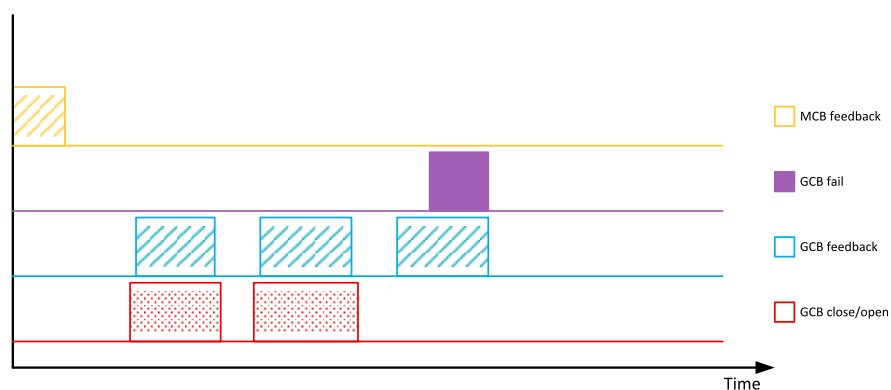


Image 5.24 CB control Follow SEM mode island operation

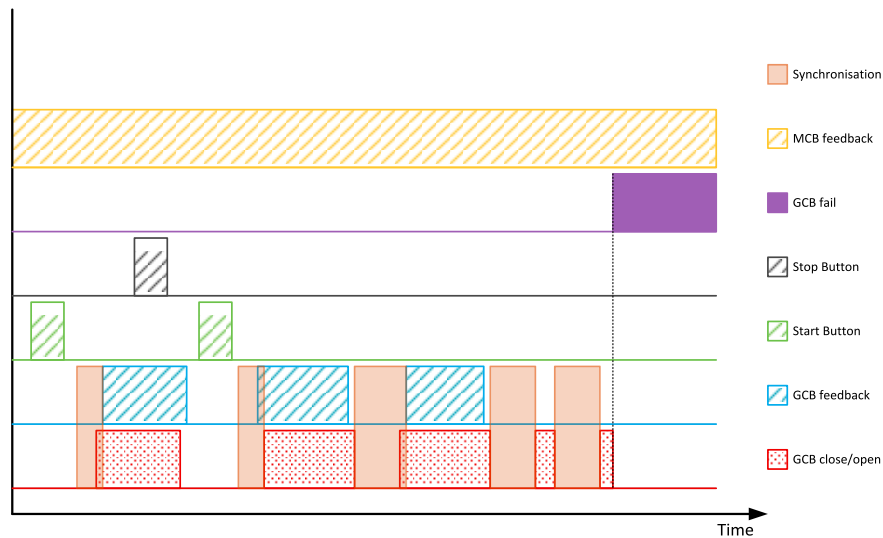


Image 5.25 CB control Follow SEM mode paralel operation

AUT mode

Controller doesn't accept any external closing of GCB. Closing of GCB activates immediately red alarm message.

External opening of GCB is accepted, controller try to close the breaker:

- Island operation – breaker is automatically closed after delay given by setpoint **FwRet break (page 428)**
- Parallel operation – synchronisation starts immediately

TEST mode (TEST on Load)

Controller doesn't accept any external closing of GCB. Closing of GCB activates immediately red alarm message.

External opening of GCB is accepted:

- Island operation – after delay given by setpoint **MCB Close del (page 424)** will be first closed the MCB, GCB is after that forward synchronized and closed, MCB is opened again.
- Parallel operation – MCB stays closed and the forward synchronisation starts immediately

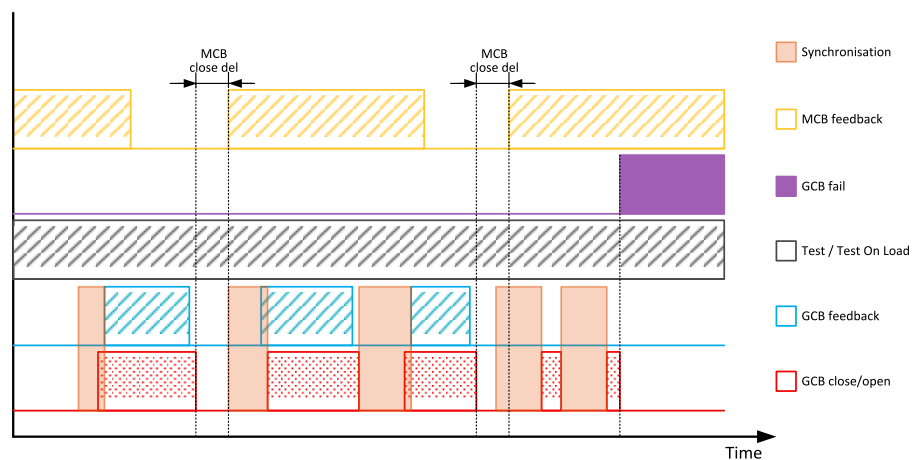


Image 5.26 CB control Follow mode Test on Load

External mode

Breakers are controlled only from external sources. Controller doesn't control the breaker. Breaker protections are deactivated. In case of any red type of protection, controller only visualise the alarm message but without controlling of the breaker. All following actions will be provided only on the breaker feedback position.

setpoint **CB ctrl mode (page 341)** is set to EXTERNAL.

IMPORTANT: Using of MAN mode and external control of breakers expects knowledges and skills in general breaker control. Due to missing active breaker protections may be possible to activate very dangerous states e.g. switch on the GCB breaker in to the stopped engine or stopped engine with closed GCB and MCB breaker.

Note: During synchronisation can be used following Logical binary outputs: *IN SYNCHRONISM / IN RPM WINDOW (PAGE 783), SYNCHRONIZING (PAGE 846).*

MAN mode

GCB button activates the synchronisation in case the forward synchronisation has to be started.

If the GCB button is pressed in parallel operation the soft unload is started.

MCB button activates the synchronisation in case the backward synchronisation has to be started.

SEM mode

After pressing the Start button is Gen-set started and after MinStabTime is automatically started synchronisation. GCB is closed externaly.

Pressing the Stop button activates the soft unload operation, Gen-set stays running until the GCB is not opened even the timer **GCB open del (page 452)** is counted down.

- Island operation – opening MCB and mains fail activates the Gen-set start operation.
- Paralel operation – losing the GCB feedback (GCB is opened) synchronisation starts again immediately.
By losing the MCB feedback (MCB is opened) will be the back synchronisation started after the delay given by setpoint **Mains ret del (page 428)**.

AUT mode

REM START/STOP (PAGE 738) (logical binary input) signal activates the starting procedure. Deactivation of this LBI activates the stopping procedure with following actions:

- GCB is opened – standard cooling and stopping procedure
- GCB is closed – controller lets the Gen-set running until the GCB is opened

Behavior in Mains fail:

- AMF settings – **MCB Opens on (page 425)** = MAINS FAIL – Gen-set starts first when is MCB opened.
- AMF settings – **MCB Opens on (page 425)** = GEN RUNNING – Gen-set starts immediately.

Switching of GCB:

- Island operation – controller has no reaction on any closing or opening of the GCB.
- Parallel operation – opening of the GCB activates immediately the forward synchronisation

Switching of MCB:

- Mains operation – opening or closing of MCB is fully on demand of external unit
- Parallel operation – backward synchronisation is started after delay given by setpoint **Mains ret del (page 428)**.

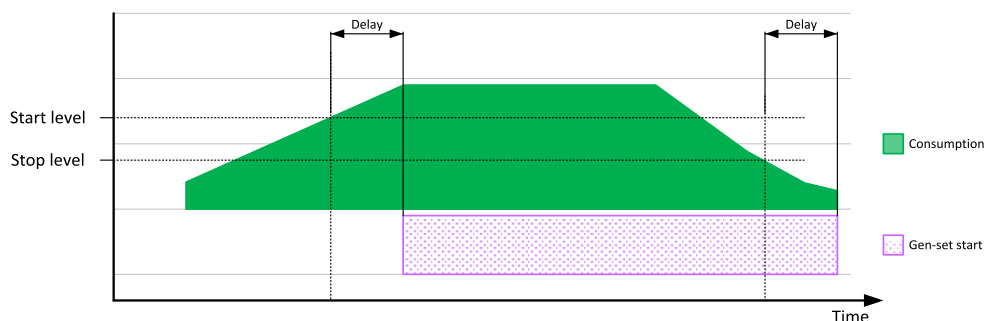
TEST (Test on Load) mode

Control of breakers is fully on demand of external unit. Controller follow the actual state of feedbacks.

5.3.13 Peak shaving

Peak shaving is available in SPI, SPtM and Combi applications. The function starts the Gen-set automatically when the consumption goes above set limit. The function can be based on active or apparent power.

The Peak shaving function is active only in AUT mode in Parallel to Mains operation. Peak shaving is based on Object P or Object P and Object Q (active or apparent power consumption of a load). If load consumption increases over **PeakLevelStart (page 330)** or **Peak kVA Start (page 332)** for period longer than **PeakAutS/S del (page 331)** or **PeakKVAS/S del (page 332)** the Gen-set is started. If load consumption decreases below **PeakLevelStop (page 331)** or **Peak kVA Stop (page 332)** or period longer than **PeakAutS/S del (page 331)** or **PeakKVAS/S del (page 332)** the Gen-set is stopped. Both Peak shaving based on kW and kVA can work simultaneously (the Gen-set is started if at least one condition is fulfilled). The activation of the function is indicated by LBO: **PEAKSHAVEACT (PAGE 829)**.



5.3.14 Load shedding

Load shedding is a function common for all applications except for COX. There may be some variations (in MINT there is no MCB button etc.).

All Load shedding outputs are activated (closed) to trip the unessential load when Gen-set goes to island:

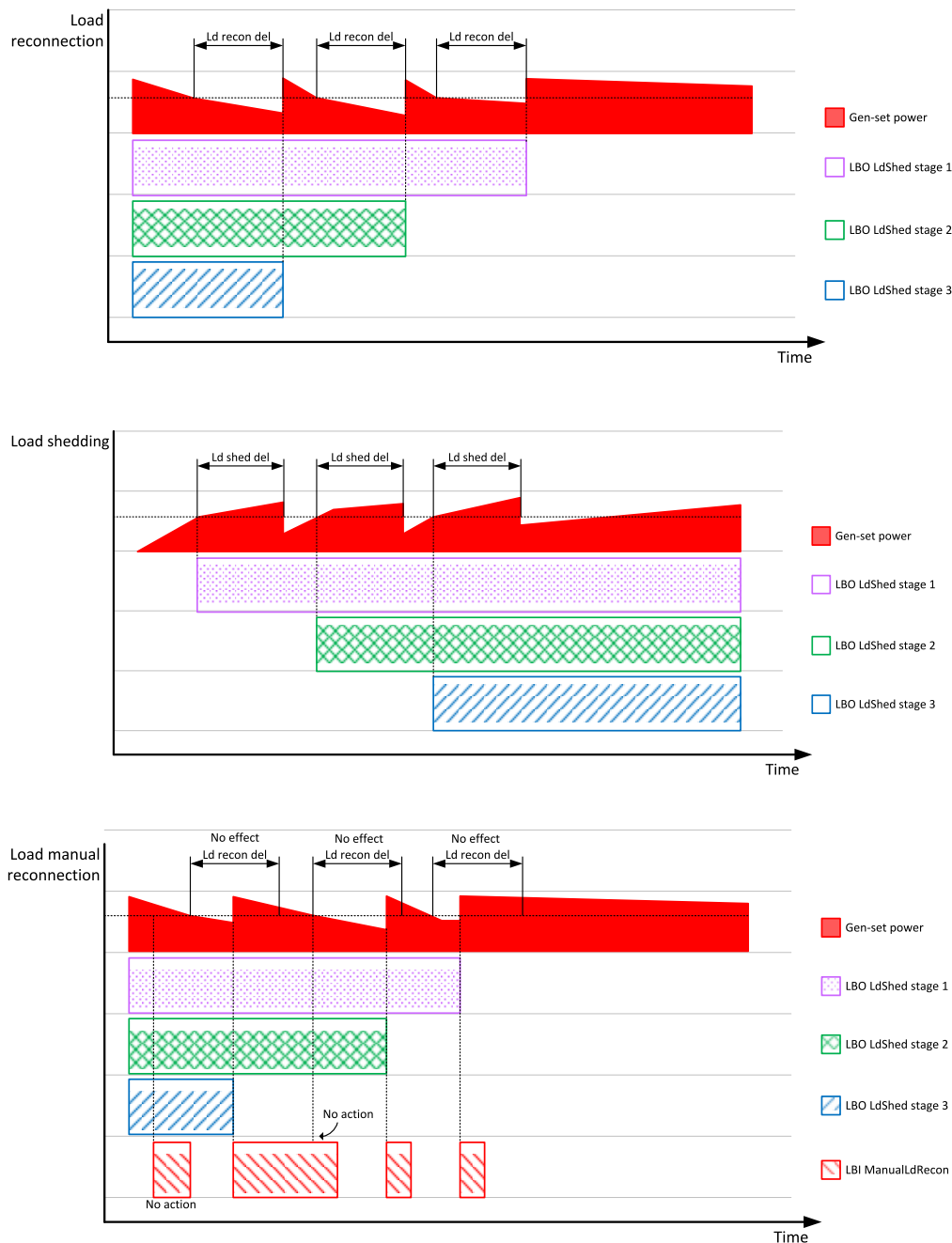
- When GCB is closed after mains fail and gen-set starts in SEM/AUT mode.
- When MCB opens from parallel to mains operation in SEM/AUT mode.
- Before MCB is opened in MAN mode by button.

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

Load shedding has three steps and each step is linked with its own Load shed x binary output. There is only one load shed level and delay for all three steps as well as recon level and delay. Load shed can only move from one step to the next, e.g. No LoadShed to LdShed S1 to LdShed S2 to LdShed S3 and vice versa.

If manual reconnection of the load is desired, the **AutoLd recon** (page 532) setpoint needs to be disabled (DISABLED). To get more information on this function please go to the setpoint description.

Note: If Load shedding outputs (at least one) are configured (e.g. to a PLC function) the controller will show screen timer of the Load shedding and it will create history record when Load shedding occurs. Otherwise there is no indication of Load shedding happening (although LBO state still change).



5.3.15 Controller redundancy

Redundant system is a general term for applications where there are two controllers at each Gen-set. One is the main controller, which controls the Gen-set in normal conditions, the other is the redundant controller, which takes over the control when the main controller fails. Both controllers have identical firmware, and most of the configuration and setpoints. Only several things need to be adjusted/configured differently because of the redundancy function itself.

IMPORTANT: If there are shared binary or analog outputs used on the controller (e.g. for system start/stop), it is necessary to prepare the configuration in the way so each controller uses binary or analog output set with different address. Configuration in Gen-set controllers then needs to be altered so it can receive signals from both controllers (e.g. using built-in PLC functions).

Redundant systems using binary signals

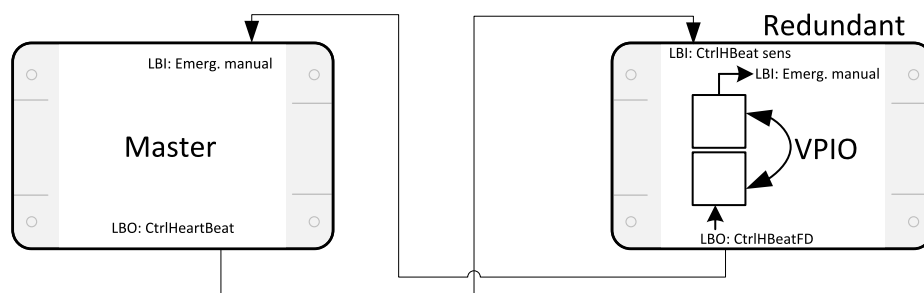
In MINT and Combi in MINT mode

It is not possible to use this redundancy system since correct function of the controller depends on CAN bus communication and thus CAN redundancy should be always used. CAN communication is used for load sharing and VAr sharing which are crucial functions for multiple Gen-sets in parallel.

In SPtM, SPI and Combi in SPtM or SPI mode

In this case it is possible to use both system with binary signal and CAN bus. Generally the system using CAN bus produces faster results. See the chapter **Redundant systems using CAN bus (page 147)** if you want to use redundancy with CAN bus.

If you want to use redundancy using binary signals the configuration should be adjusted according to the picture below.



Note: Alternatively it is possible to use RS PLC block to lock the master controller in disabled state once it fails to prevent its random unstable returns.

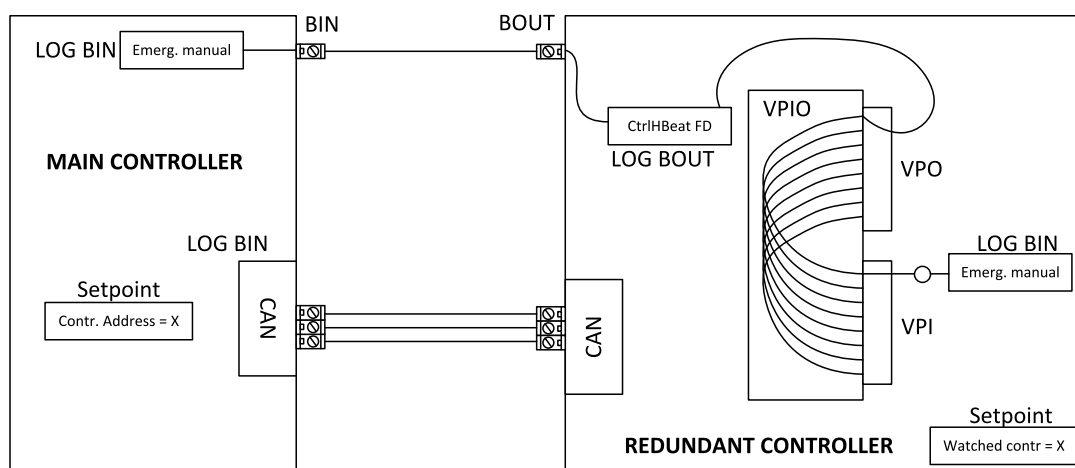
Redundant systems using CAN bus

This system uses the CAN bus for detection whether the main controller is operational or not. If the redundant controller has not received two consequent messages from the main one (~100 ms) it will take over the system control – it activates the LBO **CTRLHBEAT FD (PAGE 771)**, which has to be wired in such a way, that it disconnects the dead main controller from the control, connects the redundancy controller instead and activates it by deactivation of the LBI **EMERG. MANUAL (PAGE 679)**.

As there can be up to 16 pairs of controllers at the CAN bus it is necessary to select which main controller (address) belongs to which redundant one. The setpoint **WatchedContr (page 340)** is used for this purpose. It must be adjusted to address of the respective main controller in each redundant controller and it must be adjusted to 0 in each main controller.

IMPORTANT: Correct wiring of all inputs and outputs that should be used both by the main and the redundant controller needs to be done. Please refer to the corresponding chapter for wiring of binary inputs and outputs.

IMPORTANT: Do not use Shared Binary Inputs/Outputs for LBO CtrlHBeat FD (page 771) -> LBI EMERG. MANUAL (PAGE 679) connection since the failed controller may not interpret it correctly.

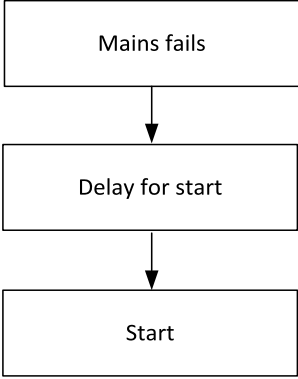
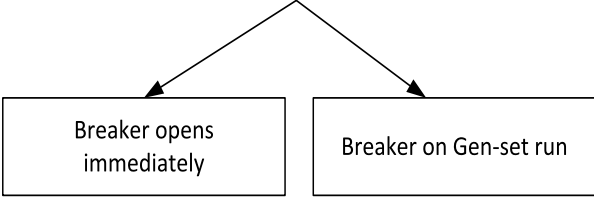
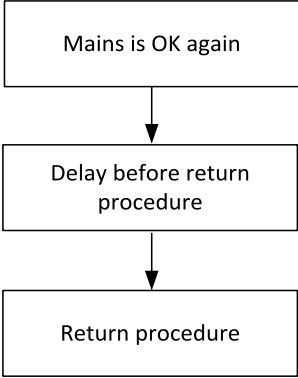
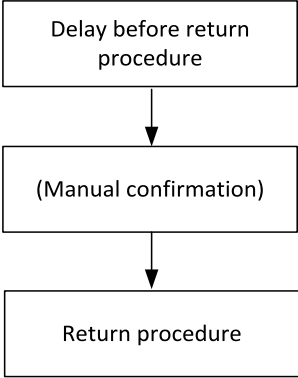
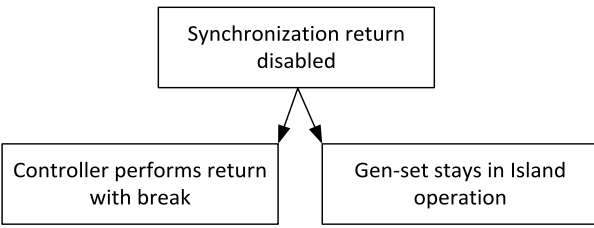


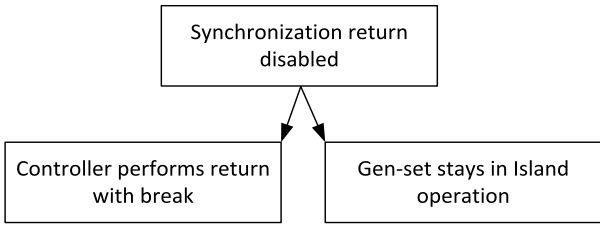
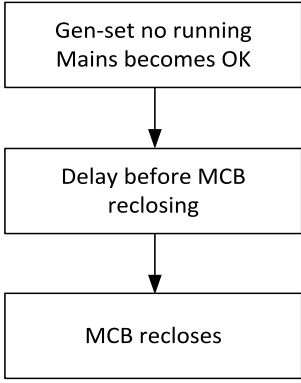
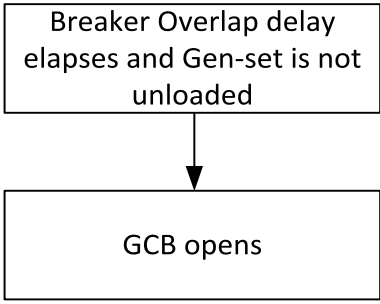
In the figure above the signal of LBO **CtrlHBeat FD** (page 771) is used to disable the main controller if it is lost from CAN bus or CAN bus communication from that controller becomes erratic. It is used also to disable the redundant controller when the communication on CAN bus is alright (it is negated). For more information on Virtual Binary Inputs and Outputs (VPIO) please refer to the chapter **Shared Binary IO and Virtual IO** (page 159).

IMPORTANT: Use pulse signals for control of circuit breakers. MCB ON COIL, MCB OFF COIL, MGCB ON COIL and MGCB OFF COIL should be used to prevent sudden opening for a short period of time when the controller fails and to ensure proper function of redundancy.

5.3.16 AMF operation

SPtM and Combi application in SPtM mode contains complex AMF function. There are several setpoints that allows user to adjust the function behavior. Detailed description is below. Everywhere SPtM application is mentioned Combi application in SPtM mode is also relevant.

 <pre> graph TD A[Mains fails] --> B[Delay for start] B --> C[Start] </pre>	<p>When the Mains fail occurs the system is started with adjustable delay (EmergStart del (page 424)).</p>
 <pre> graph TD A[Mains fails] --> B[Breaker opens immediately] A --> C[Breaker on Gen-set run] </pre>	<p>In some cases it may be crucial to choose when the MCB opens after Mains failure). It is possible to choose whether the breaker opens directly when Mains failure is detected or when the generator is running. This is done via setpoint MCB Close del (page 424).</p>
 <pre> graph TD A[Mains is OK again] --> B[Delay before return procedure] B --> C[Return procedure] </pre>	<p>When the Mains parameters become OK again it is possible to adjust the delay time which must elapse before the controller starts the return to Mains procedure. This delay is adjusted by Mains ret del (page 428). This function is particularly useful when the Mains fail happens several times in a row with short period of Mains being OK.</p>
 <pre> graph TD A[Delay before return procedure] --> B["(Manual confirmation)"] B --> C[Return procedure] </pre>	<p>It is also possible to choose option that return to Mains needs manual confirmation before the controller starts the return procedure. You can choose this by setpoint RetFromIsland (page 427). For the full description of manual confirmation of return procedure refer to the description of the setpoint.</p>
 <pre> graph TD A[Synchronization return disabled] --> B[Controller performs return with break] A --> C[Gen-set stays in Island operation] </pre>	<p>By default return to Mains (when the Mains parameters are OK again and Mains ret del (page 428) elapses) is done by reverse synchronization of Gen-set(s) back to Mains, soft unload of the Gen-set and opening of its GCB or by opening GCB.</p>

 <pre> graph TD A[Synchronization return disabled] --> B[Controller performs return with break] A --> C[Gen-set stays in Island operation] </pre>	<p>When it is not possible to synchronize to the Mains (Parallel operation is not enabled, Synchronization is not enabled, Synchronization is unsuccessful etc.), return with break may be enabled to ensure that the load returns to the Mains even though parallel operation is not possible.</p>
	<p>ReturnWithIntr (page 426) enables the return with break (the duration of the break is given by the setpoint FwRet break (page 428)). If return with break is disabled and it is not (for whatever reason) possible to synchronize back to the Mains, the Gen-set stays running in Island operation even though the Mains is OK.</p>
 <pre> graph TD A[Gen-set no running Mains becomes OK] --> B[Delay before MCB reclosing] B --> C[MCB recloses] </pre>	<p>In case that the Gen-set is not able to start (e.g. it is not in AUT mode etc.) the AMF function recloses MCB back to healthy Mains after delay given by the setpoint MCB Close del (page 424) elapses.</p>
 <pre> graph TD A[Breaker Overlap delay elapses and Gen-set is not unloaded] --> B[GCB opens] </pre>	<p>In SPtM application there is also setting for the duration of breaker overlap available. This time (given by the setpoint BreakerOverlap (page 426)) defines the maximal time for run in parallel during return to once again healthy Mains (even though soft unloading is not completed, after BreakerOverlap (page 426) elapses the GCB is opened regardless of load on Gen-set).</p>

5.3.17 Service timers

Service timers are used as maintenance interval counters. Counters can be set by four setpoints (**Service time 1 (page 397)**, **Service time 2 (page 397)**, **Service time 3 (page 398)** and **ServiceTimeStp (page 398)**).

Example: Each service timer can be used for different type of regular maintenance work such as oil change, spark plug change etc.

Actual value of counters is located in **Group: Statistics (page 658)**: **Service time 1 (page 660)**, **Service time 2 (page 661)**, **Service time 3 (page 661)** and **ServiceTimeStp (page 662)**. This value is decremented every running hour of Gen-set.

When the value of first three counters reaches 0, the alarm *WrnServiceT1+2* respectively *WrnServiceT3* is activated and the counter continues decrement the value next to minus values until the respective counter is readjusted back to nonzero value.

When the **ServiceTimeStp (page 398)** counter reaches 0, the alarm *StpServiceTime* is issued until the related counter is readjusted back to nonzero value.

Note: Service timers can be renamed in the GenConfig tab Miscellaneous.

Reset of Service timers

Reset command allows to readjust the Service timer to original value presented by the related setpoints (**Service time 1 (page 397)**, **Service time 2 (page 397)**, **Service time 3 (page 398)** and **ServiceTimeStp (page 398)**).

Reset command for each Service timer can be locked with user password setting. (GenConfig tab Commands).

Modules	I/O	Setpoints	Commands	Protection
Name	Access Group			
Engine Cmd	Q _N	0 _{FF}	0 _{FF}	0 _{FF}
Open/Close Cmd	Q _N	0 _{FF}	0 _{FF}	0 _{FF}
ClearStatistics	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
kW hours	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
kVAr hours	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
Set num starts	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
EngRun hours	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
SetUnsuc starts	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
RemSw(On/Off)	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 1	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 2	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 3	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 4	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
ExtValue 1	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
ExtValue 2	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
SetTotDnTime	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
SetDntReqToRun	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
UserBtns 1-5	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
RemoteSwitch	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
UserBtns 6-8	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
ServTimeRes1	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
ServTimeRes2	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
ServTimeRes3	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
ServTimeRes4	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 6	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 7	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}
PulseCounter 8	0 _{FF}	0 _{FF}	0 _{FF}	0 _{FF}

Image 5.27 Service timers – GenConfig Commands

Reset of Service timers in IntelliMonitor

There is a Service timers menu which will open the related dialog window. With this dialog window it is possible to readjust the actual service timer value to the original setpoint value.

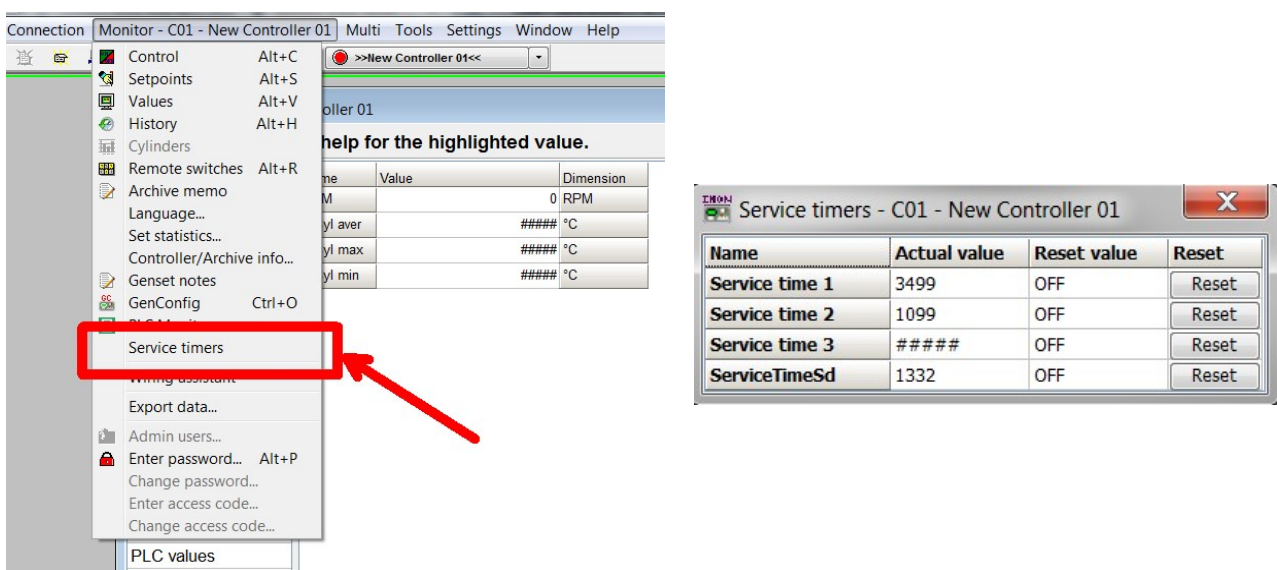


Image 5.28 Service timers reset

Note: Unused timer has to be adjusted to maximal value (OFF).

Reset of Service timers on display

The principle is the same as it is described here: **User buttons (page 157)**.

There are available commands ServTimeRes1, ServTimeRes2, ServTimeRes3, ServTimeRes4 which can be used to readjust the service time value on display.

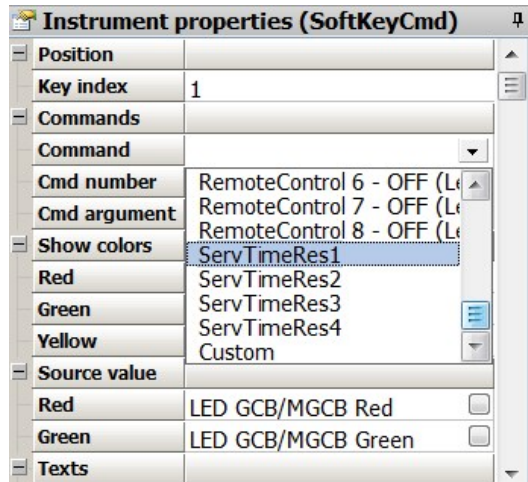


Image 5.29 Service timers – user button

Reset of Service timers via Modbus commands

It is also possible to reset the Service timers via Modbus commands.

SD Service Timer 1: Command 103, Argument 23

SD Service Timer 2: Command 104, Argument 23

SD Service Timer 3: Command 105, Argument 23

SD Service Timer Sd: Command 106, Argument 23

For more information about Modbus commands, please refer to the latest version of **IGS-NT Communication Guide**.

5.3.18 Force value

In this chapter there is complete step by step guide which shows how to use Force value function of the controller.

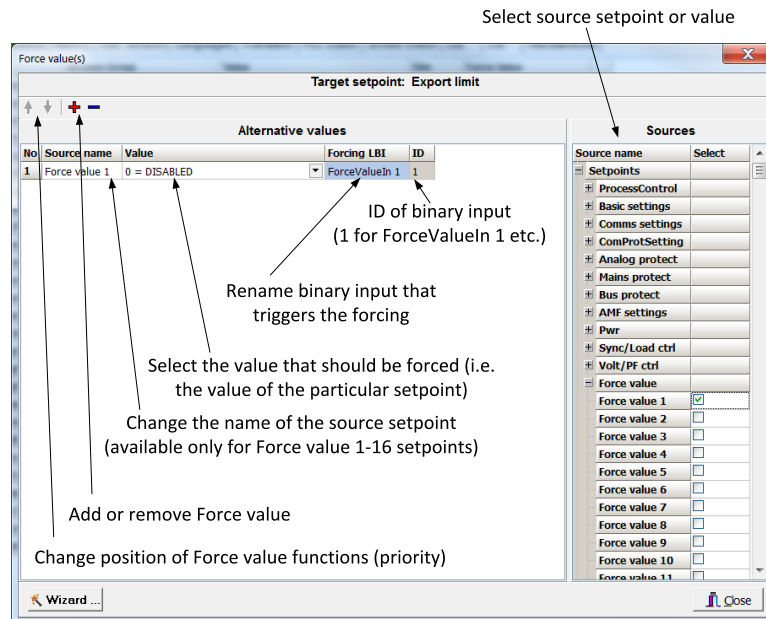
Forcing of values is used to change particular setpoint temporarily by activation of related Binary Input. This is used to change function of controller under given conditions (e.g. there are two different periods during the day when Export limit given by distribution network is required or not).

IMPORTANT: It is possible to continuously rewrite any setpoint in the controller and it is not necessary to use external values. The memory that holds setpoints is designed for up to 10¹⁴ writings. Then memory may be damaged!

Setpoints that are available for forcing may be identified by Force value button on the right side in GenConfig.



When the button is clicked, Force value dialog appears.

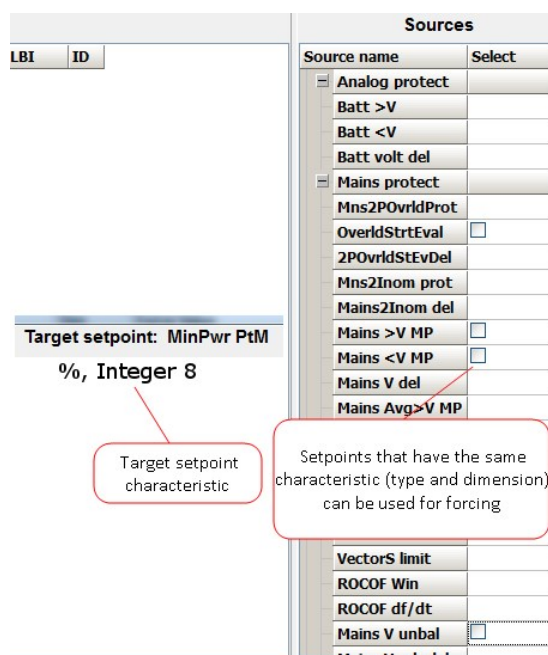


For example if we add **Force value 1 (page 500)** to be forced to **Export limit (page 333)** as value 0 (DISABLED) by Binary Input **FORCEVALUEIN 1 (PAGE 695)** we can change the function of **Export limit (page 333)** from ENABLED to DISABLED by activation of **FORCEVALUEIN 1 (PAGE 695)**. It is possible to rename the setpoint to e.g. ExportDisabled and Binary Input as well to e.g. DISABLEEXPLIM. The function will not change (only the corresponding names).

It is possible to use several force value functions for one setpoint. If more than one forcing Binary Input is active, the one with the highest position (lowest number in the Force value dialog) is used.

It is possible as well to use one Binary Input to force multiple setpoints (e.g. in case of complex function change).

Note: It is possible only to force value or setpoint in other setpoint if their dimension and range are the same (e.g. only value with dimension in hours and which is Integer 16 to a setpoint with dimension hours and which is as well Integer 16). You may use PLC block Convert to change the dimension and range if needed.



5.3.19 External values

This function is especially designed for continuous writing of setpoints from external sources (e.g. via Modbus connection).

IMPORTANT: It is possible to continuously rewrite any setpoint in the controller and it is not necessary to use external values. However external values are very useful when you need to change the value based on binary impulses (Up, Down, Reset).

It is possible to use up to two different External values for continuous writing from external sources. The values are adjusted by setpoints in Force value group. Default (also initial) value may be adjusted, rate of change of ExValueX (by Binary Inputs EXVALUEX UP and EXVALUEXDOWN) can be adjusted as well as high and low limit of the value.

Get more information on this function in the setpoints **ExValue1deflt (page 515)** and **ExValue2deflt (page 515)**.

There are two ways, how to adjust External values. One is using Binary Inputs mentioned above. Second one is to write the value directly using e.g. Modbus. External values then may be converted using PLC block convert and force into setpoint which is then continuously forced by the value of ExValueX.

External values are reverted back to their default (initial) value (given by corresponding setpoint) when Logical binary input **ExValue1 reset (page 682)** or **ExValue2 reset (page 683)** for their reset is active (and they change to the previous value after Binary Input deactivates). When the Binary Input is active the External value cannot be changed by Modbus writing or by using Binary Inputs for up and down value.

Note: External values are not available for external writing when any Binary Input (up, down or reset) related to them is active.

IMPORTANT: Note also that when the controller is reset (powered down and up again), all external values are reverted back to their default (initial) values.

Note: For information on how to write (or read) objects from controller via Modbus, please refer to the latest Communication guide for Controller.

5.3.20 General purpose timers

There are 16 general-purpose timers in the controller, each 4 of them are joined together to one output. That means there are 4 fully independent timer blocks including 4 timer channels each. The combined outputs from the timer blocks are **TIMERACT 1-4 (PAGE 846)**, **TIMERACT 5-8 (PAGE 847)**, **TIMERACT 9-12 (PAGE 847)** and **TIMERACT 13-16 (PAGE 847)**.

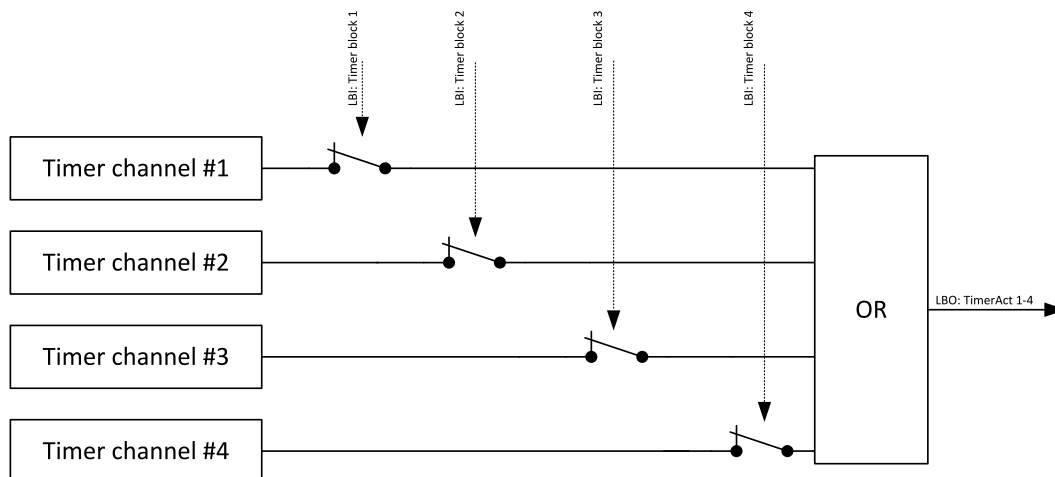
The timers are intended for scheduling of any operations such as e.g. periodic tests of the Gen-set, scheduled transfer of the load to the Gen-set prior to an expected disconnection of the mains etc. Each timer channel can be activated more than once within a single day (setting Short Period). The activation time and duration of each channel is adjustable (both as hh:mm).

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.

The mode of each timer channel is adjusted by an assigned setpoint. The setpoints are located in the Timer settings group and can be adjusted via IntelliMonitor and GenConfig.



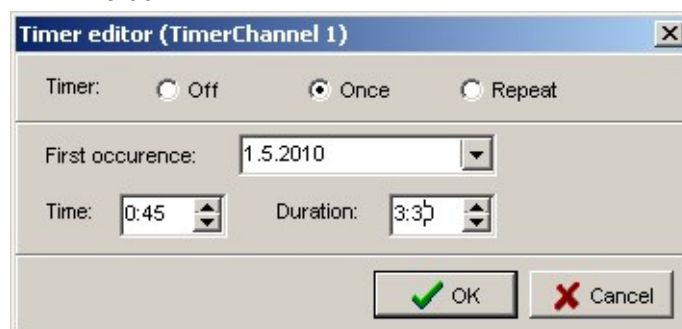
Example: Below is an example how to use the timers for periodic tests of the Gen-set performed every Sunday with duration of 30 minutes and also for scheduled transfer of the load before expected mains failure announced by the local electricity distribution company to 1.5.2010 from 01:00 to 04:00.

1. The output **TIMERACT 1-4** (PAGE 846) is configured internally in GenConfig (LBI tab) to the logical binary inputs **REMOTE TEST** (PAGE 739) and **TEST ON LOAD** (PAGE 747).
2. The setpoint Timer settings: **Timer channel 1** (page 532) is adjusted to "repeated" mode, "weekly" period, only sundays, starting date/time next sunday at 0:00, timer duration 0:30 min.

The screenshot shows the 'Timer editor (TimerChannel 1)' window. At the top, 'Timer:' has three radio buttons: 'Off', 'Once', and 'Repeat' (which is selected). Below this, 'First occurrence:' is set to '13.4.2010'. 'Time:' is '0:00' and 'Duration:' is '0:30'. Under 'Repeating since first occurrence', there are four radio buttons: 'daily', 'weekly' (selected), 'monthly', and 'short period'. To the right of 'weekly', it says 'every 1 .week on'. Below this, there are checkboxes for 'Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday', and 'Sunday' (which is checked).

3. The setpoint Timer settings: **Timer channel 2** (page 532) is adjusted to "once" mode, starting date/time

1.5.2010 at 01:00, timer duration 3:00 hrs.

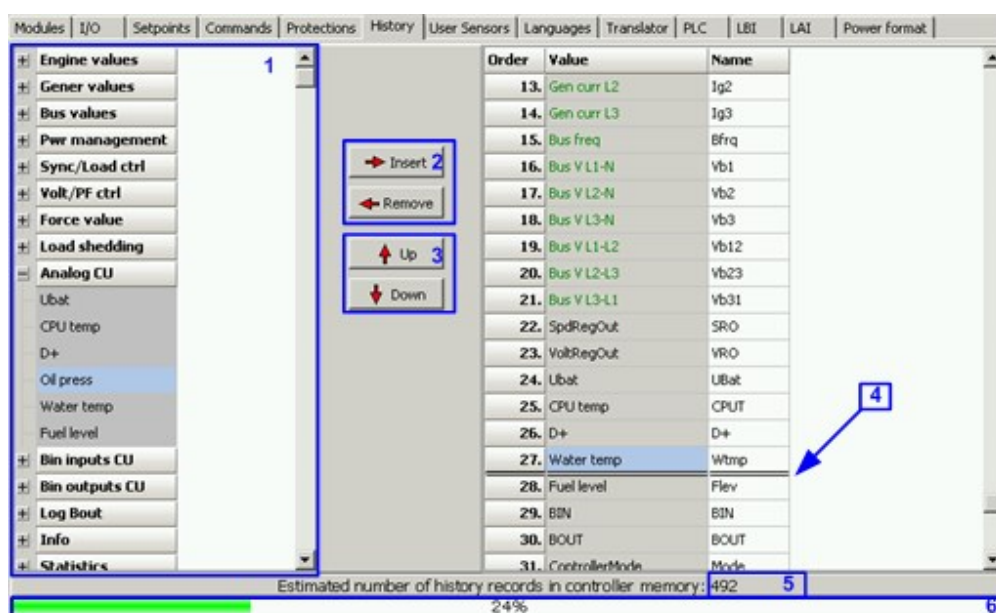


5.3.21 History log

History records adjustment

It is possible to change History records content. Each record contains date, time and cause of the record as obligatory columns. The rest of columns are configurable.

The history record structure has two parts. The upper part is so-called fast and is written into the history memory immediately in the moment when the written event occurs. The rest of the record may be written with a delay max. 100 ms. The fast part is intended for fast changing values as e.g. currents, voltages or power. The parts are separated by a line in the record content list.



1.	Values selection tree
2.	Buttons for adding/removing values into/from the record structure
3.	Buttons for ordering of the values in the record structure
4.	Fast history separator. The fast part is located above the separator
5.	Estimated number of records depending on record size
6.	Record capacity usage indicator

Note: Values that are displayed in green color are recommended to be placed in the fast part.

Note: If the checkbox **Add modules to history automatically** in the Modules tab is checked then all values of a module are automatically added into the history record when the module is inserted into the configuration.

Time stamp function

The controller allows user to define when the history records are written even though there is no other reason for history record (so called Time Stamp).

It is possible to disable time stamping function (for example when time stamping is not needed and just floods the history). It may be conditioned by Gen-set run or it may be enabled always.

Period of time stamping may be adjusted from 1 to 240 minutes.

Note: Beware of History flooding by too many Time Stamps (vital information may be overwritten).

You can find more information in the setpoint **Time stamp act** (page 543).

Time and Date intercontroller sharing

Time and Date are used mainly for History records. Time and date values are shared between controllers that are connected to CAN. When the value is changed in one controller, it sends its new value to all other controllers that are connected to the same CAN bus and they update their time and date values and setpoints accordingly.

Summer time mode

Summer Time Mode function may be enabled and disabled by user. It is possible to set if the controller is located in the northern or southern hemisphere as well.

SummerTimeMode implemented in ComAp controllers is based on CET summer time which means:

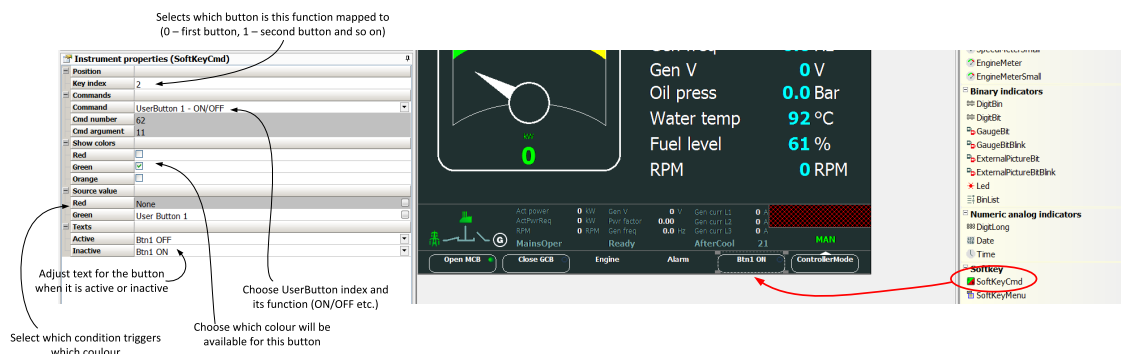
- Clock goes forward 1 hour at 2:00 a.m. on the last Sunday in March
- Clock goes backwards 1 hour at 3:00 a.m. on the last Sunday in October

Note: Please be aware that in other regions summer time adjustments may be done in different time.

You can get more information in the setpoint **#SummerTimeMod** (page 544).

5.3.22 User buttons

There are several User Buttons available in the controller. It is possible to set them on Soft Buttons in IntelliVision 5, 8 or 12.



Available functions for soft buttons

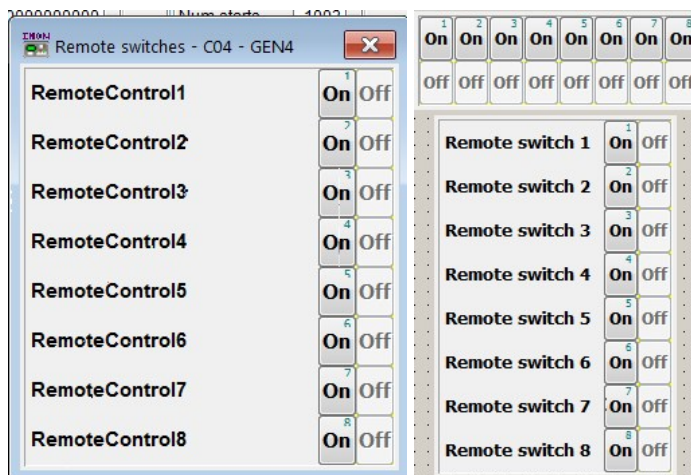
ON	Pressing the button changes the state of Logical binary output USER BUTTON X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of Logical binary output USER BUTTON X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of Logical binary output USER BUTTON X to opened or closed depending on previous state (it is changed to the opposite state).
Pulse ON	Pressing the button issues Logical binary output USER BUTTON X to close for a period of time given by the setpoint UserBtn pulse. Note: Repeated pressing of button during the closed period causes issuing other pulse of the same length to be generated from the moment of button pushing.

Note: It is possible to lock User Button with password (go to tab Commands in GenConfig). User Buttons 1-5, 6-8 and 9-16 (IS controllers only) can be locked separately. It is also possible to use User Buttons in SCADA diagrams.

5.3.23 Remote Control function

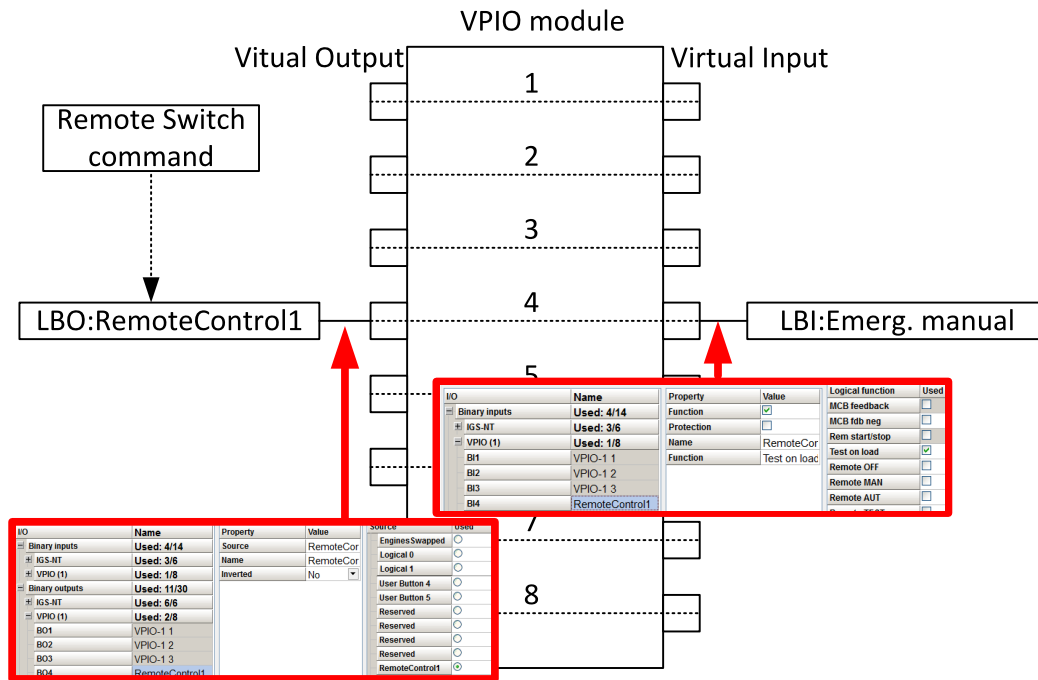
It is possible to remotely control several Logical binary outputs in the controller. You can either use Remote Switches tool in IntelliMonitor (select Remote switches in menu for corresponding controller), import Remote Switches tool to a IntelliSCADA diagram in Line Diagram Editor or use external device via Modbus (register #46361 and command #26 (1A hex), for more information about Modbus please refer to the IS2GASXX Communication guide).

Remote Switch will activate or deactivate depending on remote control so it can be used to manually control devices, simulate malfunctions while commissioning etc. Below you can see example of controls of Remote Switches in IntelliMonitor and in Single Line Diagram for IntelliMonitor.



Note: Remote switches can be renamed in the GenConfig tab Miscellaneous.

Remote Switches may be easily used to trigger logical Binary Input function and all other related functions as normal switch on Binary Input. Module VPIO (Virtual Peripheral Inputs–Outputs) can be added to configuration and it will copy the state of Remote Switch on virtual output to its counterpart virtual input. Refer to the figure below for example.



5.3.24 Shared Binary IO and Virtual IO

Virtual Peripheral Inputs-Outputs (VPIO) module

For the controller there are several modules available. One of them is Virtual Peripheral Inputs-Outputs module which is particularly useful for connection of Logical binary output functions to Logical binary input functions. This way internal controller function may easily trigger other internal controller functions without unnecessary wiring or usage of PLC functions.

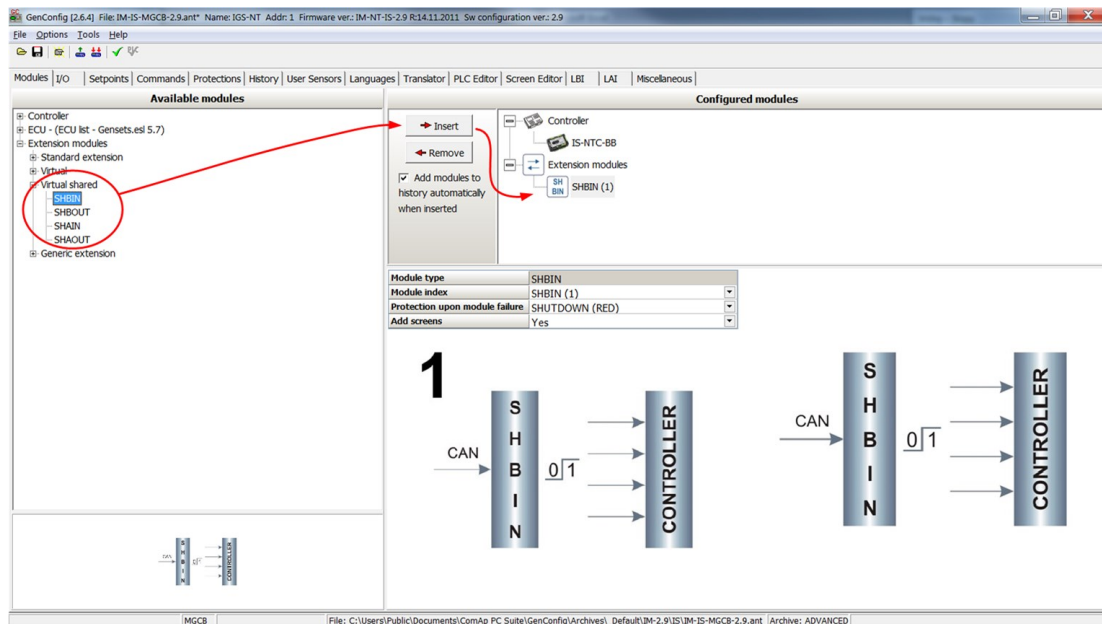
Module is functioning the same way as normal module with 8 outputs and 8 inputs, but the difference is that each input copies its counterpart output. It is possible to select any logical Binary Output function for one of the outputs of VPIO module. Inputs on VPIO module work the same way as standard input of the controller (i.e. it can be assigned function and protection).

For example of this function please refer to the chapter **Remote Control function (page 158)**.

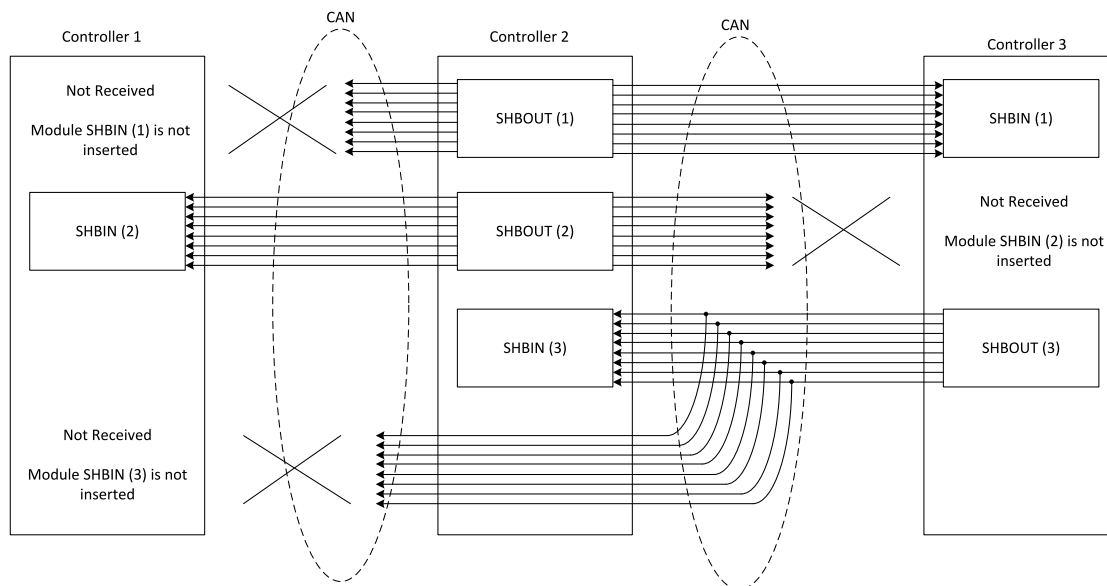
Shared virtual inputs and outputs

It is possible to share Binary and Analog values between all the controllers via CAN bus, thus saving physical Inputs and Outputs and excess wiring.

How to add a virtual module is shown in the following picture.



The principal of how shared Binary inputs and Binary outputs work is shown below.

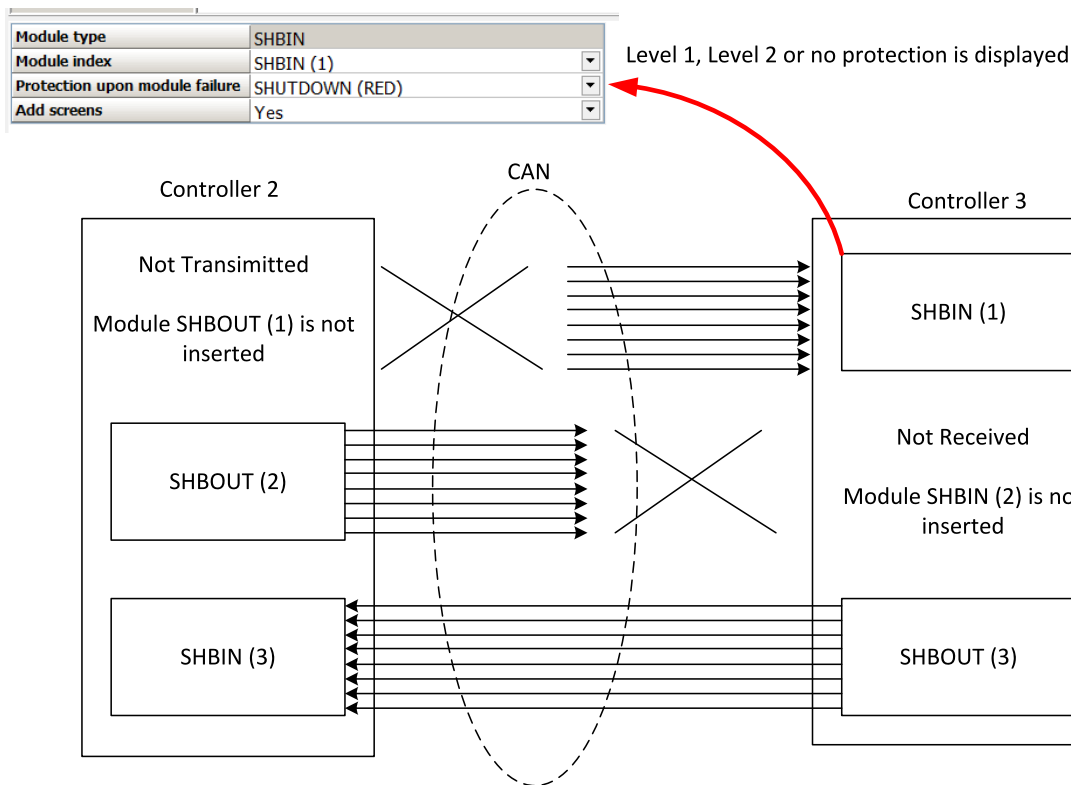


Shared Binary Inputs and Outputs may be used exactly in the same way as standard physical Inputs and Outputs. If SHBIN or SHAIN modules are configured, at least one corresponding module of SHBOUT or SHAOUT (respectively) is needed. If it is not configured, corresponding protection appears because SHBIN or SHAIN will be missing. See the figure below for more information.

IMPORTANT: For proper function of Shared Binary and Analog Inputs and Outputs, only one source of Shared Binary or Analog Outputs must be configured (i.e. it is not possible to configure in one controller SHBOUT1 and to another one as well SHBOUT1).

Note: Controller sends Shared Binary Outputs each 100 ms if there are any changes in any bit position. If there are no changes, controller sends the information with period 1 s.

A protection upon module failure can be configured in GenConfig. See the schematic below.



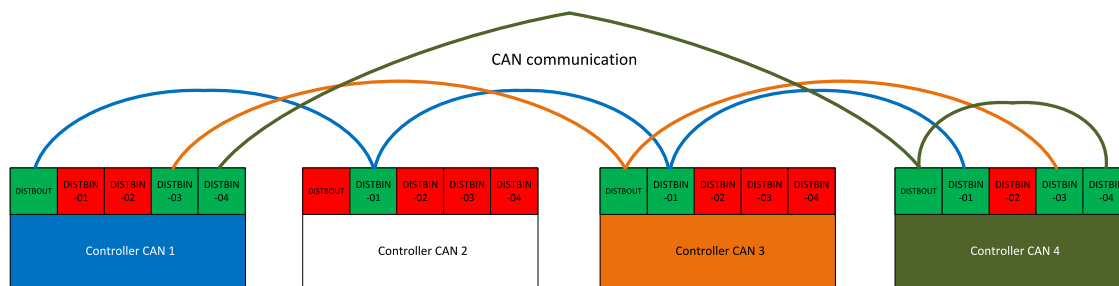
Distributed Binary Inputs and Outputs

It is possible to share Binary and Analog values between all the controllers via CAN bus, thus saving physical Inputs and Outputs and excess wiring.

DISTBIN and DISTBOUT work in a different way than SHBIN and SHBOUT. Each controller has one pack of eight DISTBOUT available (if not configured or no function is assigned to any output, it does not broadcast them). The number of DISTBOUT module is not shown in the configuration and it is always corresponding to the CAN address of the controller (e.g. the controller with address 5 will be broadcasting DISTBOUT-05 which can be received if module DISTBIN-05 is configured in another controller. Up to 32 DISTBIN modules can be configured (meaning that the controller will be receiving all DISTBOUT from all the controller, even his own).

It is not possible to change the name of DISTBIN inputs or add protections.

In the example below you can see 4 controllers with various DISTBIN and DISTBOUT configuration.



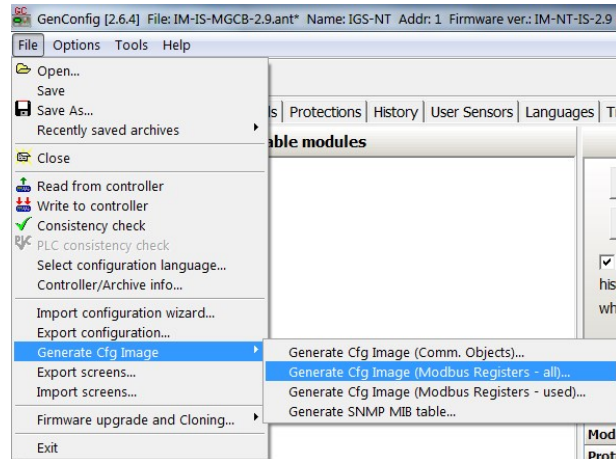
Note: Controller sends Distributed Binary Outputs each 100 ms if there are any changes in any bit position. If there are no changes, controller sends the information with period 1 s.

IMPORTANT: DISTBIN and DISTBOUT function is conditioned by dongle. IS-AFC-LSM+PMS / IGS-NT-LSM+PMS / IGS-NT-AFR-LSM+PMS dongle can be used.

IMPORTANT: If DISTBIN/DISTBOUT is configured and the correct dongle is not used, alarm message "Wrong config" is issued.

5.3.25 Modbus

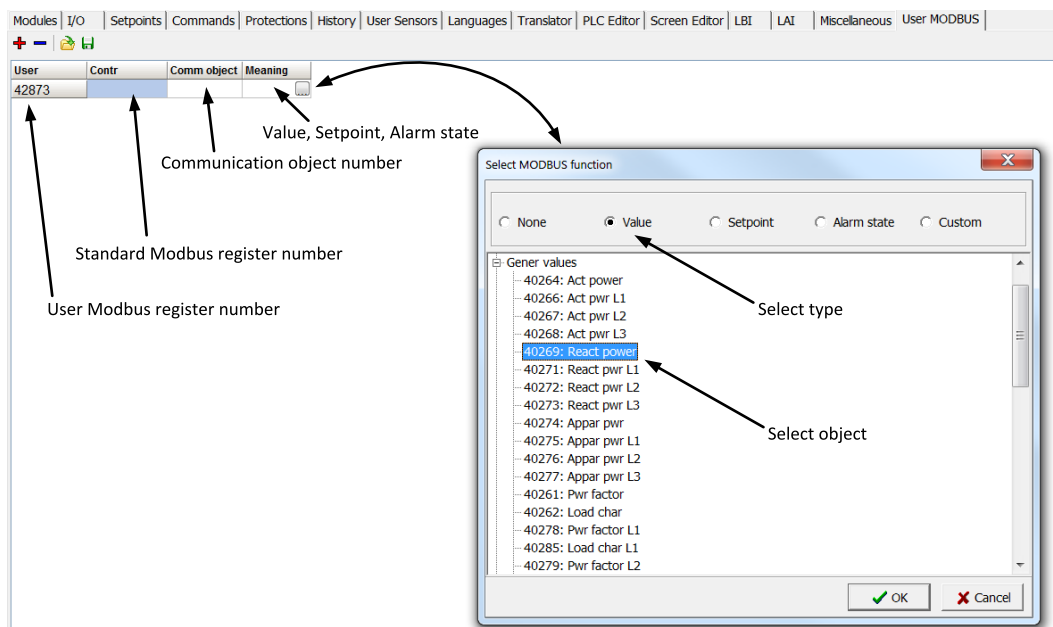
Controller supports Modbus Slave functions (an external device may write or read from a controller). Modbus registers corresponding to objects in the controller can be exported to text form in GenConfig.



If Modbus Master function is required extension module I-CB/Modbus connected via CAN1 can be used.

User Modbus

Users can define Modbus registers from 42754 to 43009. Values, setpoints and Alarm states can be specified for these new Modbus registers to prepare the Modbus protocol for batch reading or to standardize Modbus protocol between FW versions or branches.



Modbus Switches

The Modbus Switches consist of two groups of Logical binary outputs in values named **ModbusSw1** (page 648) and **ModbusSw2** (page 648). Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in Logical binary outputs of the controller as "ModbusSw1..ModbusSw32". No password is required for writing of

those registers. There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.

Register for writing	Modbus register number	Value for back-reading	Modbus register number
<i>ModbusSw1</i>	46337	<i>ModbusSw1</i>	See export of MODBUS registers, value ModbusSw1 (page 648)
<i>ModbusSw2</i>	46338	<i>ModbusSw2</i>	See export of MODBUS registers, value ModbusSw2 (page 648)

The LSB of ModbusSw1 (46337) corresponds to LBO "ModbusSw1". The LSB of ModbusSw2 (46338) corresponds to LBO "ModbusSw17".

IMPORTANT: The values **ModbusSw1** and **ModbusSw2** are starting from the left.

5.3.26 Sensors

Controller and/or some extension modules allow connection of sensor outputs to Analog Inputs. There is whole variety of common sensor output characteristics prepared in configuration by default. Although if there is sensor that is not in the list, it is possible to prepare custom characteristics (up to 16) with up to 31 definition points.

Default sensors:

- > PT100/°C
- > PT1000/°C, PT100/°F
- > PT1000/°F
- > NI1000/°C
- > NI1000/°F
- > 4-20 mA active (linear)
- > 0-2400 Ω (linear)
- > 0-2.4 V (linear)
- > Tri-state

For the definition **see Analog Inputs wiring on page 55.**

The configuration of a sensor for analog inputs is shown below.

The screenshot shows the configuration interface for analog inputs. On the left, a tree view lists I/O modules: Binary inputs (Used: 6/32), Binary outputs (Used: 16/32), Analog inputs (Used: 1/4), and IGS-NT (Used: 1/4). Under IGS-NT, four analog inputs are listed: AIN1 (Ain 1), AIN2 (Ain 2), AIN3 (Ain 3), and AIN4 (Ain 4). The 'Analog outputs' section shows 0/1 used.

The right pane shows the configuration for 'Ain 1'. The 'Property' list includes:

- Function:** A dropdown menu.
- Protection:** A checkbox.
- Name:** 'Ain 1'.
- Dim:** A dropdown menu.
- Sensor:** 'PT100/°C' (labeled as 'Connected Sensor (default and user sensors)').
- Resolution:** '0,1'.
- Sensor range:** '0,0'.
- Bargraph 0%:** '0,0'.
- Bargraph 100%:** '100,0'.
- Offset:** '0,0'.

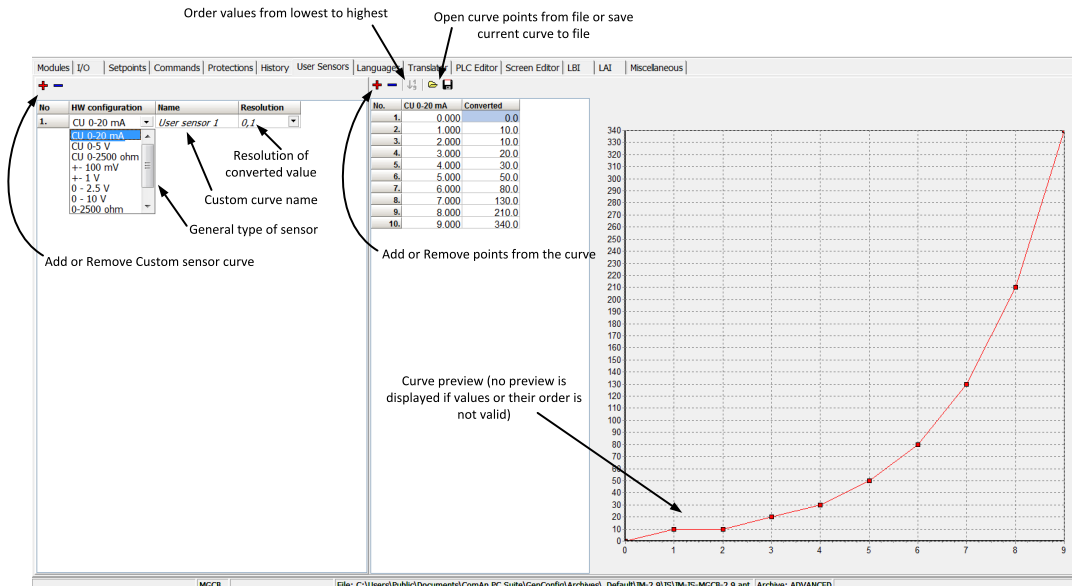
Annotations with arrows point to specific fields:

- 'Name of the Analog Input' points to the 'Name' field.
- 'Dimension' points to the 'Dim' field.
- 'Connected Sensor (default and user sensors)' points to the 'Sensor' field.
- 'Offset of the received value' points to the 'Offset' field.
- 'Interpretation of the received value in bar graph form' points to the 'Bargraph 0%' and 'Bargraph 100%' fields.
- 'Resolution and Range of the sensor (in some cases this is fixed by sensor type and cannot be changed)' points to the 'Resolution' and 'Sensor range' fields.

IMPORTANT: There is "electronic" type of sensor available for Shared Analog Inputs which can be used to interpret shared data over CAN bus. To get more information on Shared virtual peripherals can be found in the chapter Shared Binary IO and Virtual IO (page 159).

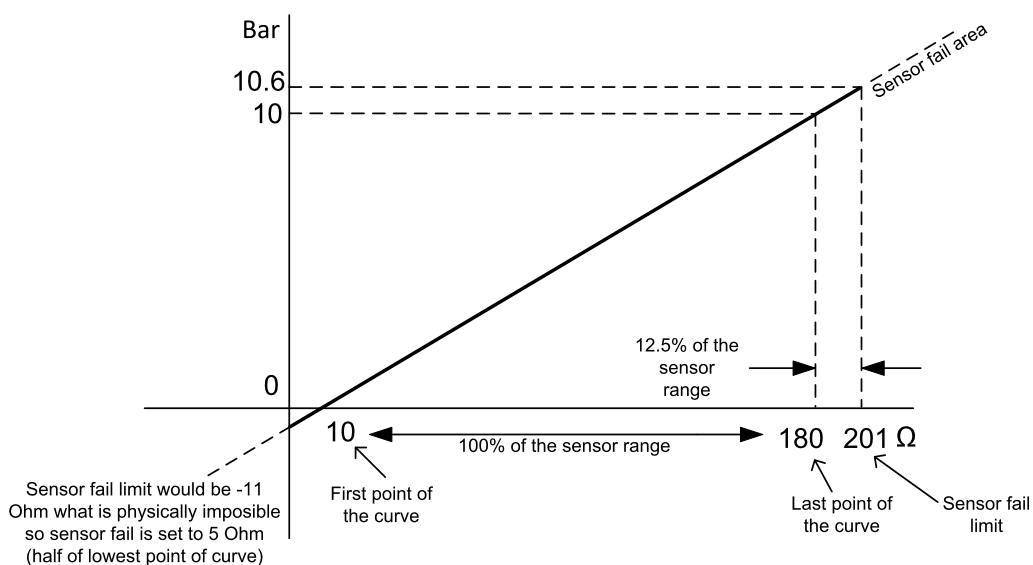
Custom sensor configuration

The picture below depicts configuration a custom sensor characteristic.



Sensor fail detection (FLS)

If the measured resistance, voltage or current on an analog input gets out of valid range, the sensor fail will be detected and a sensor fail message will appear in the alarmlist. The valid range is defined by the most-left (R_L) and most-right (R_H) points of the sensor characteristic $\pm 12.5\%$ from $R_H - R_L$.



The sensor fail alarm does not influence the Gen-set operation. Sensor fail does not activate Binary output Alarm.

IMPORTANT: It is possible to configure protection to trigger e.g. Shutdown or Warning on Fail sensor event. To get more information please go to the chapter Protections and Alarm management (page 194).

Example: If engine shutdown/stop is required when Fail sensor appears, configure in GenConfig → Inputs/Outputs → Analog inputs → Protection → property “Active when” to Under/Over limit + Fls.

5.3.27 Power formats

InteliSys Gas allows users to choose from several Power Formats that affect dimensions in which values and some setpoints are interpreted or adjusted. Power formats may be changed in Miscellaneous tab in GenConfig. There are following Power Formats available:

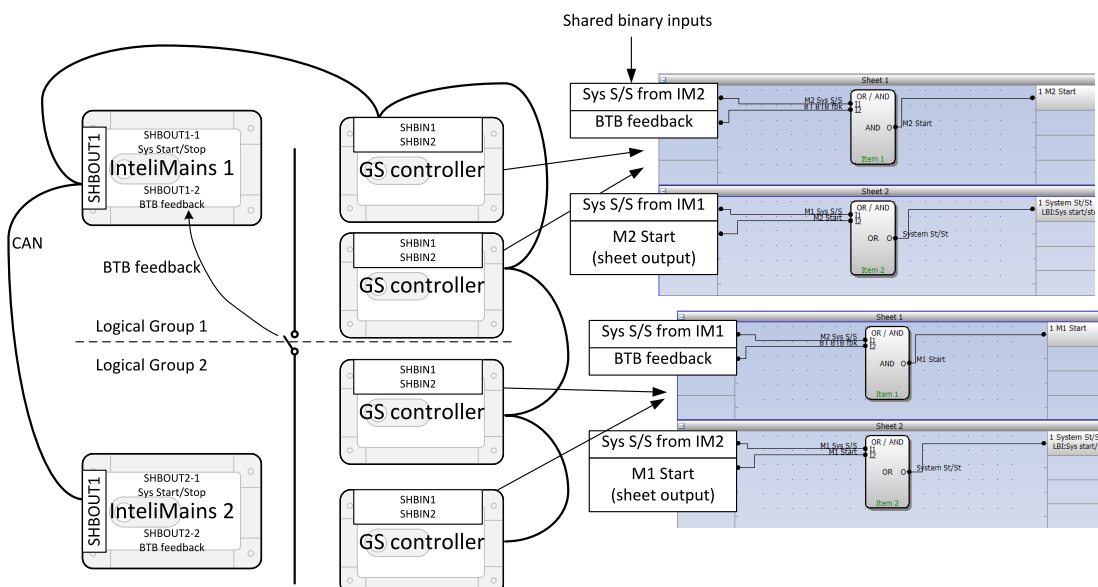
- > 1 kW kVAr kVA kX V
- > 0.1 kW kVAr kVA kX V
- > 0.01 MW MVar MVA MX kV
- > 0.01 MW MVar MVA MX V

Note: Range of some setpoints and values is changed significantly when different Power Formats are selected. Last Power Format is designed to be used in combined Power/High Voltage and Low Voltage installations. High voltage is then interpreted in Volts (e.g. 33256 V instead of 33 kV). Last two Power Formats can be used in combination on one CAN bus.

5.3.28 System Start/Stop

There is a Logical binary input that is used to start and stop a Gen-set remotely in AUT mode. Get more information on this Logical binary input in **REM START/STOP (PAGE 738)** for controllers running SPtM, SPI or Combi applications or in **SYS START/STOP (PAGE 747)** for controller running MINT, COX or Combi applications. In case of using **SYS START/STOP (PAGE 747)** functionality with multiple controllers proper configuration of the system is necessary to ensure correct operation.

Below there is scheme that shows how to use the Logical binary input **SYS START/STOP (PAGE 747)** in the system using just CAN wiring (no physical wiring is needed to share the starting and stopping signal into all controllers in the system).



5.3.29 Languages and Translator

For detailed description of Languages and Translator tool please refer to GenConfig interactive help (press F1 when in corresponding tab or open Help -> Gen-set Help).

InteliSys Gas supports several languages that can be switched during the operation of the controller. When the memory for languages is depleted GenConfig will notify the user when upload to the controller or saving is initiated.

Changing language using binary inputs

There are several Logical binary inputs dedicated for changing of the language of the controller by their activation.

To get more information on this function please refer to **LANG SEL INT A (PAGE 719)**.

Changing language of Remote Alarm Messaging

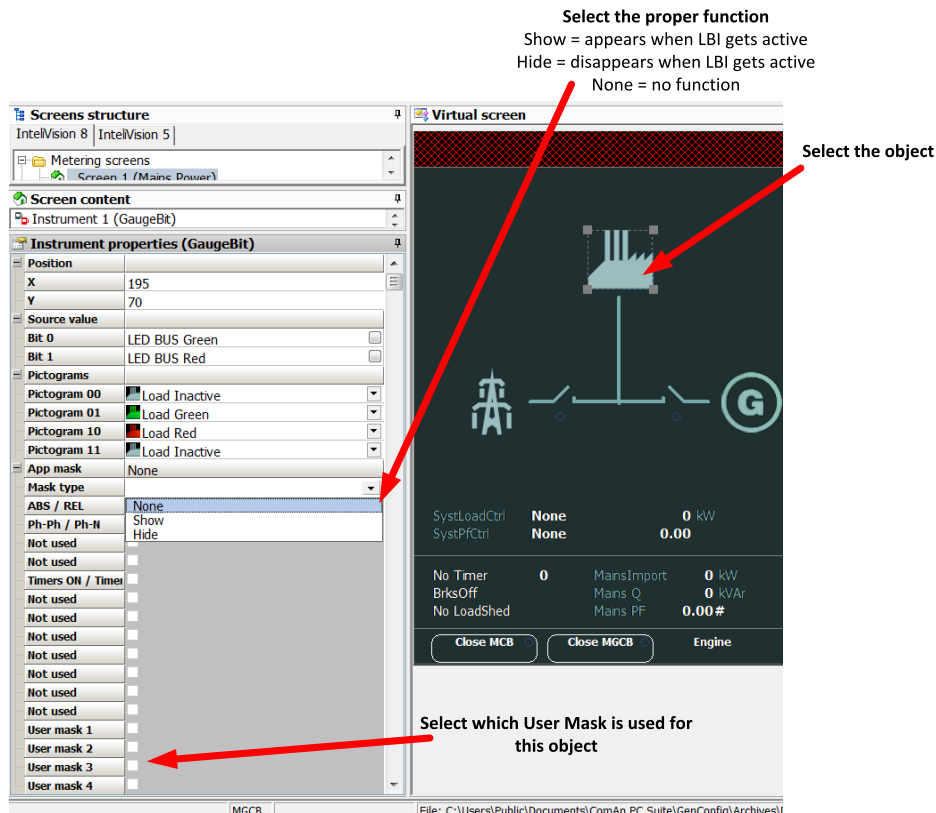
It is possible to change the language of Remote Alarm Messaging function regardless to the actual language of the controller. Get more information in **Acall+SMS lang (page 543)**. Get more information on Remote Alarm Messaging function in the chapter **Remote Alarm Messaging (page 198)**.

Changing language via display GUI

Get more information for separate displays in the chapter **Operator Guide (page 61)**.

5.3.30 User mask

In GenConfig you can easily set any object in ScreenEditor to show or hide based on activation of particular Logical Binary Input available for users. There is diagram bellow, showing the setup of User Mask function in ScreenEditor.



Note: Masking of screens in IntelliVision 5 supports only Show function. Use also other masking functions (masking can react on several internal states, e.g. activation of Timers).

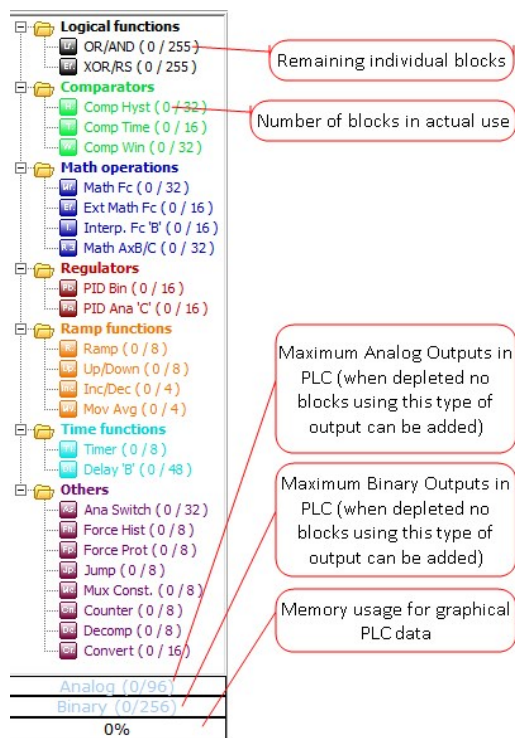
5.3.31 Binary selector

There are four setpoints (**Bin selector 1 (page 388)**, **Bin selector 2 (page 389)**, **Bin selector 3 (page 389)** and **Bin selector 4 (page 389)**) through which user can change state of four corresponding Logical binary outputs (**BIN SELECTOR 1 (PAGE 764)**, **BIN SELECTOR 2 (PAGE 764)**, **BIN SELECTOR 3 (PAGE 764)**, **BIN SELECTOR 4 (PAGE 764)**).

This function can be used to switch on and off devices by changing a setpoint e.g. via a display. It can also be used in combination with Force value function to change a whole group of setpoints with one setpoint. To get more information on the Force value function please refer to the chapter **Force value (page 152)**.

5.3.32 PLC functions

You can get more information on PLC in GenConfig by pressing F1 in the tab PLC or by selecting a PLC block and pressing F1 for individual help for each block. You can check maximum number of usable blocks in IntelliSys Gas in GenConfig (see the picture below).



5.3.33 Power Management

IMPORTANT: Power management is relevant only for MINT application and Combi application in MINT mode.

The Power management function decides how many Gen-sets should run and selects particular Gen-sets to run. The power management is applicable in cases multiple Gen-sets 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 Gen-sets based on the load demand, it can vastly improve the system fuel efficiency. In other words, an additional Gen-set starts when the load of the system raises above certain level. The additional Gen-set stops, when the load of the system drops down below a certain level. The process of determining Gen-set 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 Gen-set is not available for the power management.

The power management evaluates so called load reserve. The load reserve is calculated as difference between actual load and nominal power of running Gen-sets. The reserve is calculated as absolute value (in kW / kVA) or relatively to the nominal power of Gen-set(s) (in %). The setpoint **Pwr mgmt mode (page 430)** is used to select the absolute or relative mode.

The automatic priority swapping function focuses on efficient run of Gen-set in regards to running hours and Gen-set size.

IMPORTANT: The function of the controller is designed to handle the maximum sum of nominal power at 32000 kW (3200.0 kW, 320.00 MW depending on the power format in the controller). If the sum of nominal power of all Gen-sets connected to the intercontroller CAN exceeds these values the power format needs to be changed accordingly.

Example: There are 20 Gen-sets each with 2000 kW of nominal power. The sum of the nominal power is 40000 kW. Therefore the power format in kW cannot be used because the sum exceeds 32767. Therefore power format in MW needs to be chosen because the sum in MW is 40 MW (it does not exceeds 320.00 MW).

Basic power management

The setpoint **Pwr Management (page 430)** enables and disables the Gen-set to be active within the power management and makes automatic load dependent starts and stops. If the power management is disabled, the start and stop of the Gen-set do not depend on the load of the group. If the Gen-set remains in AUT mode, the running condition depends only on the Logical binary input **SYS START/STOP (PAGE 747)**.

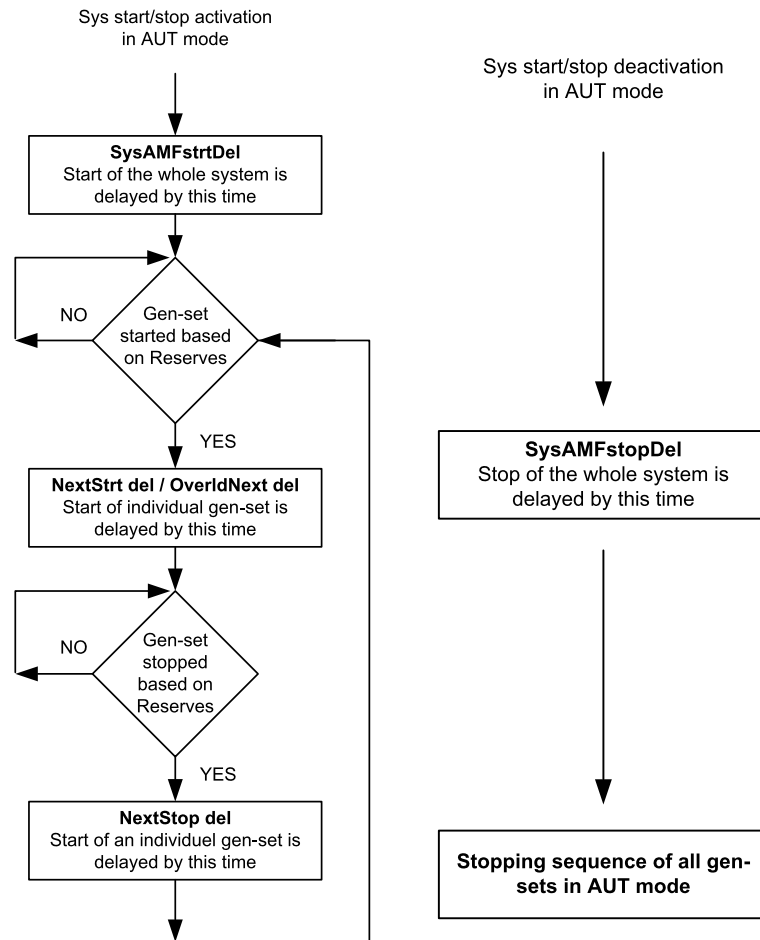
The Logical binary input **SYS START/STOP (PAGE 747)** requests the Gen-set to start or stop. If the input is not active, the Gen-set stops with delay **#SysAMFstopDel (page 433)** after the input has been deactivated and will not start again if in AUT mode. If the input is activated again, the delay **#SysAMFstrtdel (page 433)** starts to count down. Once the delay elapsed, the Gen-set is activated and can be started by the power management. In other words, the power management is activated only if the Logical binary input **REM START/STOP (PAGE 738)** is activated, the option of setpoint **Pwr Management (page 430)** = ENABLED and the AUT mode are selected.

Note: The Gen-set takes part of the power management (= is active) only if the controller is in AUT mode!

Note: The Gen-set performs load and VAR sharing whenever it is connected to the bus bar i.e. it is independent on whether the controller is in AUT or MAN mode or whether the power management is active or not. Do not confuse power management with load sharing.

Principles 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 Gen-set is started after delay given by the setpoint **NextStrt Del (page 438)** is elapsed. Once the Gen-set runs the controller evaluates stopping conditions based on load reserves and priorities. If the reserve is sufficient enough to stop a particular Gen-set, it is stopped after delay given by the setpoint **NextStopDel (page 439)** is elapsed. All the time the system stop condition – i.e. the Logical binary input **SYS START/STOP (PAGE 747)** deactivated – is evaluated as well. Once the delay given by the setpoint **#SysAMFstopDel (page 433)** has elapsed all Gen-sets in AUT mode are stopped. Following figure depicts the system activation and deactivation logic.



The setpoint **#OverldNextDel** (page 438) is used in the case Gen-sets are running at 90 % or more of their nominal power. The setpoint **#OverldNextDel** (page 438) should be generally shorter than the setpoint **NextStrt Del** (page 438). The shorter time always applies in such a case (counting in that part of **NextStrt Del** (page 438) may have already been elapsed).

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 or kVA 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 group (i.e. running Gen-sets active in power management) given by a relevant set-point. Depending of the situation, load reserves are calculated differently in two cases:

Case #1:

- Island operation
- Or parallel to mains operation, **#SysLdCtrl PtM** (page 324) = LDSHARING

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

Case #2:

- Parallel to mains operation, ProcessControl: **#SysLdCtrl PtM (page 324) = BASELOAD**

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

Where:

- AR_{strt} .. Actual Absolute reserve in kW or kVA – for engine start calculation.
- AR_{stp} .. Actual Absolute reserves in kW or kVA – for engine stop calculation.
- RR_{strt} .. Actual Relative reserve in % – for engine start calculation.
- RR_{stp} .. Actual Relative reserves in % – for engine stop calculation.
- $\sum P_{gNom}$.. Sum of Nominal power of all Gen-sets on the bus.
- $\sum P_{g*Nom}$.. Sum of Nominal power of all Gen-sets on the bus apart of the one, which is going to be stopped.
- $\sum P_{gAct}$.. Sum of Actual power of all Gen-sets on the bus = system load.
- BaseLd .. Baseload is given by the setpoint **#SysBaseLoad (page 322)**

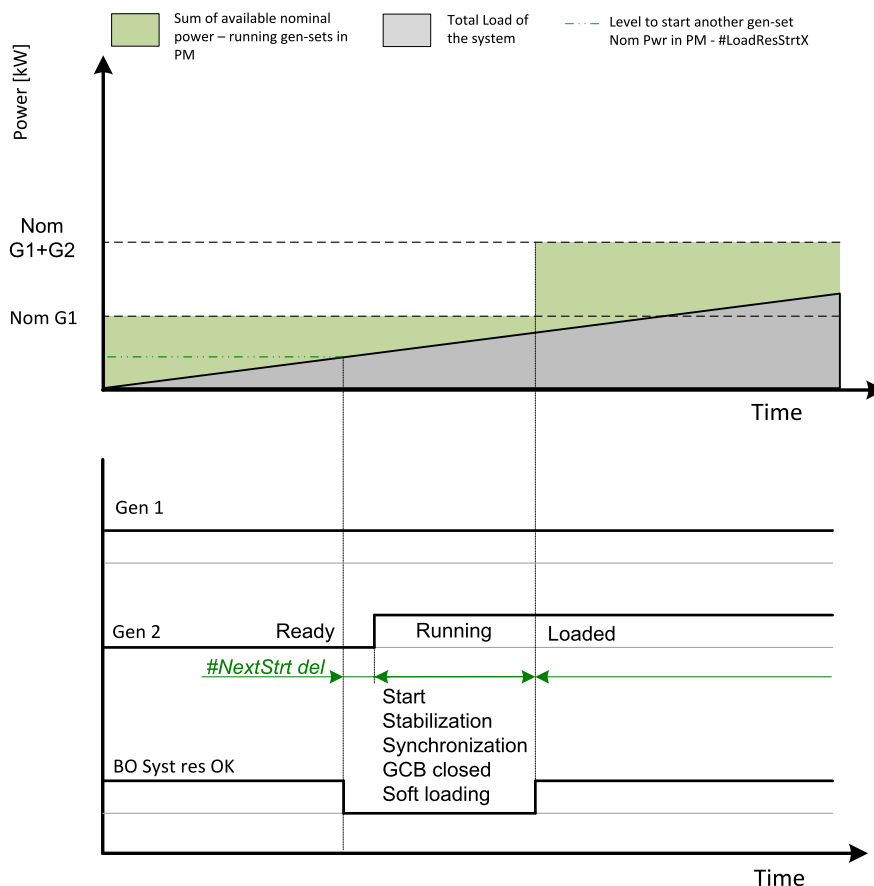
Note: System starting sequences may be very different due to their complexity (i.e. Gen-sets which do not take part in power management, various nominal powers etc.). Each system should be considered individually. Optional functions in absolute or relative Power management are:

- Running hours balancing (equalization) – in absolute or relative pwr mgmnt
- Load demand (different size) engines swap – **in absolute pwr mgmnt only**
- Power management of two or more Gen-set groups (bus tie support) – in absolute or relative power management

Note: The parallel operation to the mains of multiple Gen-sets requires use of the IntelliMains controller. The IntelliMains controller supervises the mains. For further information, please refer to the IM-NT-MCB-MGCB 3.0 Reference Guide or newer version of the guide.

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 Gen-set 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 Gen-set is requested to join the already running Gen-set(s) to the bus.

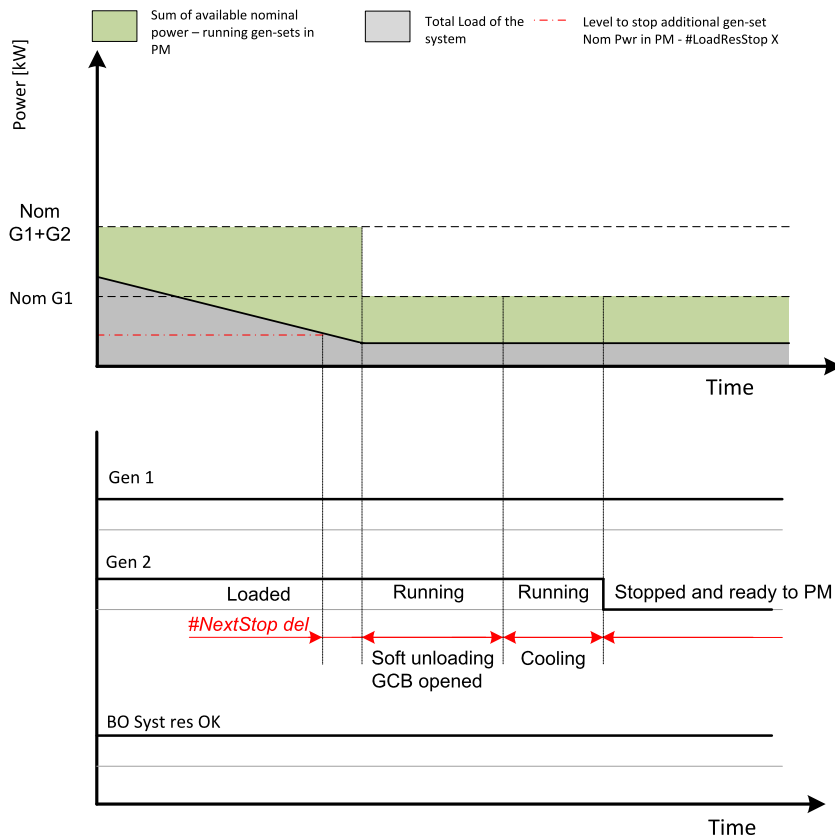


As shown above, the load of the system has increased above the level defined by the start condition – i.e. the load reserve is not sufficient as required by the setpoint **LoadResStrt 1 (page 434)** (or other active reserve set). Further explanation is provided in chapters **Absolute Power Management (page 173)** and **Relative Power Management (page 176)**.

The level is illustrated by the green dashed line. If the load reserve keeps insufficient for longer time than defined by the setpoint **NextStrt Del (page 438)**, the next Gen-set is actually started. The standard starting sequence follows. Please refer to the chapter **Other engine states (page 133)** for further information. Once the synchronization procedure is done, the GCB breaker is closed and the Gen-set 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 Gen-sets on the bus is increased by the nominal power of the additional Gen-set.

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 Gen-set stops when the load of the system drops below certain level to avoid inefficient run of the Gen-set. Following figure depicts the situation when a Gen-set is requested to stop due to the 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 setpoint **LoadResStop 1 (page 434)** (or other selected reserve set). Further explanation is provided in chapters **Absolute Power Management (page 173)** and **Relative Power Management (page 176)**.

The level is illustrated by the red dashed line. If the load reserve keeps over this limit for longer time than defined by setpoint **NextStopDel (page 439)**, the next Gen-set is actually requested to stop. Once the Gen-set is unloaded, the GCB breaker is opened. Please note the sum of nominal power of all Gen-sets on the bus is decreased by the nominal power of the stopped Gen-set. The cooling sequence follows before the Gen-set is actually stopped. The Gen-set is ready to be started if the system load increases again.

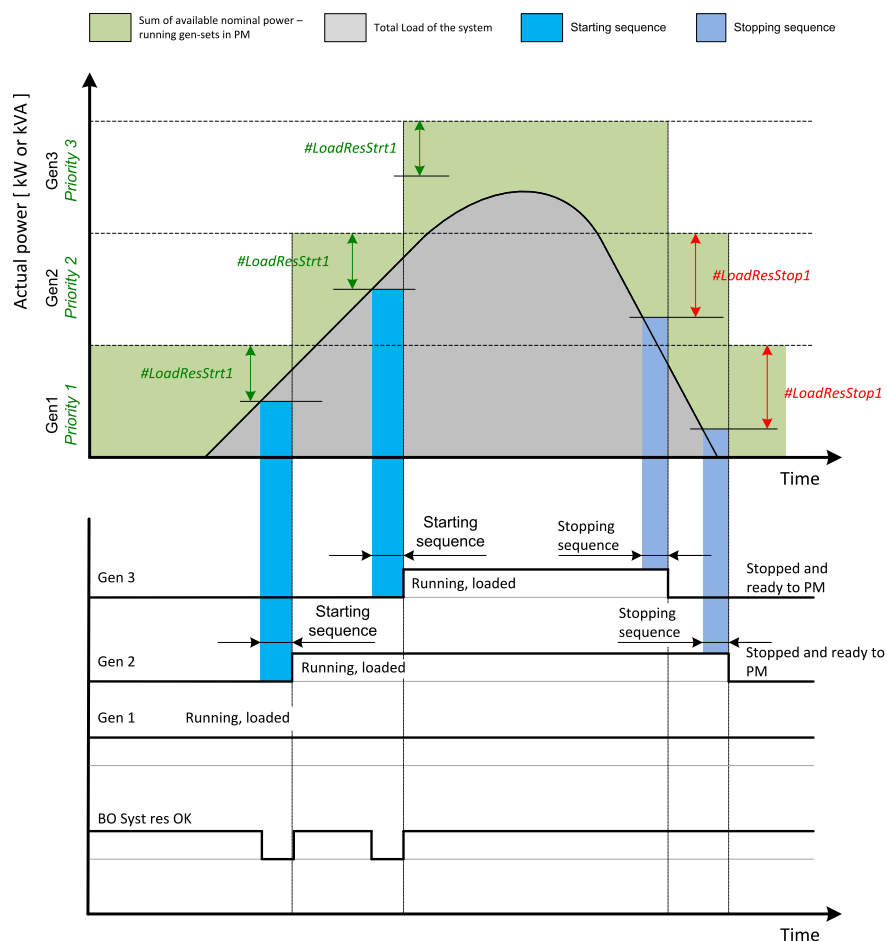
Absolute Power Management

The power management based on absolute load reserves can be successfully used in cases the load portions are similar to the Gen-set 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 Gen-sets are currently running. The mode perfectly fits for industrial plants with large loads.

The absolute power management guarantees adjustable load reserve in kVA or kW.

Activation

Pwr mgmt mode (page 430) = ABS (kW) -	Based on active power load reserve. Suitable for load demand-based optimization
Pwr mgmt mode (page 430) = ABS (kVA) -	Based on apparent power load reserve. Suitable for generator or busbar dimensioning-based optimization.

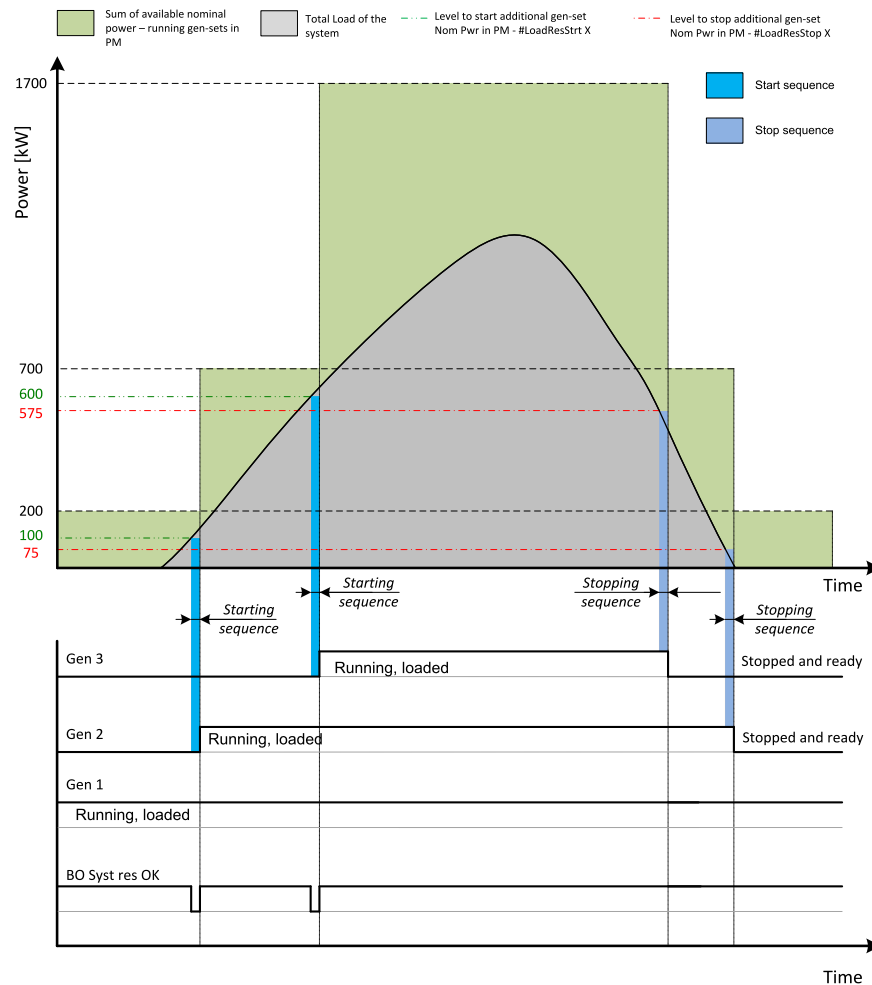


Example: An example of absolute power management is shown on the figure below. There are three Gen-sets with following choice of setpoints:

Setpoint group	Basic settings	Pwr management					
Setpoint	Nomin power	Pwr management	#Pwr mgmt mode	Priority	#PriorityAuto Swap	#LoadRes Strt X	#LoadRes Stop X
Gen-set #1	200 kW	ENABLED	ABS (kW)	1	DISABLED	100 kW	125 kW
Gen-set #2	500 kW	ENABLED	ABS (kW)	2	DISABLED	100 kW	125 kW
Gen-set #3	1 000 kW	ENABLED	ABS (kW)	3	DISABLED	100 kW	125 kW

Note:

Gen-set #1 means that the CAN address of the controller is set to 1. The relevant setpoint is adjusted by Contr. address (page 365).



As it is shown on both figures above, the additional Gen-set is added once the actual load reserve is below the level given by the setpoint **LoadResStrt 1 (page 434)** (or other selected reserve set). The additional Gen-set is removed once the actual load reserve is above the level set by **LoadResStrt 1 (page 434)** (or other selected reserve set). The green dashed line depicts the value of load at which the additional Gen-set is requested to start. This value of the load value is linked with the setpoint **LoadResStop 1 (page 434)** (or other selected reserve set) in following way:

Sum of Nominal power – **LoadResStrt 1 (page 434)** (or other selected reserve set) = Value of load when additional Gen-set requested to start (e.g.: 700 kW-100 kW = 600 kW).

The red dashed line depicts the value of load at which the additional Gen-set is requested to stop. This value of the load value is linked with the setpoint **LoadResStop 1 (page 434)** (or other selected reserve set) in following way:

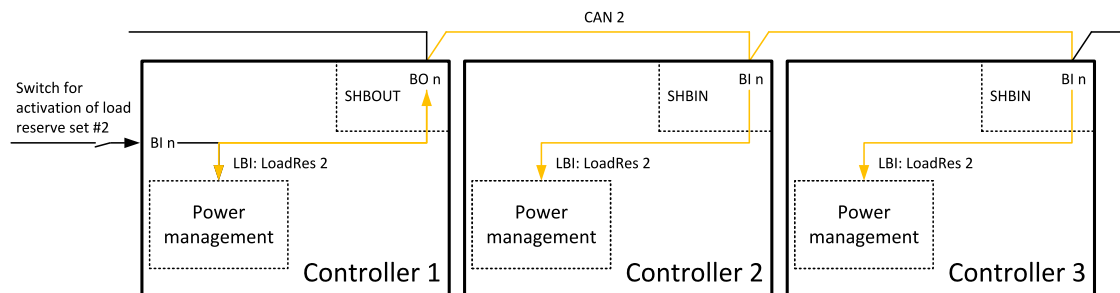
Sum of Nominal power - **LoadResStop 1 (page 434)** (or other selected reserve set) = Value of load when additional Gen-set requested to stop (e.g.: 700 kW-125 kW = 575 kW).

There are 4 levels for starting and stopping Gen-sets.

- **LoadResStrt 1 (page 434) / LoadResStop 1 (page 434)** considered by default.
- **LoadResStrt 2 (page 435) / LoadResStop 2 (page 435)** considered if **LOAD RES 2 (PAGE 722)** activated
- **LoadResStrt 3 (page 436) / LoadResStop 3 (page 436)** considered if **LOAD RES 3 (PAGE 722)** activated
- **LoadResStrt 4 (page 437) / LoadResStop 4 (page 437)** considered if **LOAD RES 4 (PAGE 723)** activated

The option of switching the load reserves by LBI may be usefull in cases appliances with important power consumption are expected to be connected to the bus.

Note: All controllers cooperating together in Power management must have the same load reserve set selected. It is possible to use virtual shared peripherals for distribution of the binary signal to activate LBI Load res 2,3 or 4 among controllers over the CAN bus. For further information see **Shared Binary IO and Virtual IO on page 159**.



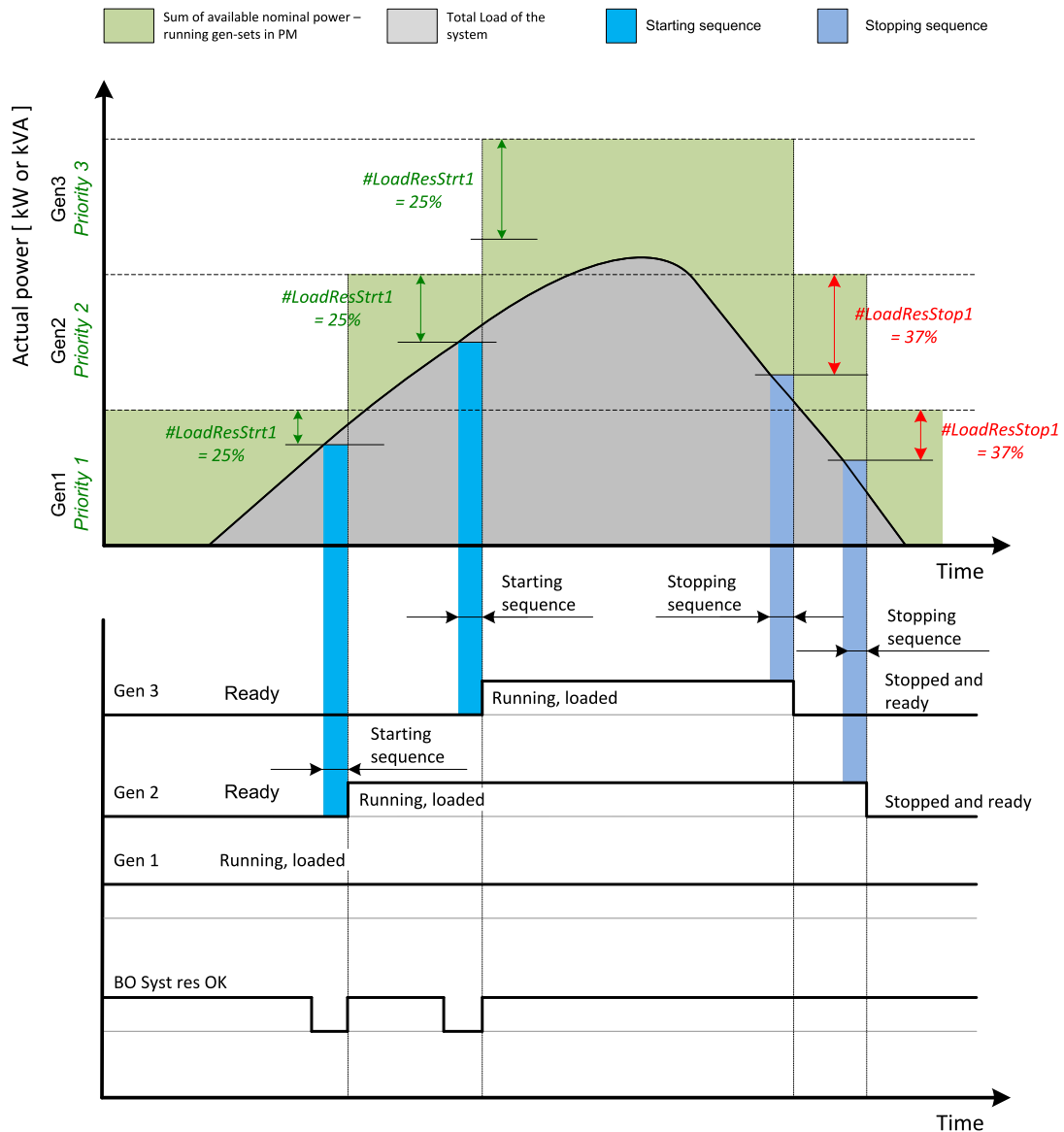
Relative Power Management

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 Gen-set nominal power. This mode helps to achieve the maximal lifetime of the Gen-sets, as they can be operated within optimal load range. The maximal size of the load connected at once depends on number of actually working Gen-sets. The more Gen-sets are connected to the busbar 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.

Activation: **Pwr mgmt mode (page 430) = REL (%)**

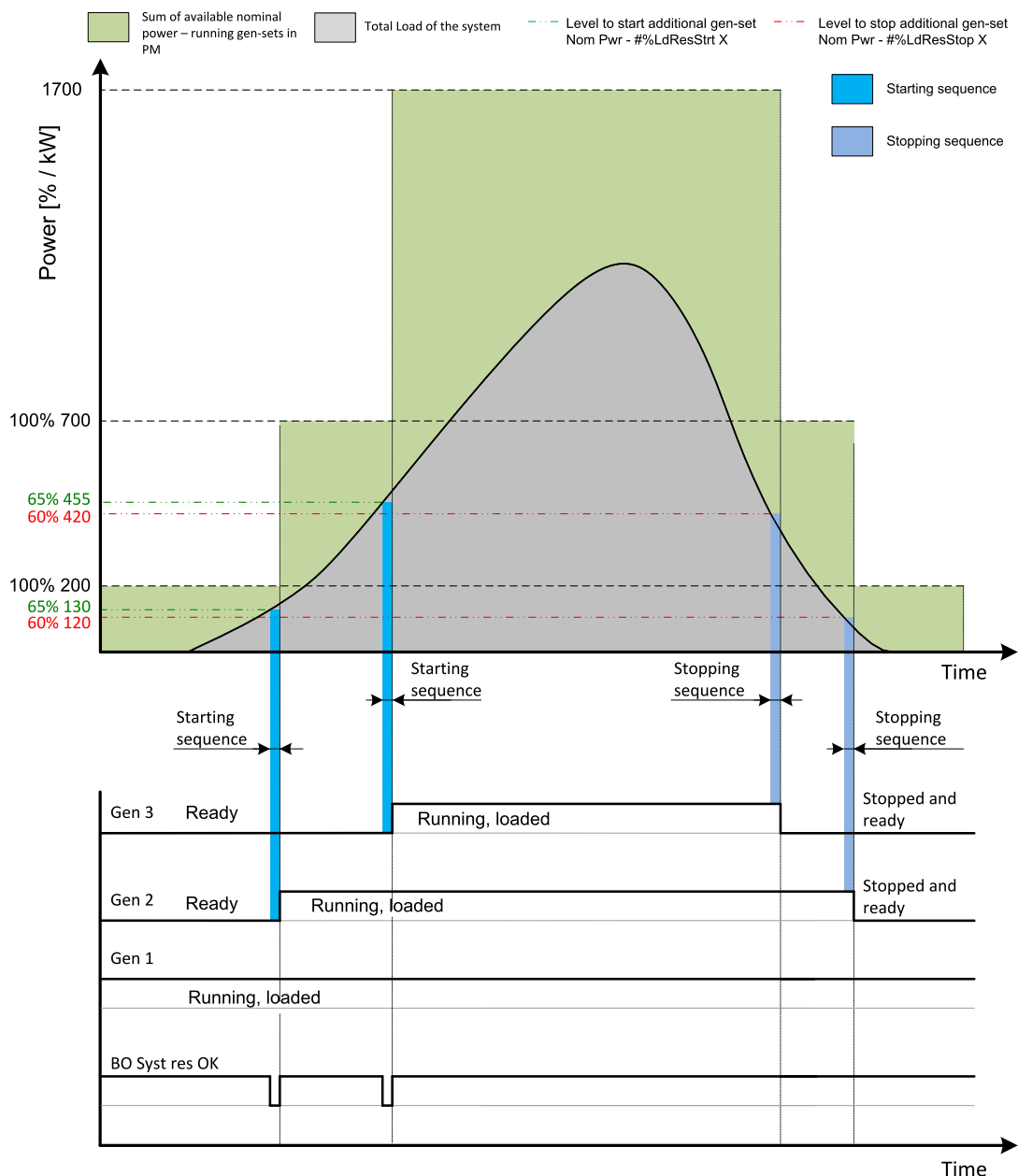
Suitable for engine size-based optimization.



Example: An example of relative power management is shown on the figure below. There are three Gen-sets with following choice of setpoints:

Setpoint group	Basic settings	Pwr management					
Setpoint	Nomin power	Pwr management	#Pwr mgmt mode	Priority	#PriorityAuto Swap	##%LdRes Strt X	##%LdRes Stop X
Gen-set #1	200 kW	ENABLED	REL (%)	1	DISABLED	35 %	40 %
Gen-set #2	500 kW	ENABLED	REL (%)	2	DISABLED	35 %	40 %
Gen-set #3	1 000 kW	ENABLED	REL (%)	3	DISABLED	35 %	40 %

Note: Gen-set #1 means that the CAN address of the controller is set to 1. The relevant setpoint is adjusted by *Contr. address* (page 365).



As it is shown on both figures above, the additional Gen-set is added once the actual load reserve is below the level given by the setpoint **LoadResStrt 1 (page 434)** (or other selected reserve set). The additional Gen-set is removed once the actual load reserve is above the level set by **LoadResStop 1 (page 434)** (or other selected reserve set). The green dashed line depicts the value of load at which the additional Gen-set is requested to start. This value of the load value is linked with the setpoint **LoadResStrt 1 (page 434)** (or other selected reserve set) in following way:

$(100 \% - \text{LoadResStrt 1 (page 434) (or other selected reserve set)}) * \text{Sum of Nominal power} = \text{Value of load when additional Gen-set requested to start in kW (in \% of nominal power)}$, e.g.: $100 \% - 35 \% * 700 \text{ kW} = 455 \text{ kW}$ (65 % of nominal power).

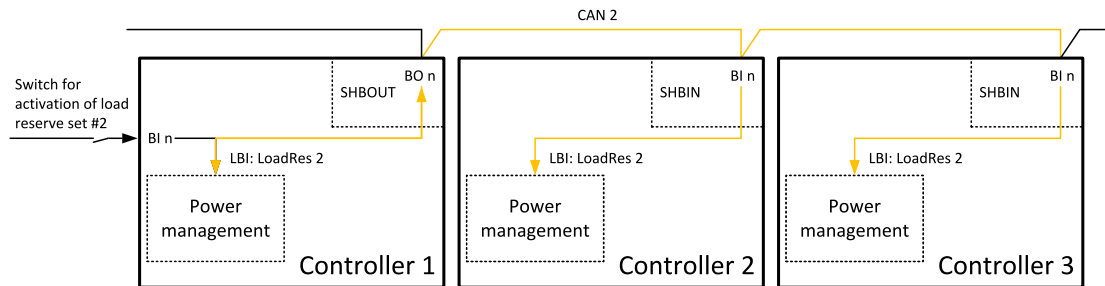
The red dashed line depicts the value of load at which the additional Gen-set is requested to stop. This value of the load value is linked with the setpoint **LoadResStop 1 (page 434)** (or other selected reserve set) in following way:

$(100 \% - \text{LoadResStop 1 (page 434) (or other selected reserve set)}) * \text{Sum of Nominal power} = \text{Value of load when additional Gen-set requested to stop in kW (in \% of nominal power)}$, e.g.: $(100 \% - 40 \%) * 700 \text{ kW} = 420 \text{ kW}$ (60 % of nominal power).

There are 4 levels for starting and stopping Gen-sets.

- **LoadResStrt 1 (page 434) / LoadResStop 1 (page 434)** considered by default.
- **LoadResStrt 2 (page 435) / LoadResStop 2 (page 435)** considered if **LOAD RES 2 (PAGE 722)** activated
- **LoadResStrt 3 (page 436) / LoadResStop 3 (page 436)** considered if **LOAD RES 3 (PAGE 722)** activated
- **LoadResStrt 4 (page 437) / LoadResStop 4 (page 437)** considered if **LOAD RES 4 (PAGE 723)** activated

Note: All controllers cooperating together in Power management must have the same load reserve set selected. It is possible to use virtual shared peripherals for distribution of the binary signal to activate LBI Load res 2,3 or 4 among controllers over the CAN bus.



Automatic priority swapping

As stated in the chapter Priorities, the operator is able to select the order of Gen-set 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 Gen-set(s) to be running with consideration of their running hours and the actual load. The Running hours equalization (RHE) function keeps a constant maximal difference of Gen-sets' running hours. The Load demand swap (LDS) function keeps running only the Gen-sets with suitable nominal power to avoid inefficient fuel consumption or Gen-set overload.

At least one Gen-set in the group must be set as the master for priority optimization (**Priority ctrl (page 432)** = MASTER). It is possible to have more than one master, the one with lowest CAN address will play the role of the master and if it is switched off the next one will take the master role.

Important setpoint: **PriorAutoSwap (page 431)**

The Automatic priority swapping function does not change the setpoint **Priority (page 431)**. The function sets the order of Gen-sets by virtual values "engine priority".

Running hours equalization

The Gen-sets "engine priorities" are automatically swapped to balance engine running hours. In other words, the controllers compare Run hours of each Gen-set and select Gen-set(s) to run in order to maintain constant maximal difference of running hours. Up to 32 controllers are supported.

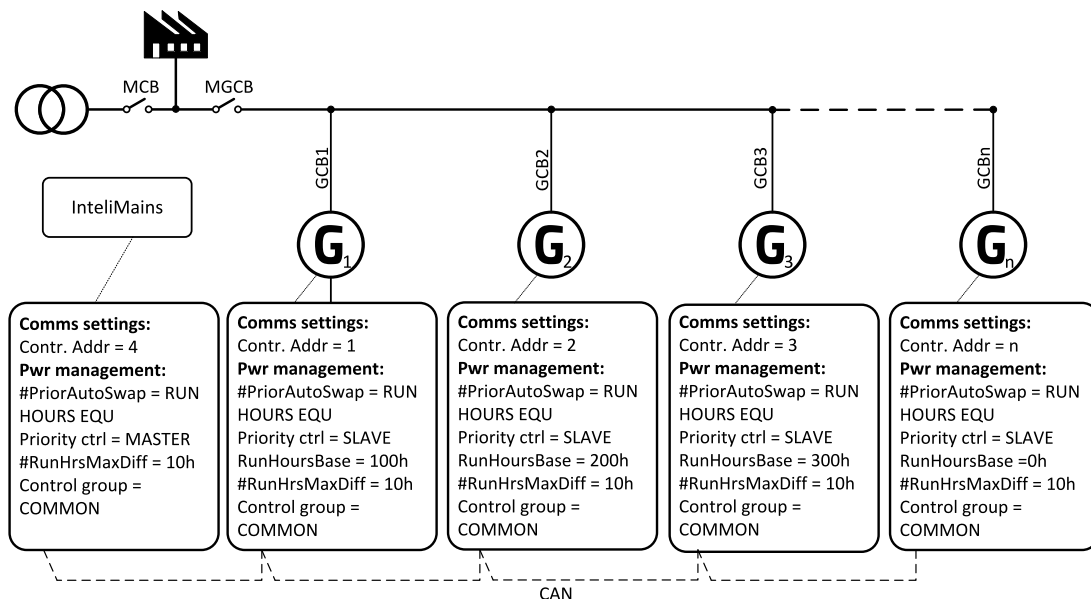
Activation: **PriorAutoSwap (page 431)** = RUN HOURS EQU

Important setpoints: **RunHoursBase (page 441)**, **RunHrsMaxDiff (page 441)**, **Priority ctrl (page 432)**, **Control group (page 443)**.

The actual values to be considered by the Running Hours Equalization are calculated from the following formula:

$RHE_i = Runhours_i - RunHoursBase_i$, where RHE is considered value for Running hours equalization, i stands for a particular Gen-set, Runhours is a cumulative sum of run hours available in statistic values of the controller, RunHoursBase is a setpoint. This setpoint may be used in the case of Gen-sets with different runs hours are intended to be set at the same initial point (e.g. a new Gen-set and a used Gen-set 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 **RunHrsMaxDiff (page 441)** (i.e. **RunHrsMaxDiff (page 441) + 1**), the Gen-set(s) with the lowest is/are started.



Example: The system structure is shown on the figure above. The IntelIMains controller assumes the role of master in priority swapping and swaps priority of the engines based on their running hours.

3 cases are considered:

- Case #1: 2 Gen-set gets available
- Case #2: 3 Gen-set gets available with same initial RHE.
- Case #3: 3 Gen-set gets available with different initial RHE.

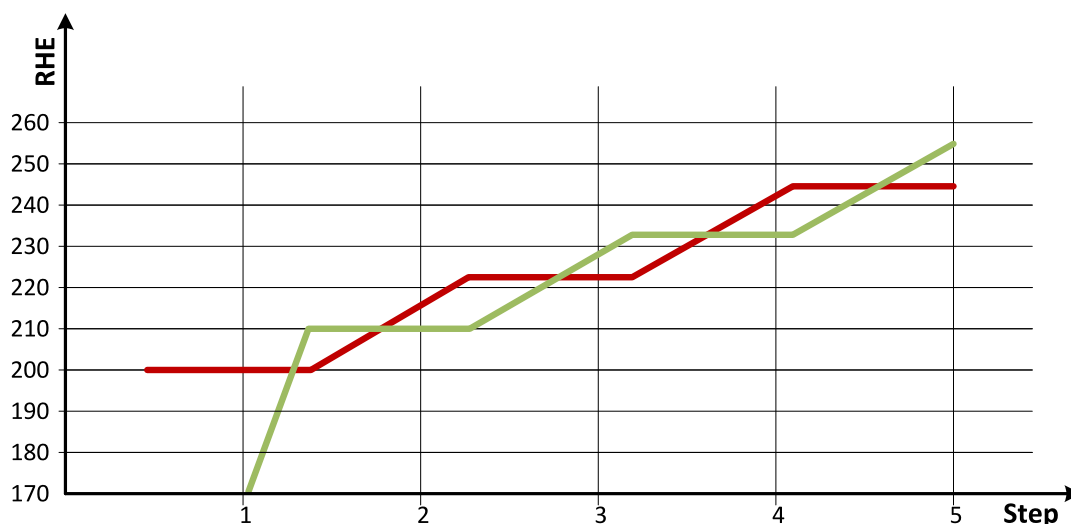
Case #1:

- Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150- **RunHoursBase (page 441)**)
- Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250- **RunHoursBase (page 441)**)

Both Gen-sets have the same nominal power of 700 kW. Originally, priority of Gen-sets 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 IntelIMains controller sets the engine priority of the Gen-set 1 to 1 because it has the lowest considered RHE and the difference between RHE2 (i.e. considered RHE of Gen-set 2) and RHE1 is higher than **RunHrsMaxDiff (page 441)** that is set to 10 h.

	Run hours	#RunHoursBase	RHE
Gen-set #1	250	150	100
Gen-set #2	450	250	200

The Gen-set 1 runs for 100 hours to equalize the RHE of both Gen-sets. The Gen-set 1 keeps running until the difference between RHE1 and RHE2 exceeds **RunHrsMaxDiff (page 441)** (i.e. 10 h). The Gen-set 1 runs 100 + **RunHrsMaxDiff (page 441)** + 1 = 100 + 10 + 1 = 111 hours. After 111 hours the Gen-sets 2 has the lowest RHE and the difference between RHE1 and RHE2 is higher than **RunHrsMaxDiff (page 441)**. The Gen-set 2 runs 11 hours to equalize the RHE of both Gen-sets and then additional **RunHrsMaxDiff (page 441)** + 1 hours (i.e. 11 + 10 + 1 = 22 hours). The evolution of RHE1 and RHE2 is shown on the figure below.



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 Gen-sets are swapped after the duration determined by following formula:

SwapTime = Second lowest considered running hours – Current lowest considered running hours + RunHrsMaxDiff (page 441) +1

Case #2:

- > Gen-set 1 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)
- > Gen-set 2 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)
- > Gen-set 3 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)

Each Gen-set has the same RHE = 0 h. By applying the SwapTime formula, we get the run time of Gen-set 1 before next swapping:

$$\text{SwapTimeG1} = 0 - 0 + 10 + 1 = 11$$

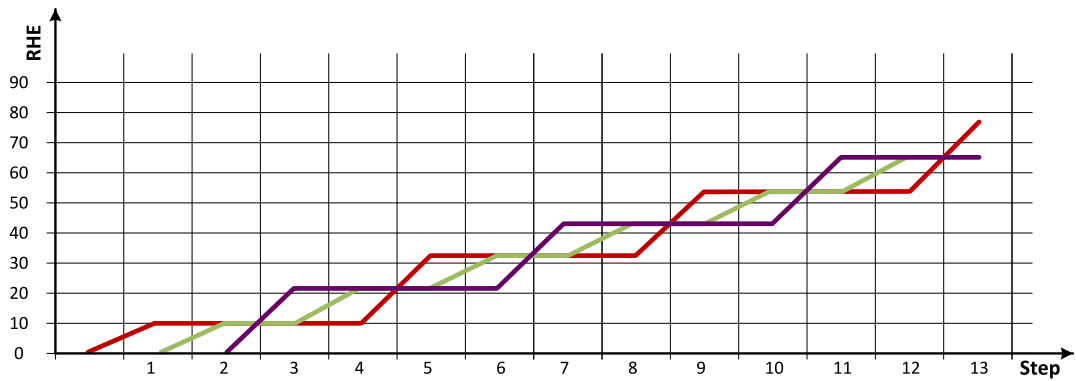
Similar way, we get the run time of Gen-set 2 before next swapping:

$$\text{SwapTimeG2} = 11 - 11 + 10 + 1 = 11$$

Finally, we get the run time of Gen-set 3 before next swapping:

$$\text{SwapTimeG2} = 11 - 0 + 10 + 1 = 22$$

Please refer to figure below to understand the evolution of RHE of Gen-sets in this particular case.



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

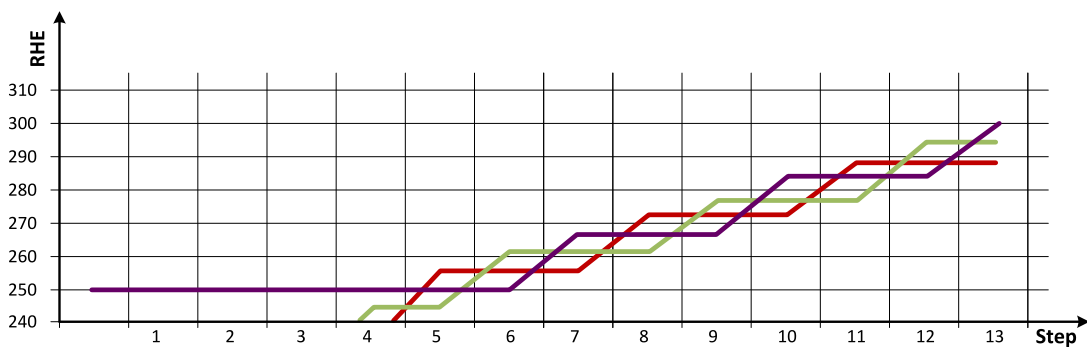
Case #3:

- Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150-RunHoursBase)
- Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250-RunHoursBase)
- Gen-set 3 running hours = 750 -> running hours considered in RHE = 250 (500-RunHoursBase)

The Gen-set 1 has the lowest RHE1 = 100 h. By applying the SwapTime formula, we get the run time of Gen-set 2 before next swapping:

$$\text{SwapTimeG1} = 200 - 100 + 10 + 1 = 111$$

Till the step 5, the evolution of the Gen-set swapping is the same as in the case #1, just Gen-set 1 and Gen-set 2 involve. In the step 6 the Gen-set 2 can run only 17 hours (previously 22 hours) because the Gen-set 3 involves. The evolution of RHE1, RHE2 and RHE3 is shown on the figure below.



Step	0	1	2	3	4	5	6	7	8	9	10	11	12	13
RHE1	100	211	211	233	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 *RunHrsMaxDiff* (page 441) = 5 does not mean that Gen-sets 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.

In the case *RunHrsMaxDiff* (page 441) is set to 0 and all Gen-set in the group are at the same initial point (RHE are equal), the Gen-set swapping happens every hour.

Load Demand Swap

If there are Gen-sets of different size at the site, it may be required always to run such Gen-sets that best fit to the actual load demand. The Load demand swap function is intended for this purpose and can control up to 3 Gen-sets (priorities). Up to three running engines (priorities) can be swapped based on load demand (e.g. one "small" engine may run on "small" load and swaps to another one, "big" engine that runs when load increases). This function is available **only in combination with absolute power management**.

Activation: **PriorAutoSwap** (page 431)

Important setpoints: **PwrBandContr 1** (page 441), **PwrBandContr 2** (page 442), **PwrBandContr 3** (page 442), **PwrBandContr 4** (page 442), **PwrBnChngDIDn** (page 443), **PwrBnChngDIUp** (page 443), Load reserve setpoints (depends on the selected reserve set), **Priority ctrl** (page 432), **Control group** (page 443).

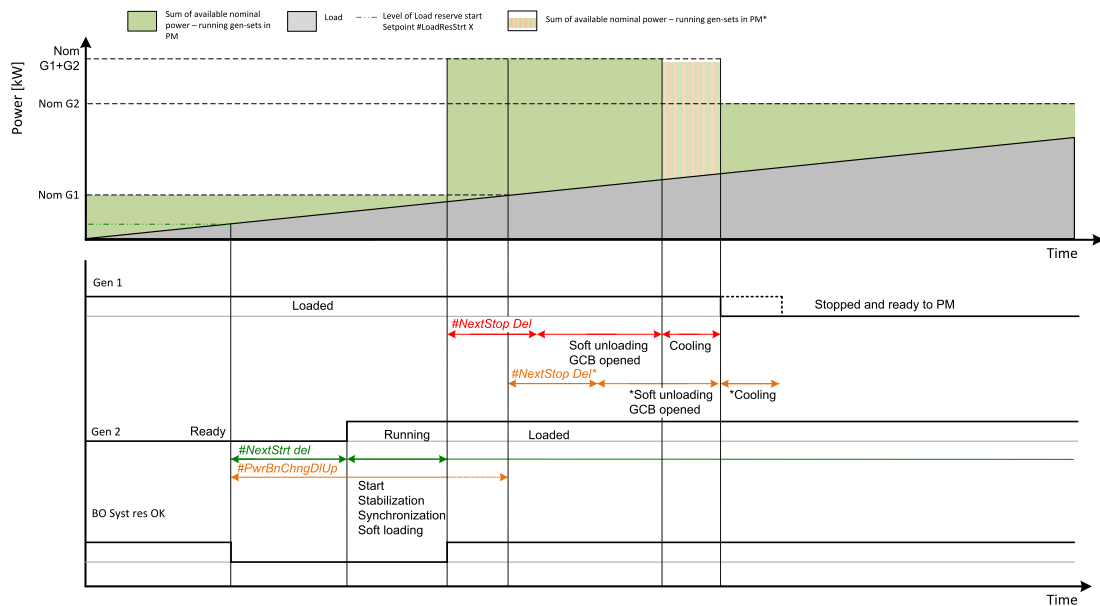
The Gen-sets must have addresses 1, 2 and 3. There are four power bands; each of them has adjusted specific combination of Gen-sets that run within it. Power bands are adjusted by setpoints **PwrBandContr 1** (page 441), **PwrBandContr 2** (page 442), **PwrBandContr 3** (page 442) and **PwrBandContr 4** (page 442). The load levels of the power bands are defined by sum of nominal powers of Gen-sets that are adjusted to run in each particular power band, and the load reserve for start. The combinations of Gen-sets must be created in the way the total nominal power of the Power band #1 < #2 < #3 < #4. If the load demand is above the power band #4 then all Gen-sets are ordered to run. In fact there is power band #5, which has fixedly selected all the Gen-sets to run.

The currently active power band is given by the actual load demand. If the load demand changes and gets out from the current power band, the next/previous power band is activated with delay **PwrBnChngDIDn** (page 443) or **PwrBnChngDIUp** (page 443) depending on the direction of the change. The Gen-sets which are included in the current power band get engine priority 1, the others get priority 32. The setpoint **Priority ctrl** (page 432) is not influenced by this function. Virtual values "engine priority" are used.

Note: If the power band change delays (i.e. *PwrBnChngDIDn* (page 443) and *PwrBnChngDIUp* (page 443)) are adjusted to higher values than *NextStrt Del* (page 438) and *#OverldNextDel* (page 438) setpoints then it may occur, that also the Gen-sets not belonging to the current power band will start. This is normal and it prevents the system from overloading. Priority setpoints are not actually changed. Virtual values "engine priority" are used.

Handover Up swap sequence

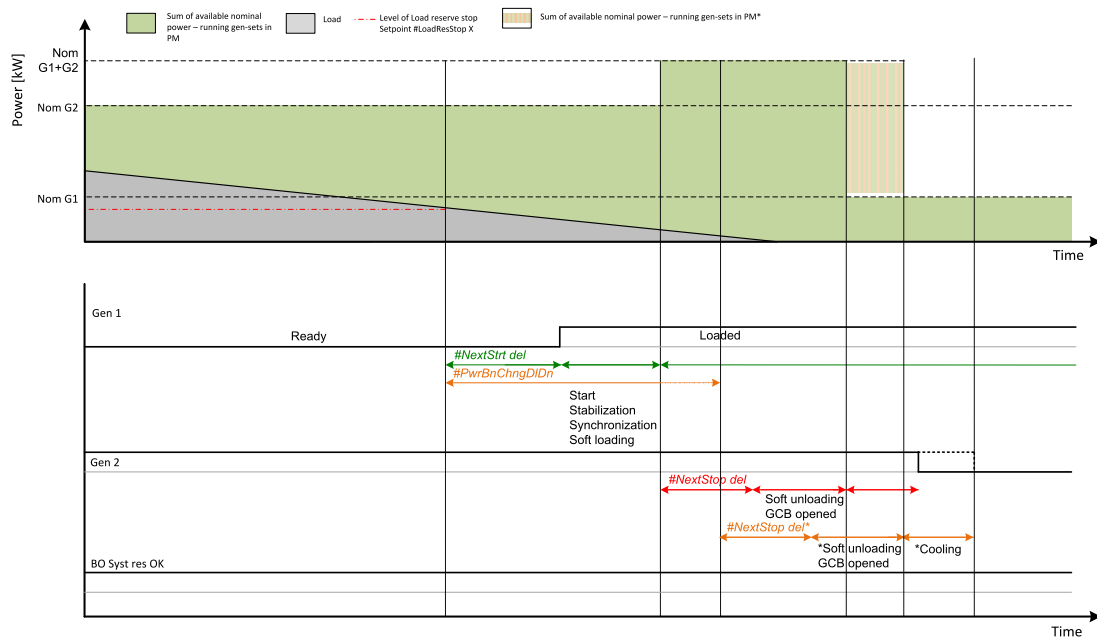
As explain above, the automatic priority swapping evaluates the load of the system and assigns the most appropriate power band. The handover UP sequence describes the situation the Gen-set with lower nominal power is swapped by the Gen-set with higher nominal power. The Gen-set with lower nominal capacity is stopped once the sequence is over. The stopped Gen-set is in ready state and keeps available in power management.



Note: If the power band change delay *PwrBnChngDIUp* (page 443) is adjusted to that longer value than total time requiring start of other Gen-set, stabilization, synchronization, GCB closing and soft loading, it postpones the soft unloading of the gen-set to be stopped. This delay is depicted by the dashed orange line. Consequently, the handover up swap sequence is postponed by this delay.

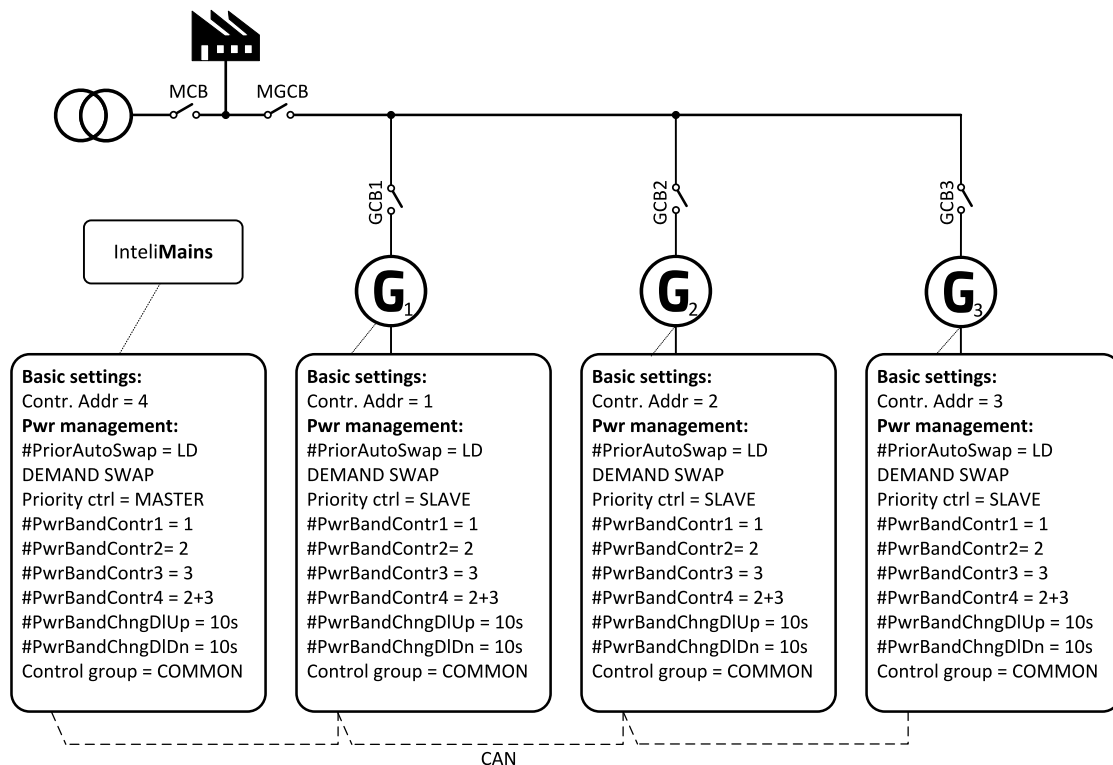
Handover Down Swap sequence

The handover DOWN sequence describes the opposite situation. The Gen-set with higher nominal power is swapped by the Gen-set with lower nominal power. The Gen-set with higher nominal capacity is stopped once the sequence is over. The stopped Gen-set is in ready state and keeps available in power management.



Note: If the power band change delay *PwrBnChngDIDn* (page 443) is adjusted to that longer value than total time requiring start of other Gen-set, stabilization, synchronization, GCB closing and soft loading, it postpones the soft unloading of the Gen-set to be stopped. This delay is depicted by the dashed orange line. Consequently, the handover down swap sequence is postponed by this delay.

Load Demand Swapping example



The system is shown in previous figure. The IntelliMains controller assumes the role of master in priority swapping and swaps engine priority based on user defined power bands. There are 4 available customizable power bands. The power band #5 is fixed – all available Gen-set in power Gen-set are running.

Power bands are changed up if:

(Nominal power of all Gen-sets in a particular band – Total generated power by Gen-sets in power management) < Reserve for start

or down if:

(Nominal power of all Gen-sets in next lower band – Total generated power by Gen-sets in power management) > Reserve for stop

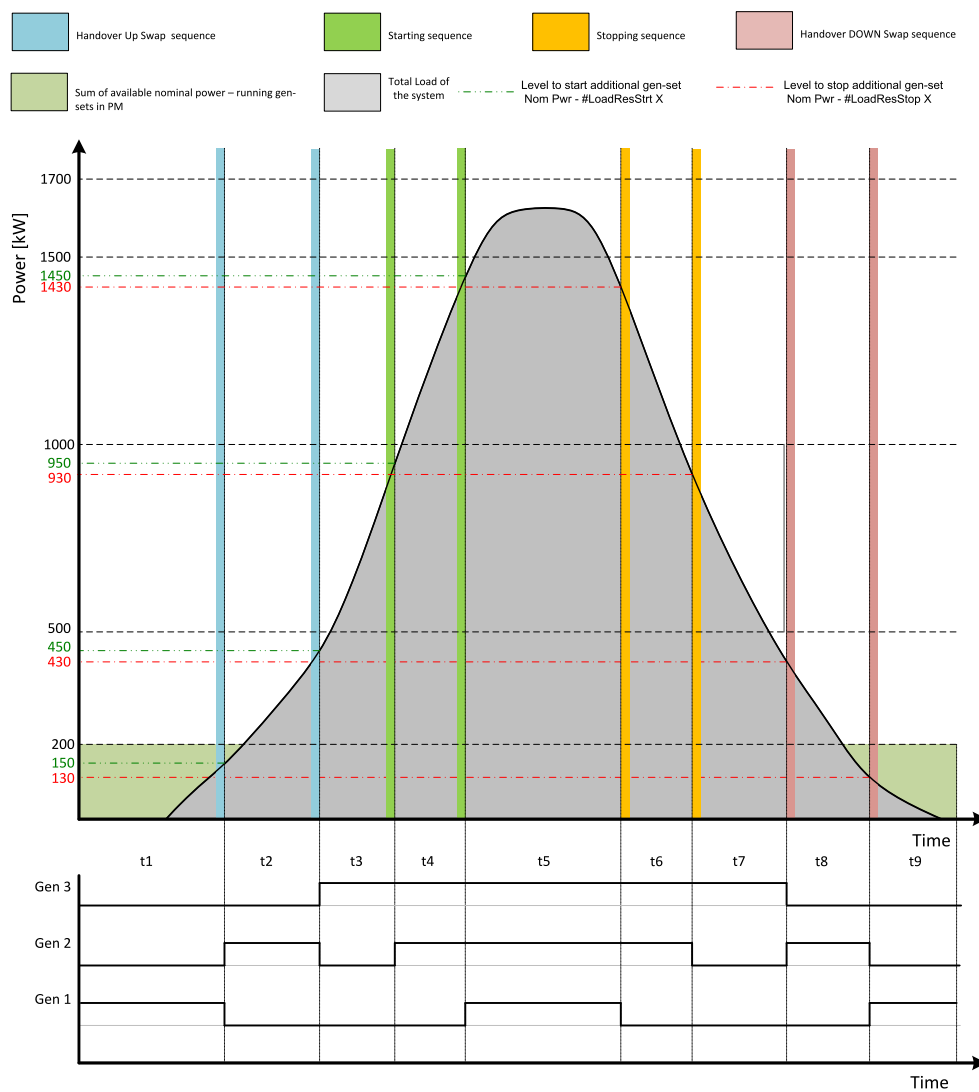
The site contains 3 gen-sets, G1 is 200 kW, G2 is 500 kW and G3 is 1000 kW. The reserve for start is adjusted to 50 kW and for stop to 70 kW. Following table describes available power bands:

Gen-sets	Nominal power [kW]	Power band [kW]
G1	200	0 .. 150
G2	500	151 .. 450
G1+G2	700	451 .. 650
G3	1000	651 .. 950
G1+G3	1200	951 .. 1150
G2+G3	1500	1151 .. 1450
G1+G2+G3	1700	>1450

Following table describes selected power bands:

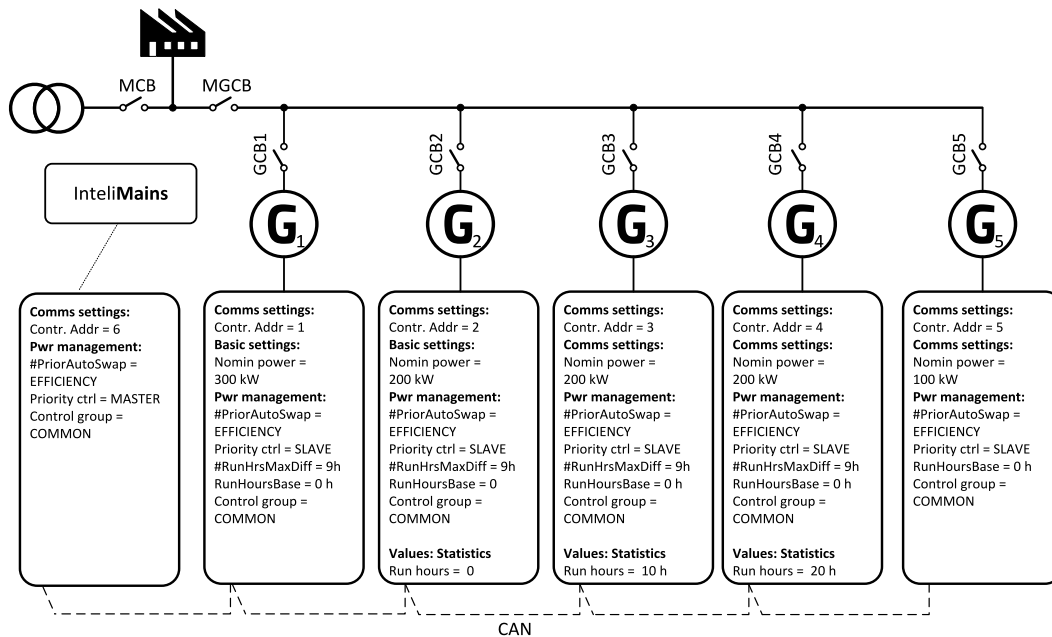
Power band	Gen-sets	Nominal power [kW]	Power band range [kW]
PwrBandContr 1 (page 441)	G1	200	0 .. 150
PwrBandContr 2 (page 442)	G2	500	151 .. 450
PwrBandContr 3 (page 442)	G3	1000	451 .. 950
PwrBandContr 4 (page 442)	G2+G3	1500	951 .. 1450
Fixed power band #5	G1+G2+G3	1700	>1450

Following figure illustrates the power bands swapping in function of load evolution.



Efficiency

The Efficiency mode is a combination of Running Hours Equalization and Load Demand Swap priority optimization modes. Please refer to **Running hours equalization (page 179)** and **Load Demand Swap (page 183)** for further information about RHE and LDS priority optimization function



Setpoint group	Basic settings	Pwr management					
		Nomin power / RHE	Pwr management	#Pwr mgmt mode	Priority	#PriorityAutoSwap	#LoadResSt rt X
Gen-set #1	300 kW	ENABLED	ABS (kW)	1	EFFICIENT	20 kW	30 kW
Gen-set #2	200 kW / 0 h	ENABLED	ABS (kW)	2	EFFICIENT		
Gen-set #3	200 kW / 10 h	ENABLED	ABS (kW)	3	EFFICIENT		
Gen-set #4	200 kW / 20 h	ENABLED	ABS (kW)	4	EFFICIENT		
Gen-set #5	100 kW	ENABLED	ABS (kW)	5	EFFICIENT		

Note: Gen-set #1 means that the CAN address of the controller is set to 1. The relevant setpoint is adjusted by Contr. address (page 365).

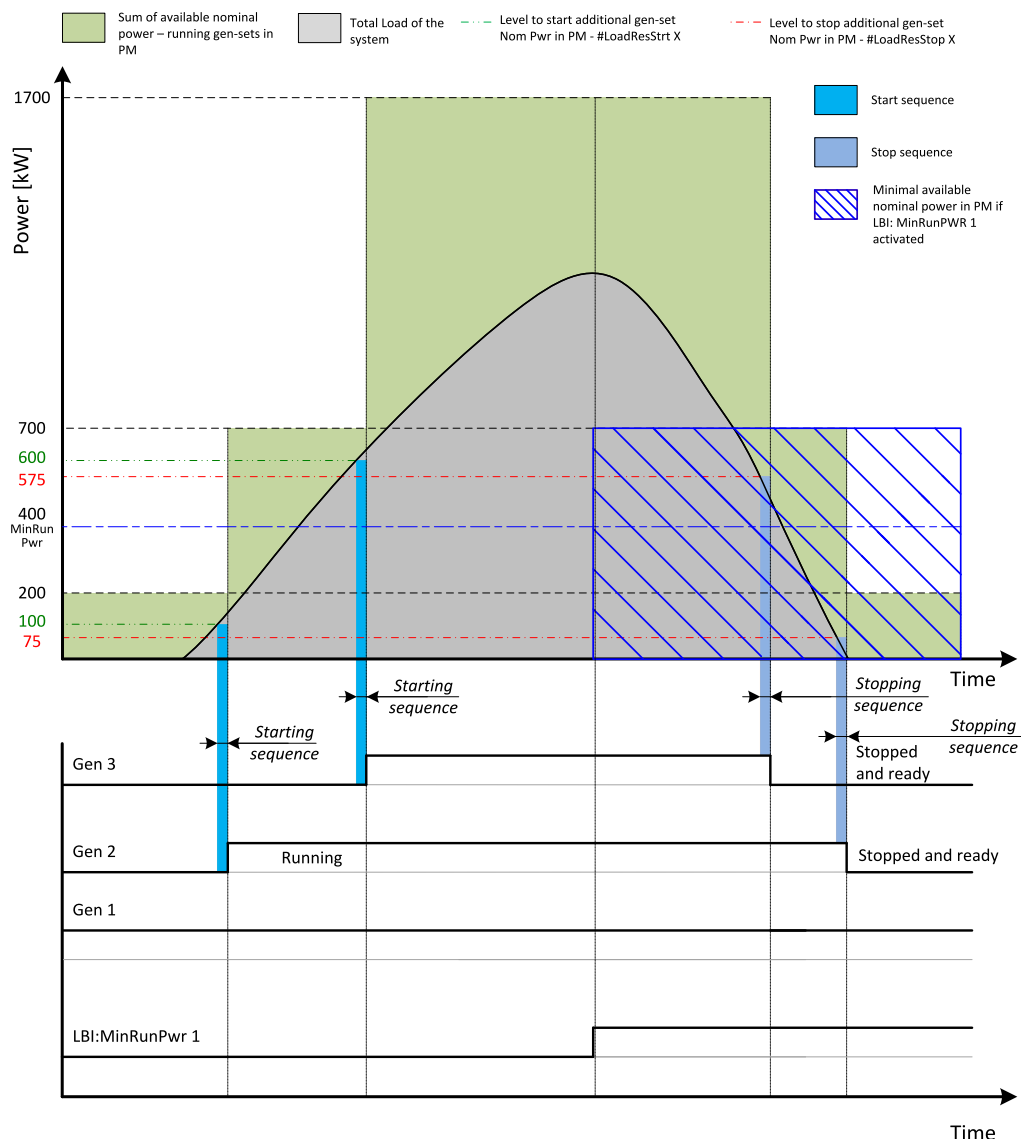
Following table provide an example of Gen-set selection in function of system load evolution. The table is an example of Efficiency priority optimization function.

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
40	5			100	40%
60	5			100	60%
80	5 2 [0h]	2 start 5 stop	LDS Swap	300	26%
100	2[10h]			200	50%
120	2[20h]			200	60%
120	2[30h] 3[10h]	3 Start 2 stop	RHE Swap	400	30%
120	3[20h]			200	60%
140	3[30h]			200	70%
180	3[40h] 1	1 Start 3 stop	LDS Swap	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 Swap	800	73%
600	1 4 2			700	86%
640	1 4 2			700	91%

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
680	1 4 2 5	5 start	Gen#5 joins (LDS)	800	85%
740	1 4 2 5			800	93%
780	1 4 2 5 3[40h]	3start 5 stop	LDS Swap	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%

Minimum Running Power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running Gen-sets. If the function is active, then the Gen-sets would not be stopped, although the reserve for stop is fulfilled.



Setpoint **MinRunPower 1** (page 439) is adjusted to 400 kW. Once the **MinRunPower 1** (page 439) 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 Gen-set #2 (nominal power 500 kW), the Gen-set keeps running as at least 400 kW has to be available. The Gen-set#1 (nominal power 200 kW) is not enough.

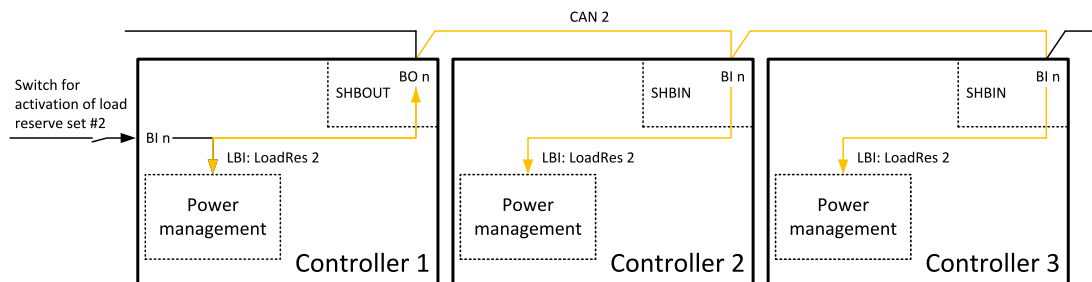
There are 3 different MinRunPower setpoints.

- **MinRunPower 1** (page 439) considered if LBI **MINRUN POWER 1** (PAGE 726) activated
- **MinRunPower 2** (page 440) considered if LBI **MINRUN POWER 2** (PAGE 727) activated
- **MinRunPower 3** (page 440) considered if LBI **MINRUN POWER 3** (PAGE 727) activated

Note: If more than one binary input for MinRunPower activation is closed MinRunPower setpoint with higher number is used (i.e. binary inputs with higher number have higher priority). When no binary input is closed, then minimal running power is 0.

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

Note: It is possible to use virtual shared peripherals for distribution of the binary signal activating LBI MinRun Power 1,2 or 3 among controllers over the CAN bus.



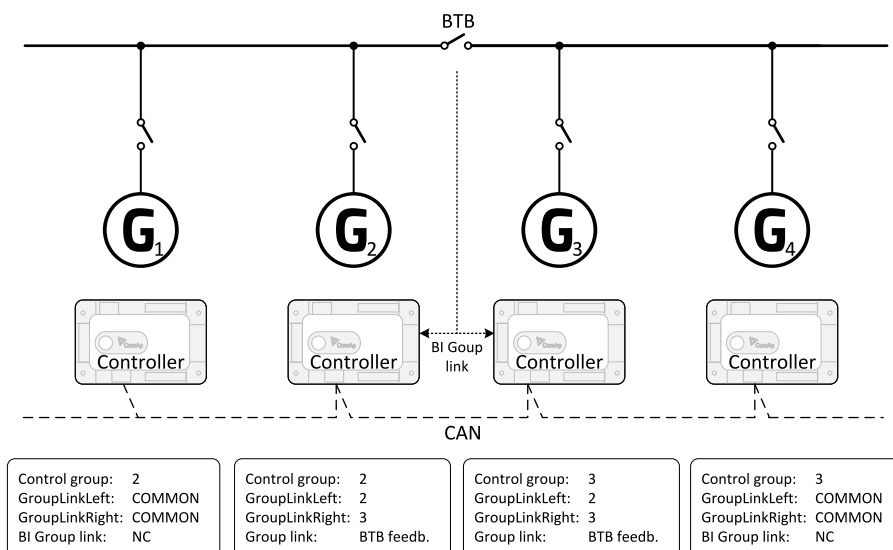
Control groups

The physical group of the Gen-sets (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 Gen-set 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 and if the bus-tie breakers are open, the sub-groups have to work independently.

- The group which the particular controller belongs to is adjusted by the setpoint **Control group (page 443)**. If there is only one group in the site, adjust the setpoint to 1 (=COMMON).
- 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 Logical binary input **GROUPLINK (PAGE 708)** (i.e. this input is to be connected to the breaker feedback).
- The two groups which are connected together by the BTB breaker mentioned above are adjusted by setpoints **GroupLinkLeft (page 444)** and **GroupLinkRight (page 444)**.
- If the "group link" is opened the two groups act as two separated groups. If it is closed the groups act as one large group.

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.

The picture below shows an example of a site with 4 Gen-sets 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 backup source of the group link information if the primary source (controller) is switched off.



5.3.34 Dynamic Spinning Reserves

Dynamic spinning reserves, is common ComAp a.s.hybrid feature, which is used in applications with renewables sources with **IS-NTC HYBRID** or with newest supported ComAp a.s.hybrid portfolio controllers. Master hybrid controllers are the primary source of both dynamic spinning reserves **DynSpinRes** (page 1) and **DynSpinResOffs** (page 1). These values are used in applications with renewable sources where we want to avoid problems and system overloading in case of renewable sources have a decrease in performance. It enables to increase **Reserve** (page 614) level and start additional gen-set, which is not needed with immediate renewables output, but will be needed when anticipated renewables output drop occurs. It as well enables to increase **Reserve Stp** (page 615) level to prevent stopping of a gen-set, which is not needed with immediate renewables output, but could be started again when the anticipated renewables output drop occurs. **DYNSPINRES** (PAGE 1) is used to change both **Reserve** (page 1) and **Reserve Stp** (page 1) thresholds, while **DynSpinResOffs** (page 1) changes the **Reserve** (page 1) threshold only. Master hybrid controllers are the primary source of both **DYNSPINRES** (PAGE 1) and **DynSpinResOffs** (page 1) for Gen-set controllers. It transmits both values via CAN2 bus and both are used automatically by a controller, if valid values are associated with LAI: **DYNSPINRESREQ** (PAGE 883)/LAI: **DYNSPINRESOFST** (PAGE 883) in the Master hybrid controllers. Values associated with LAI: **DYNSPINRESREQ** (PAGE 883)/LAI: **DYNSPINRESOFST** (PAGE 883) of a Gen-set controller are used by that Gen-set controller only when invalid values are associated with LAI: **DYNSPINRESREQ** (PAGE 883)/LAI: **DYNSPINRESOFST** (PAGE 883) of the Master hybrid controllers or the LAI: **DYNSPINRESREQ** (PAGE 883)/LAI: **DYNSPINRESOFST** (PAGE 883)(PAGE 1) functions are not configured with the Master hybrid controllers. Setpoint **Dynam Spin Res** (page 1) has to be set to **ENABLED** with every Gen-set controller, which is supposed to use the dynamic spinning reserves functionality, regardless if the values comes from the Master hybrid controllers or from the internal LAI functions. Setpoint **Dynam Spin Res** (page 1) setting to **DISABLED** in the Master hybrid controllers does not prevent transmitting of the LAI: **DYNSPINRESREQ** (PAGE 883)/LAI: **DYNSPINRESOFST** (PAGE 883) values. It disables use of the values with the **IS-NTC HYBRID** power management functions, but the values are still transmitted via CAN2 bus to Gen-set controllers (if valid values are associated with corresponding LAI functions in Master hybrid controllers).

Note: **Reserve** (page 1) and **Reserve Stp** (page 1) are called **LoadRes Start** and **LoadRes Stop** in a hybrid controller.

5.3.35 Protections and Alarm management

The following set of protections is available in the controller. It is possible to create additional custom protections.

ANSI code	Protection
25	Synchronization Check
27	Undervoltage
32	Overload
32R	Reverse Power
37	Undercurrent
40	Excitation Loss
46	Current Unbalance
47	Voltage Asymmetry
47	Phase Rotation
50+51	Overcurrent
50N+64	Earth Fault Current
51N+64	Earth Fault Current, IDMT
55	Power Factor
59	Overvoltage
71	Gas (Fuel) Level
78	Vectorshift
81H	Overfrequency
81L	Underfrequency
81R	Rate of Change of Frequency

Protection groups

There are two types of protections in the controller

- Fixed
- Universal (configurable)

Protection group	Configurability	Settings location
Analog protections	Configurable	Analog protect
Generator protections	Configurable	Gener protect
Mains protections	Configurable	Mains protect
Fixed protections	Fixed	Engine params, Gener protect, Mains protect, Analog protect

Note: Fixed protections have (usually) configurable settings but they are fixed because they cannot be removed from the configuration completely. However they may be disabled in their settings. On the other hand Universal (configurable) protections can be removed from the configuration completely and new protections with individual settings may be created from scratch.

Alarm types

There are two levels of alarm. Level 1 (Yellow) does not have direct effect on the Gen-set or Circuit breaker control (i.e. engine is not stopped, Circuit breaker is not opened). Level 2 (Red) has direct effect on the Gen-set or Circuit breaker.

There are several types of alarm for both Level 1 and Level 2 alarms. The table below gives overview of these types.

Alarm/Event kind	Level	Description
Warning	1	The alarm appears in the Alarmlist and is recorded into the history log. Activates the output COMMON WRN (PAGE 767) as well as the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)).
Alarm Only	1	The alarm appears only in the Alarmlist. Activates the output COMMON AL (PAGE 765) as well as the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)).
HistRecOnly	1	The event is recorded into the history. Activates the output COMMON HST (PAGE 765) for one second. Standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)) are not activated.
AL indication	1	The event is only indicated in the Alarmlist. It disappears for the alarmist automatically as soon as the cause disappears. Standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)) are not activated.
A+H indication	1	The event is only indicated in the Alarmlist and recorded into the history log. It disappears from the alarmlist automatically as soon as the cause disappears. Standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)) are not activated.
Shutdown	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the Gen-set without unloading and cooling phase. The Gen-set cannot be started again while there is a Shutdown alarm in the Alarmlist. Activates the output COMMON SD (PAGE 766) as well as the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)).
Slow Stop	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes stop of the Gen-set by the standard stop sequence, i.e. including unloading and cooling phase. The Gen-set cannot be started again while there is a Slow stop alarm in the Alarmlist. Activates the output COMMON STP (PAGE 767) as well as the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)).
Off Load	2	The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, disappears by itself. It causes immediate opening of the GCB. In AUT and SEM modes the Gen-set remains running for 60 seconds and then it is stopped by the standard stop sequence. In MAN mode the Gen-set remains running until the operator changes its operational state manually. If the controller is in AUT or SEM mode and all previously active Off load alarms disappeared the Gen-set is automatically started back and connected

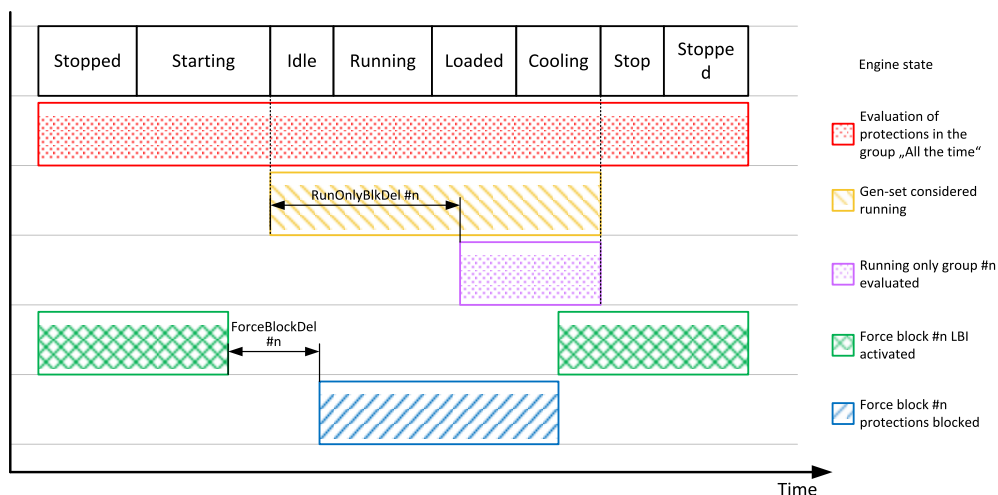
Alarm/Event kind	Level	Description
		to the load if the conditions for the Gen-set to be running persists (e.g. REM START/STOP (PAGE 738) is active). This event is used to put the Gen-set temporarily off the load for any reason. Activates the output COMMON OFL (PAGE 766) .
Low Power	2	The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, disappears by itself. It causes reduction of the required Gen-set load to the Min Power PtM (page 401) during Parallel to Mains operation or local baseload operation. If all previously active Low power alarms disappear the Gen-set is automatically ramped back to the original required load, which is given according to the currently active load control mode (Load ctrl PtM (page 328) or #SysLdCtrl PtM (page 324)) in Parallel to Mains operation. Activates the output COMMON LOP (PAGE 766) . This alarm type is not overridden by the input SD OVERRIDE (PAGE 744) .
BrkOpen&CoolDn	2	The event appears in the Alarmlist and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and then the standard stop sequence with cooling follows. The Gen-set cannot be started again while there is a BOC alarm in the Alarmlist. Activates the output COMMON BOC (PAGE 765) as well as the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)).
Mains Protect	2	The protection is only recorded into the history log. In applications which control the MCB this protection causes opening of the MCB. The Gen-set can continue operation in Island mode if required. The MCB can be closed back as soon as there is not any Mains protection active (including the fixed Mains protections). In applications which do not control the MCB this protection causes opening of the GCB. The controller waits then for the MCB to open. After that the Gen-set can continue operation in Island mode if required. As soon as there is not any Mains protection active (including the fixed Mains protections) the GCB is opened again and the controller waits for the MCB to close. After that the Gen-set can continue operation in Parallel to Mains mode if required. Activates the output COMMON MP (PAGE 766) . This alarm type is not overridden by the input SD OVERRIDE (PAGE 744) .
Sd Override	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the Gen-set without unloading and cooling phase. The Gen-set cannot be started again while there is a Sd override alarm in the Alarmlist. Activates the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)). This alarm type is not overridden by the input SD OVERRIDE (PAGE 744) .
Fail Sensor	-	This is a special kind of alarm. On its own it does not activate the standard alarm outputs (HORN (PAGE 780) and ALARM (PAGE 762)). To get more information on this alarm please refer to the chapter Sensor fail detection (FLS) (page 164) .

Protection blocking

Fixed protections may be blocked based on fixed conditions (e.g. electrical protection are blocked in states where healthy voltage is not expected – engine stopped, cranking etc.). Universal (configurable) protections may be blocked based on the following conditions.

Blocking type	Description
All the time	The alarms are being evaluated all the time the controller is switched on.
RunOnlyBlkDel1	The alarms are being evaluated only while the Gen-set is running. The evaluation begins RunOnlyBlkDel1 (page 390) seconds after the engine has been started.
RunOnlyBlkDel2	The alarms are being evaluated only while the Gen-set is running. The evaluation begins RunOnlyBlkDel2 (page 390) seconds after the engine has been started.
RunOnlyBlkDel3	The alarms are being evaluated only while the Gen-set is running. The evaluation begins RunOnlyBlkDel3 (page 391) seconds after the engine has been started.
Force block 1	The alarms are being evaluated while the input FORCE BLOCK 1 (PAGE 693) is not active. The evaluation begins ForceBlockDel1 (page 392) seconds after the input has been deactivated.
Force block 2	The alarms are being evaluated while the input FORCE BLOCK 2 (PAGE 693) is not active. The evaluation begins ForceBlockDel2 (page 392) seconds after the input has been deactivated.
Force block 3	The alarms are being evaluated while the input FORCE BLOCK 3 (PAGE 694) is not active. The evaluation begins ForceBlockDel3 (page 393) seconds after the input has been deactivated.
El. prot	The alarms are being evaluated while the generator is expected to provide correct voltage and frequency. That means the alarms start to be evaluated after transition from Idle to Running phase when the period of Max stab time has already elapsed, remain being evaluated while the Gen-set is running at Nominal RPM (page 355) (regardless of GCB position) and stop to be evaluated by transition to the Cooling phase.

The following diagram illustrates individual cases.



Remote Alarm Messaging

It is possible to use up to five channels for Active Call, Email and SMS upon defined type of Alarm. It is possible to define protection type for all ENABLED channels to react. All the possibilities in the controller are: History record, Alarm only, Warning, Mains protect and Mains protect with Reset. Find more information about alarm types in the chapter **Protections and Alarm management (page 194)**.

Communication Types for Remote Alarm Messaging

Below there all types of communication available for each Active Call channel.

- **DATA-ANA:** This option sends a complete archive to the recipient's PC via analog modem. An analog modem must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The channel address must contain complete telephone number of the recipient's PC where IntelliMonitor is running in Active call receiving mode.
- **DATA-GSM:** This option sends a complete archive to the recipient's PC via GSM modem. A GSM modem with activated CSD data transfers must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The channel address must contain complete telephone number of the recipient's PC where IntelliMonitor is running in Active call receiving mode.
- **DATA-ISDN:** This option sends a complete archive to the recipient's PC via ISDN modem. An ISDN modem must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The channel address must contain complete telephone number of the recipient's PC where IntelliMonitor is running in Active call receiving mode.
- **DATA-CDMA:** This option sends a complete archive to the recipient's PC via CDMA modem. A CDMA modem must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The local CDMA network must allow point-to-point data transfers. The channel address must contain complete telephone number of the recipient's PC where IntelliMonitor is running in Active call receiving mode.
- **SMS-GSM:** This option sends a short text message (SMS) containing the actual Alarmlist contents to the recipient's mobile phone via the GSM modem. The channel address must contain complete telephone number of the recipient's mobile phone.
- **SMS-CDMA:** This option sends a short text message (SMS) containing the actual Alarmlist contents to the recipient's mobile phone via the CDMA modem. The channel address must contain complete telephone number of the recipient's mobile phone.
- **IB-E-MAIL:** This option sends an e-mail containing the actual Alarmlist contents and latest 20 history records (only date, time, reason) to the recipient's mailbox via the IB-COM module or IG-IB module. The channel address must contain valid e-mail address of the recipient.

Note: The SMTP settings (*SMTP authent (page 375)*, *SMTP user name (page 375)*, *SMTP password (page 375)*, *SMTP address (page 375)*, *Contr mailbox (page 376)*) must be properly adjusted for sending e-mails.

Example: There is an example of setting of Remote Alarm Messaging. In this case active calls we be triggered on Mains protect and Mains protect with Reset alarms. Message is sent via email to email *Address@domain.com* (Channel 1 – available for NTC controller or with any controller with connected IB-NT or I-LB+), archive is sent via ISDN modem to the number +111222333444 (Channel 2) and SMS is sent to the number +999111333555 (Channel 3).

Name	Access Group								Value
History record	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	DISABLED ▾
Alarm only	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	DISABLED ▾
Warning	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	DISABLED ▾
Mains protect	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	ENABLED ▾
MainsP w/Reset	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	ENABLED ▾
AcallCH1-Type	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	IB-E-MAIL ▾
AcallCH1-Addr	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	emailAddress@domain.com
AcallCH2-Type	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	DATA-ISDN ▾
AcallCH2-Addr	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	+111222333444
AcallCH3-Type	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	SMS-GSM ▾
AcallCH3-Addr	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	+999111333555
NumberRings AA	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	3
ActCallAttempt	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	5
Acall+SMS lang	0 ON	1 OFF	2 OFF	3 OFF	4 OFF	5 OFF	6 OFF	7 OFF	1

Example: It is also possible to adjust number of attempts that controller performs in case of not successful Active Call – Act. calls/SMS: **ActCallAttempt** (page 543). The language of messages can be changed – Act. calls/SMS: **Acall+SMS lang** (page 543) (use Translator and Languages tabs in GenConfig to adjust languages).

Up to five channels can be used.

Default protections

There are many default (fixed) protections in the controller. These protections are highly dependent on what application is running in the controller.

Default protections in any application

There are several protections that are present in all the applications.

Fixed Engine protections

Protections	Protection type	Corresponding setpoints
Overspeed	SD	Overspeed (page 393)
Underspeed	SD	Underspeed (page 379), Starting RPM (page 378)

Fixed Generator protections

Generator protections	Protection type	Corresponding setpoints
IDMT overcurrent	BOC	Nomin current (page 347), Ishort (page 401)
IDMT Active power	BOC	OverldStrtEval (page 400), 2POvldStEvDel (page 400)
IDMT EarthFault Current	BOC	Nom EthFltCurr (page 407), 2EthFltCur del (page 407)
Shortcurrent	BOC	Ishort (page 401), Ishort del (page 401)
Generator voltage: Ug1>, Ug1<, Ug2>, Ug2<, Ug3>, Ug3<	BOC	Gen >V BOC (page 402), Gen <V BOC (page 403), Gen V del (page 404)
Generator voltage: Ug1>>, Ug2>>,>	Sd	Gen >V Sd (page 403), Gen V del (page 404)

Generator protections	Protection type	Corresponding setpoints
Ug3>>		
Generator frequency: fg<, fg>	BOC	Gen >f (page 404), Gen <f (page 404), Gen f del (page 405)
Reverse power	BOC	Reverse power (page 405), ReversePwr del (page 406)
Excitation Loss	BOC	ExcitationLoss (page 406), ExctLoss del (page 406)
Min power in Parallel to Mains	N/A	Min Power PtM (page 401)

Default protections in SPtM

These are protection that can be found on top of default protections in the chapter **Default protections in any application (page 199)**.

Protections	Protection type	Corresponding setpoints
Vector shift	MP	VectorS prot (page 418), VectorS limit (page 419)
Mains voltage and frequency	MP	Mains <V MP (page 412), Mains <V Del (page 412), Mains <V Hys (page 413), Mains <<V MP (page 413), Mains <<V Del (page 413), Mains <<V Hys (page 414), Mains >V MP (page 409), Mains >V Del (page 410), Mains >V Hys (page 410), Mains >>V MP (page 410), Mains >>V Del (page 411), Mains >>V Hys (page 411), MainsAv10>V MP (page 411), Mains >f MP (page 414), Mains >f Del (page 414), Mains >f Hys (page 415), Mains <f MP (page 416), Mains <f Del (page 416), Mains <f Hys (page 417), Q&U Protection (page 469), Q&U < V (page 470), Q&U < Q (page 470)
Rate of Change of Frequency	MP	ROCOF1 prot (page 419), ROCOF1 df/dt (page 420), ROCOF1 Win (page 420)

Default protections in SPI

These are protection that can be found on top of default protections in the chapter **Default protections in any application (page 199)**.

Protections	Protection type	Corresponding setpoints
Vector shift	MP	VectorS prot (page 418), VectorS limit (page 419)
Mains voltage and frequency	MP	Mains <V MP (page 412), Mains <V Del (page 412), Mains <V Hys (page 413), Mains <<V MP (page 413), Mains <<V Del (page 413), Mains <<V Hys (page 414), Mains >V MP (page 409), Mains >V Del (page 410), Mains >V Hys (page 410), Mains >>V MP (page 410), Mains >>V Del (page 411), Mains >>V Hys (page 411), MainsAv10>V MP (page 411), Mains >f MP (page 414), Mains >f Del (page 414), Mains >f Hys (page 415), Mains <f MP (page 416), Mains <f Del (page 416), Mains <f Hys (page 417), Q&U Protection (page 469), Q&U < V (page 470), Q&U < Q (page 470)
Rate of Change of Frequency	MP	ROCOF1 prot (page 419), ROCOF1 df/dt (page 420), ROCOF1 Win (page 420)

Default protections in MINT

These are protection that can be found on top of default protections in the chapter **Default protections in any application (page 199)**.

Protections	Protection type	Corresponding setpoints
Bus Measurement Error	Warning/Shutdown	BusMeasError (page 405)

Default protections in COX

These are protection that can be found on top of default protections in the chapter **Default protections in any application (page 199)**.

Protections	Protection type	Corresponding setpoints
Bus Measurement Error	Warning/Shutdown	BusMeasError (page 405)

Default protections in Combi

Combi application allows to switch among SPtM, SPI and MINT applications. Therefore Combi archive contains protection setpoints from all mentioned applications. Only protections relevant for the currently selected application are active.

Get more information on protections in the following chapters:

- **Default protections in any application (page 199)**
- **Default protections in SPtM (page 200)**
- **Default protections in SPI (page 201)**
- **Default protections in MINT (page 201)**

Shutdown override

If the Logical binary input **SD OVERRIDE (PAGE 744)** is closed, all 2nd level protections are disabled to allow the Gen-set run in an emergency situation, e.g. sprinkler devices power supply.

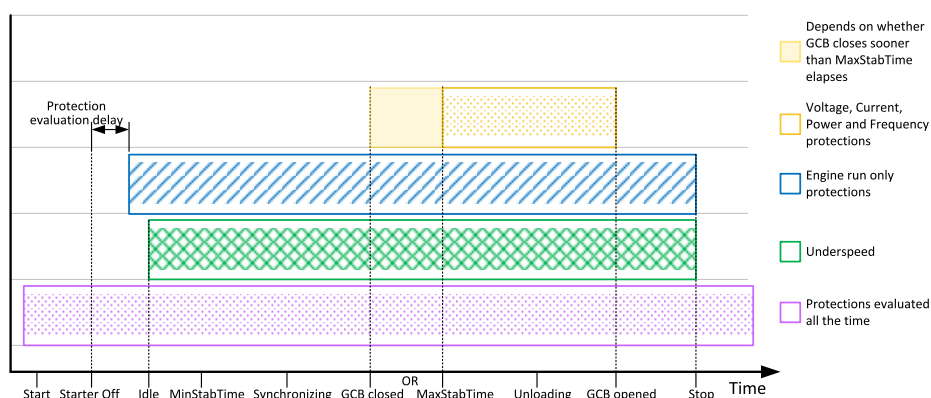
All protections are shown in Alarmlist and recorded into History, but the controller does not stop the engine because of them. If the input is deactivated and some protections are still active or not yet reset, the controller starts to take these protections into account and consequently stops the engine.

All 2nd level protections are locked out, except of these:

- > Emergency stop
- > Overspeed
- > Underspeed
- > Binary and analog protections configured as Sd override type. In fact this protection type means "Unoverridable shutdown", i.e. it works the same way as standard shutdown protection, however it cannot be overridden (blocked) by the **SD OVERRIDE (PAGE 744)** input.

Alarm Time Chart

The following time chart shows when different protections are evaluated.



Reset actual alarms selection

It is possible to determine the behavior of alarms that are in alarm list when Fault Reset button is pressed. Select behavior with **ResetActAlarms (page 393)**.

DISABLED	Pressing of the fault reset button (at any terminal or external button) resets only inactive alarms. Active alarms remain in the alarmlist unchanged and must be reset again when they become inactive.
ENABLED	Pressing of the fault reset button (at any terminal or external button) resets all alarms that are currently present in the alarm list. Inactive alarms disappear from the alarm list immediately, active alarms are changed to "confirmed" state and disappear when the alarm condition disappear or the alarm starts to be blocked.

Note: *ENABLED position corresponds to the method how the IG-classic and IS-classic controllers handled the alarms.*

Configuration of User configurable protections in GenConfig

It is possible to configure protections on Binary Input, Analog Input or any value that is available in the controller.

Binary input protection configuration

Open I/O tab in GenConfig and adjust parameters that are described below.

The screenshot shows the 'I/O' tab in GenConfig. The 'Binary inputs' section lists BI1 through BI7. BI7 is selected, showing its properties: Name (Name of Prot), Protection (Warning), Prot. active (Closed), Prot. block type (All the time), and Delay (Standard (0,5s)). Annotations point to the 'Protection' checkbox (Enable/Disable protection for this input), the 'Name' field (Name of the binary input is also used as the name of the protection), the 'Prot. active' dropdown (Type of protection), the 'Prot. block type' dropdown (Toggle normally closed/normally open), and the 'Delay' dropdown (Defines protection delay).

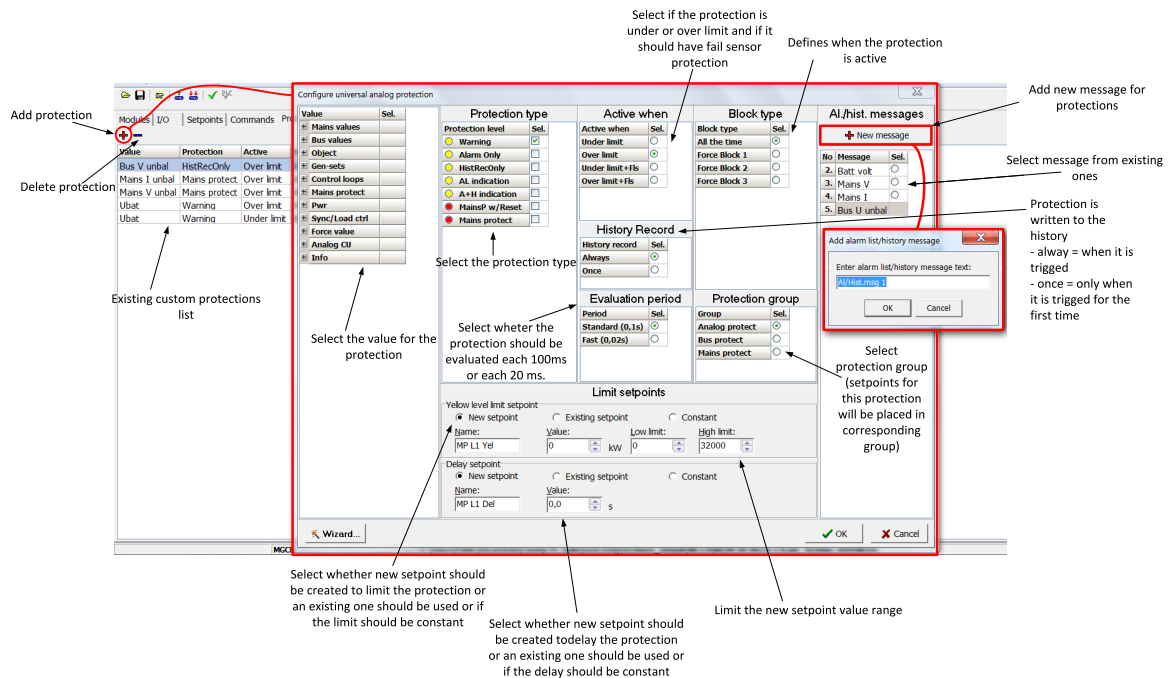
Analog input protection configuration

Open I/O tab in GenConfig and adjust parameters that are described below.

The screenshot shows the 'I/O' tab with the 'Analog inputs' section. The 'AnalogUserProt' is selected. The 'Configure analog input protection' dialog box is open, showing various configuration options. Annotations point to the 'Protection' checkbox (Enable/Disable protection for this input), the 'Protection type' dropdown (Level 1 protection type), the 'Active when' dropdown (Defines when the protection is active), the 'Block type' dropdown (User custom setpoint for level 1 limit (enables when level 1 protection type is selected)), the 'Limit setpoints' section (User custom setpoint for level 2 limit (enables when level 2 protection type is selected)), the 'Delay Setpoint' section (Delay of the protection evaluation for both levels (enables when at least one protection type is selected)), the 'History record' dropdown (Protection is written to the history - always = when it is triggered - once = only when it is triggered for the first time), and the 'Sensor fail' dropdown (Sensor fail protection ON/OFF).

Custom configurable protection

Open Protections tab in GenConfig and adjust parameters that are described below.



IMPORTANT: You need to prepare two separate protections for level 1 and level 2.

Note: Select the value for protection first and then use Wizard – it will take you through all the steps and help you adjust them correctly.

Configurable protections configured by default

The following protections are configured by default.

- SPtM, SPI, Combi
 - Gen I unbal (Generator current unbalance) **Gen I unb del** (page 409), **Gen I unbal** (page 408)
 - Gen V unbal (Generator voltage unbalance) **Gen V unb del** (page 408), **Gen V unbal** (page 408)
 - Ubat (Battery DC voltage) **Batt >V** (page 399), **Batt volt del** (page 399), **Batt <V** (page 399)
- MINT, COX
 - Gen I unbal (Generator current unbalance) **Gen I unb del** (page 409), **Gen I unbal** (page 408)
 - Gen V unbal (Generator voltage unbalance) **Gen V unb del** (page 408), **Gen V unbal** (page 408)
 - Ubat (Battery DC voltage) **Batt >V** (page 399), **Batt volt del** (page 399), **Batt <V** (page 399)
 - Bus V unbal (Bus voltage unbalance)

5.3.36 Gen-set operation states

This is a list of Gen-set operation states. Usually operation states are indicated on the display (some of them are invisible and some of them may be "covered" by e.g. a timer on the display).

Gen-set state	Description
Init	Controller is powered up and configuration setting is initialized
Not ready	Gen-set is not ready to start or is not allowed to start
Ready	Gen-set is ready to run, all condition for start are fulfilled

Gen-set state	Description
Prestart	Prestart sequence in process. From closing of Prestart output to closing of Starter output
Cranking	Engine is cranking and the starter output is closed
Pause	Pause between start attempts is counting down
Starting	Starting RPM is reached
Running	Gen-set is running and waiting for GCB connection
Warming	Gen-set is running in parallel operation and Gen-set load is reduced to Warming load
Soft load	Gen-set power is ramping up
Loaded	Gen-set is loaded
Soft unld	Gen-set power is ramping down
Cooling	State after GCB was opened and engine is not stopped
Stop	Engine is stopped
Shutdown	Shutdown alarm activated
Ventil	Gas engine – ventilation of unburned fuel when stop command comes during cranking with gas
SDVentil	Gas engine – ventilation of unburned fuel after unsuccessful start attempt
Off load	GCB is opened, Gen-set keeps running on nominal RPM
Emerg man	Emergency manual state
IslOper	Island operation (MCB is opened, GCB is closed)
Brks Off	GCB is opened, MCB is opened
MainsOper	Mains is present (MCB is closed, GCB is opened)
Synchro	Gen-set is synchronizing (MCB is closed, GCB is opened)
ParalOper	Gen-set is in parallel with mains (MCB is closed, GCB is closed)
MainsOper/Brk Off	Engine is running idle

5.3.37 Speed Governor and AVR general settings

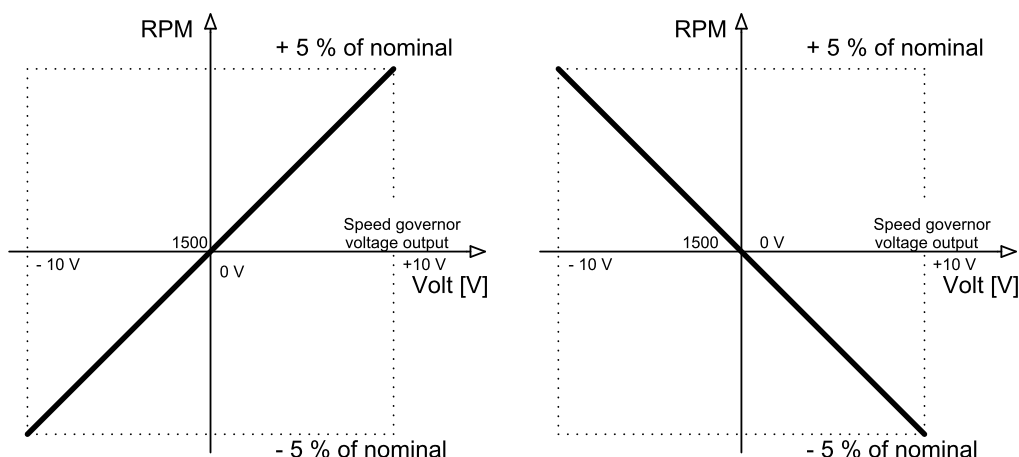
Sync/Load control adjustment

For clarification of the meaning of measured power values please refer to the chapter **Power control** (page 95).

It is important to use isochronous Speed governors with IntelliSys Gas. Two wire shielded connection from IntelliSys Gas Speed governor output (SG OUT, SG COM) to Speed governor auxiliary input is recommended.

A full range change of the IntelliSys Gas Speed governor output (from **SpeedGovLowLim** (page 449)) to **SpeedGovHiLim** (page 450)) should cause 5-10% change of the engine speed (**SpeedGovLowLim** (page 449) ~ 95% of **Nominal RPM** (page 355), **Speed gov bias** (page 449) ~ 100% of **Nominal RPM** (page 355)s, **SpeedGovHiLim** (page 450) ~ 105% of **Nominal RPM** (page 355)).

IMPORTANT: Speed governor has to be adjusted for optimum performance before Sync / load control adjusting. Check generator phase sequence before the first GCB connection.



Before optimal Sync/load setpoints adjusting disconnect output or set Phase window = 0 to avoid paralleling.

Synchronizer adjustment

1. Start the engine in MAN Mode.
2. Set the engine RPM by speed trim on the Speed governor or by **Speed gov bias (page 449)**, **SpeedGovLowLim (page 449)** and **SpeedGovHiLim (page 450)** to achieve frequency according to setpoint **Nominal RPM (page 355)**.
3. To start synchronizing press GCB ON/OFF button. GCB LED starts to flash to indicate synchronization. To stop synchronization press again GCB ON/OFF.

Slip control adjusting:

4. Adjust **Freq gain / RPM gain (page 447)** to unstable speed control and decrease value by 30 % to insure stable performance.
5. Adjust **Freq int / RPM int (page 447)** to stable (fast and smooth) slip control. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because **Angle Gain (page 448)** control is off).

Angle control adjusting:

6. Set **Angle Gain (page 448)**. Synchroscope on the controller measure screen should move slowly and stop in "up" position. Set **Angle Gain (page 448)** to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

Load control adjustment

IMPORTANT: Prior to Sync/Load control adjustment, the Volt/PF control has to be adjusted.

For MINT , COX and Combi in MINT mode

Load control loop is active in parallel to mains mode only (MCB feedback closed). Switch off other engines while adjusting.

1. Set **#SysLdCtrl PtM (page 324)** = BASELOAD, set **#SysBaseLoad (page 322)** setpoint to 30 % of **Nomin power (page 345)** of one Gen-set.
2. Set **Load gain (page 583)** to the same value as **Angle Gain (page 448)**. Set **Load int (page 451)** to zero.
3. Start the Gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close Gen-set to mains.

4. When GCB is closed, Gen-set load slowly increases to **#SysBaseLoad (page 322)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load gain (page 450)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load int (page 451)** factor is set to zero Gen-set load can differ from required **#SysBaseLoad (page 322)**.
6. To adjust and optimize **Load int (page 451)** change **#SysBaseLoad (page 322)** several times between 30 and 70 % of **Nomin power (page 345)**. Usually setting **Load int (page 451)** to 100% gives optimal performance.
7. When Gen-set is running under full load check if
 - a. Speed governor output voltage value is not limited (it does not reach **SpeedGovLowLim (page 449)** or **SpeedGovHiLim (page 450)**)
 - b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

For SPtM, SPI and Combi in SPtM or SPI mode

Load control loop is active in parallel to mains mode only (MCB feedback closed).

1. Set **Load ctrl PtM (page 328)** = BASELOAD, set **Base load (page 326)** setpoint to 30 % of **Nomin power (page 345)** of one Gen-set.
2. Set **Load gain (page 583)** to the same value as **Angle Gain (page 448)**. Set **Load int (page 584)** to zero.
3. Start the Gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close Gen-set to mains.
4. When GCB is closed, Gen-set load slowly increases to **Base load (page 326)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load gain (page 583)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load int (page 584)** factor is set to zero Gen-set load can differ from required **Base load (page 326)**.
6. To adjust and optimize **Load int (page 584)** change **Base load (page 326)** several times between 30 and 70 % of **Nomin power (page 345)**. Usually setting **Load int (page 584)** to 100% gives optimal performance.
7. When Gen-set is running under full load check if
 - a. Speed governor output voltage value is not limited (it does not reach **SpeedGovLowLim (page 449)** or **SpeedGovHiLim (page 450)**)
 - b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

Volt/PF control adjustment

Refer to the chapter **ComAp AVRi connection (page 53)** for more information on connection and wiring of the controller to IG-AVRi module and to AVR.

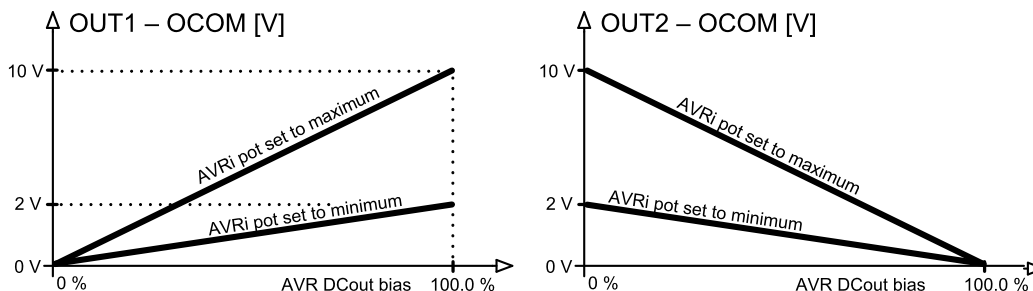
Every time refer to corresponding AVR manual before interface connecting (refer to the chapter **AVR interfaces (page 902)** to get more information on know AVRi to AVR interfaces). Do not use AVRs with Droop enabled.

IMPORTANT: IG-AVRi TRANS (AC power supply for AVRi) has to be supplied from Gen-set voltage.

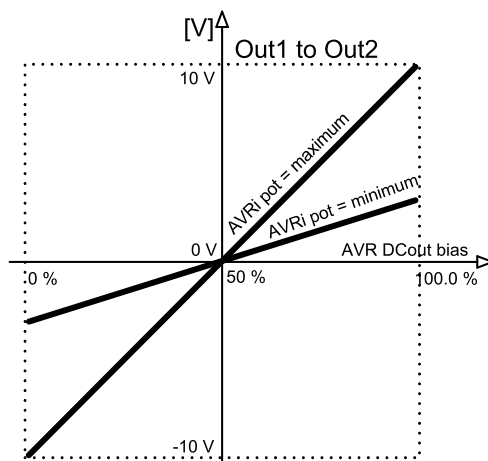
AVRi outputs can be connected as symmetrical (OUT1-OUT2) or asymmetrical (OUT1-OCOM or OUT2-OCOM).

- Potentiometer on the AVRi defines maximal OUT1, OUT2 voltage range.
- Use symmetrical (OUT1,OUT2) AVRi output to connect the AVRi to AVR auxiliary voltage input.
- Use asymmetrical output if an external AVR potentiometer has to be replaced with AVRi.
- AVRi output voltage should change generator voltage typically in range $\pm 10\%$ of **GenNomV (page 351)**.

Asymmetrical setting of AVRi outputs depends on the potentiometer setting in the following way.



Symmetrical setting of AVRi outputs depends on the potentiometer setting in the following way.



The following table sums the situation.

Bias \ Potentiometer	Out1 – OCOM		Out2 – OCOM		Out1 – Out2	
	Min	Max	Min	Max	Min	Max
0 %	0	0	2	10	-2 V	-10 V
50 %	1	5	1	5	0 V	0 V
100 %	2	10	0	0	+2 V	10 V

Voltage control adjustment

1. Set **Voltage gain (page 497)**, **Voltage Int (page 498)** to zero and **AVR DCout bias (page 498)** to 50%.
2. Start always with AVRi potentiometer minimum adjustment (fully counterclockwise).
3. Start the Gen-set in MAN Mode to **Nomin power (page 345)** without load.
4. Adjust generator voltage to **GenNomV (page 351)** by the potentiometer present on the AVR. If there is no potentiometer on the AVR, use **AVR DCout bias (page 498)** to adjust the voltage to **GenNomV (page 351)**.

5. Change **AVR DCout bias (page 498)** to 0% and 100% to check generator voltage control range (typically $\pm 10\%$ of **GenNomV (page 351)**). Adjust voltage control range by AVRi potentiometer.
6. Set **AVR DCout bias (page 498)** to again reach **GenNomV (page 351)** on the generator.
7. When Gen-set is running unloaded increase carefully **Voltage gain (page 497)** to unstable point and then decrease value by 30 % to insure stable performance.
8. Adjust **Voltage Int (page 498)** (usually setting to 100 % gives optimal performance).

Note: To judge optimal adjusting of the voltage induce generator voltage jumps by **AVR DCout bias (page 498)** change or by **GenNomV (page 351)** change.

PF control adjustment

The Gen-set should be roughly 30% loaded in Parallel to Mains operation and in BaseLoad mode (**#SysLdCtrl PtM (page 324)** or **Load ctrl PtM (page 328)** is set to BASELOAD).

For SPtM, SPI and Combi in SPtM or SPI mode

1. Set the same values to **PF gain (page 498)** and **PF int (page 498)** as in the chapter **Voltage control adjustment (page 208)** for parameters **Voltage gain (page 497)** and **Voltage Int (page 498)**.
2. Set **Base load (page 326)** = 30 % of **Nomin power (page 345)**, **PF ctrl PtM = BASEPF**, **Base PF = 1.0**.
3. Start and synchronize the Gen-set in MAN Mode by pressing GCB ON/OFF
4. When running in Parallel to Mains loaded on 30 %, increase slowly **PF gain (page 498)** to unstable point and then decrease the value by 30 % to insure stable performance.
5. Adjust **PF int (page 498)** (usually setting to 100 % gives optimal performance).

Note: To judge optimal adjusting of the power factor induce generator power jumps by **AVR DCout bias (page 498)** change or by **Base load (page 326)** change.

For MINT, COX and Combi in MINT mode

Power factor control loop is active in parallel to mains mode only (MCB feedback closed). Switch off other engines while adjusting.

1. Set the same values to **PF gain (page 498)** and **PF int (page 498)** as in the chapter **Voltage control adjustment (page 208)** for parameters **Voltage gain (page 497)** and **Voltage Int (page 498)**.
2. Set **#SysBaseLoad (page 322)** = 30 % of **Nomin power (page 345)**, **#SysPFctrl PtM (page 324)** = BASEPF, **#SysPwrFactor (page 323)** = 1.0.
3. Start and synchronize the Gen-set in MAN Mode by pressing GCB ON/OFF
4. When running in Parallel to Mains loaded on 30 %, increase slowly **PF gain (page 498)** to unstable point and then decrease the value by 30 % to insure stable performance.
5. Adjust **PF int (page 498)** (usually setting to 100% gives optimal performance).

Note: To judge optimal adjusting of the power factor induce generator power jumps by **AVR DCout bias (page 498)** change or by **#SysBaseLoad (page 322)** change.


5.3.38 User management

All ComAp controllers offer password protection for certain functions and adjustment points. In most cases the level of password protection for the particular function or setpoint is configurable using the PC configuration tool (GenConfig). Please see the configuration tool manual or controller manual for details about password protection for the particular controller type.

There are seven different users and seven different access groups. Each user has access to selected groups and has own password. Each item, which is to be protected by password, belongs to one of these seven access groups. If a valid password is entered, the user gets access to all items that belong to a group to which he has granted access. The user #0 is an "Administrator" and has access to all protected items as well as the rights for managing other users.



Entering password

If the Sites connection mode is used, then the passwords for each controller can be entered in advance into the gen-sets list (refer to the context help of IntelliMonitor – press F1 in IntelliMonitor). If the Quick connection mode is used, then the passwords for the particular controller can be entered before the connection is opened.


Single connection: To enter the password while the connection is already running, go to the menu Monitor -> Enter password or click to the icon . You also have to select the user, for whom the password is being entered.

Multiple connection: To enter the password while the connection is already running, in the toolbar select the gen-set to which you want enter the password and then go to the menu Monitor -> Enter password or use the item Enter password from the pull-down menu of the desired controller. You also have to select the user, for whom the password is being entered.

Deactivating password

Click to the icon  resp.  or use the menu item Monitor -> Deactivate password to deactivate the currently entered password (the current user).

Manage users

Log-in as the administrator and click to the icon  or use the menu Monitor -> Admin users to open the window where you can manage the other users of the controller.

1. Select the user that you want to edit in the list (2). The name of the user can be changed after clicking into the name field. The name of the currently selected user is indicated in the label (3).

Note: To change user name and levels user must be enabled first in section (1).

2. Select the top access level for this user by double-clicking on the appropriate rectangle in the access level map (4). All lower levels will be selected automatically. To select levels individually, hold the Ctrl key and click on level field.
3. Uncheck the "Enabled" item (1) if you want to disable the selected user, i.e. the user will not have any access level assigned.
4. You can reset password to default for all users except the administrator by clicking on the button (5) or reset password only for the selected user by clicking on the button (6).

Note: Default password is "0" (zero).

5. Enable/Disable function Password break protection function (7). Initial status is DISABLED.

Note: Warning "PassInsertBlck" appears in alarm list when controller is blocked. It is not allowed to insert the password in case that controller is blocked. There is information that controller is blocked for next password attempt and time remaining till the end of blockation instead of password input window at the terminal screen. The controller is locked for 5 minutes when the password is 6 times wrong entered (in case of next 6 wrong attempts (correct password was not inserted at all) for 30, 60, 120, 240 minutes). Incorrect password message appears in the history of the controller when the invalid password is used.

Admin Users - C02 - 2

Selected User: Administrator

No	Enabled	User name	Level
0	<input checked="" type="checkbox"/>	Administrator	1 ON 2 ON 3 ON 4 ON 5 ON 6 ON 7 ON
1	<input checked="" type="checkbox"/>	Operator	1 ON 2 ON 3 ON 4 ON 5 ON 6 OFF 7 OFF
2	<input checked="" type="checkbox"/>	Technician	1 ON 2 ON 3 ON 4 ON 5 OFF 6 OFF 7 OFF
3	<input checked="" type="checkbox"/>	U3	1 ON 2 ON 3 OFF 4 OFF 5 OFF 6 OFF 7 OFF
4	<input checked="" type="checkbox"/>	U4	1 ON 2 OFF 3 OFF 4 OFF 5 OFF 6 OFF 7 OFF
5	<input type="checkbox"/>	U5	1 OFF 2 OFF 3 OFF 4 OFF 5 OFF 6 OFF 7 OFF
6	<input type="checkbox"/>	U6	1 OFF 2 OFF 3 OFF 4 OFF 5 OFF 6 OFF 7 OFF
7	<input type="checkbox"/>	U7	1 OFF 2 OFF 3 OFF 4 OFF 5 OFF 6 OFF 7 OFF

☒ Password break protection

OK Cancel

5.3.39 Safety function

There is already implemented pair of LBI **EMERGENCY STOP (PAGE 680)** and Emergency stop neg to be used for Emergency Stop push button.

There could be more safety functions, for example temperature, gas leakage etc. So additional three pairs (4 in total with already implemented Emg.) of safety functions is added.

The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage). This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs. This function is very often required for various certifications and it is not possible (and not practical) to define a unique function for each instance. Because of this configurable solution is required. The configuration will be done by a user.

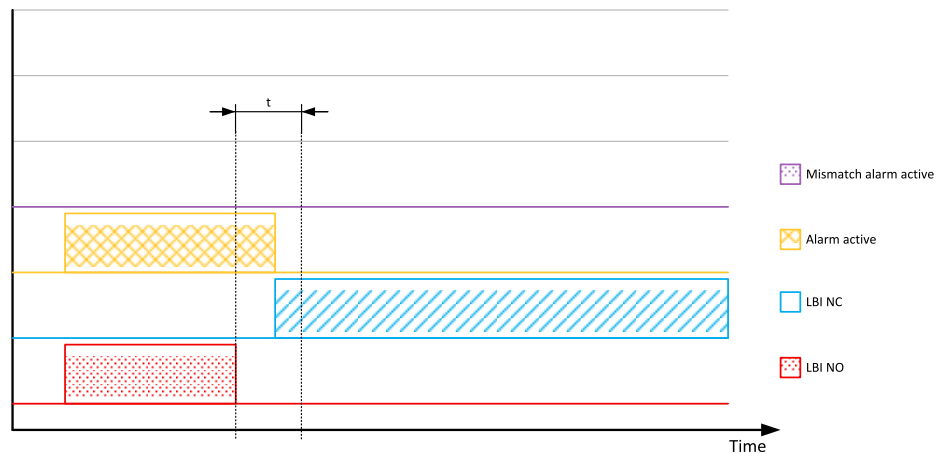


Image 5.30 Safety function

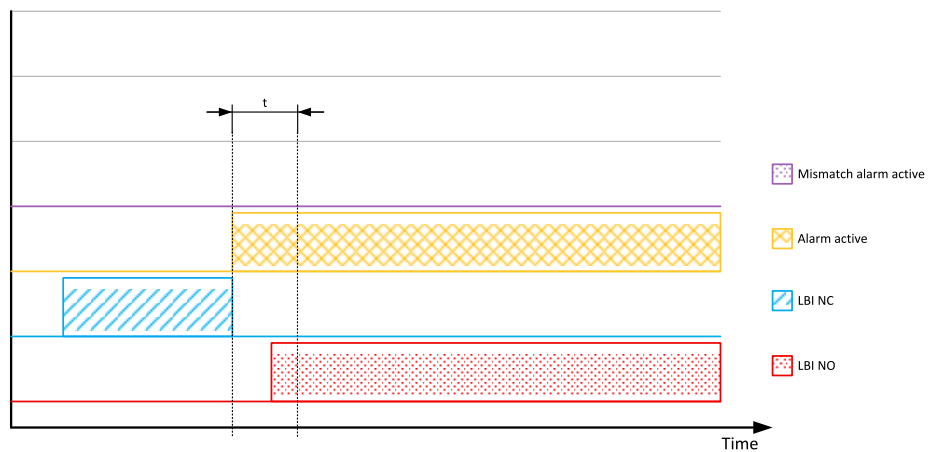


Image 5.31 Safety function

LBI	Note
SafetyFunct1NO	Normaly open contact. Can be configured as standard LBI. Pair 1
SafetyFunct1NC	Normaly close contact. Can be configured as standard LBI. Pair 1
SafetyFunct2NO	Normaly open contact. Can be configured as standard LBI. Pair 2
SafetyFunct2NC	Normaly close contact. Can be configured as standard LBI. Pair 2
SafetyFunct3NO	Normaly open contact. Can be configured as standard LBI. Pair 3
SafetyFunct3NC	Normaly close contact. Can be configured as standard LBI. Pair 3
SafetyFunct4NO	Normaly open contact. Can be configured as standard LBI. Pair 4
SafetyFunct4NC	Normaly close contact. Can be configured as standard LBI. Pair 4

Table 5.1 Safety logical binary inputs

Alarm	Note
SafetyFn1Mism	The alarm is issued if both LBI's from pair 1 are in the same state for time longer than mismatch delay
SafetyFn2Mism	The alarm is issued if both LBI's from pair 2 are in the same state for time longer than mismatch delay
SafetyFn3Mism	The alarm is issued if both LBI's from pair 3 are in the same state for time longer than mismatch delay
SafetyFn4Mism	The alarm is issued if both LBI's from pair 4 are in the same state for time longer than mismatch delay

Table 5.2 Safety function mismatch alarms

Mismatch evaluation delay = this delay is given by the internal structure of the function (this delay is the same as in the case of Emergency stop mismatch evaluation).

If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).

If none of the LBIs from one pair is configured the function is not evaluated at all.

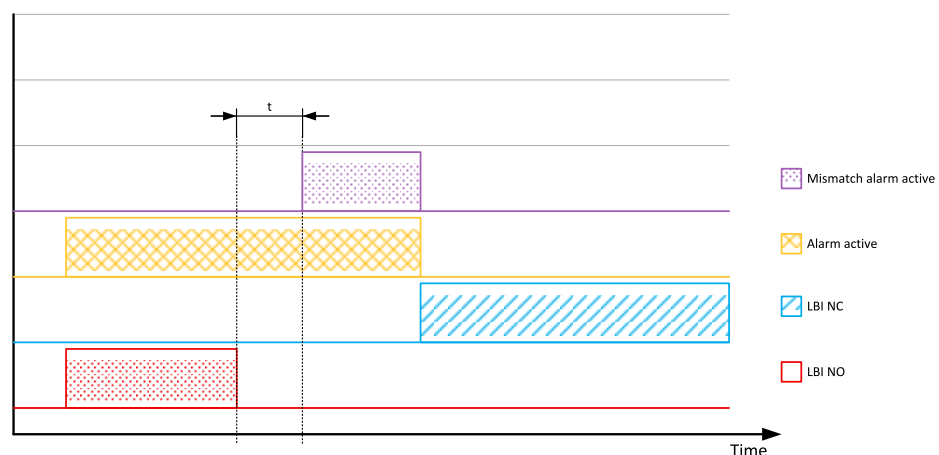


Image 5.32 Safety function mismatch

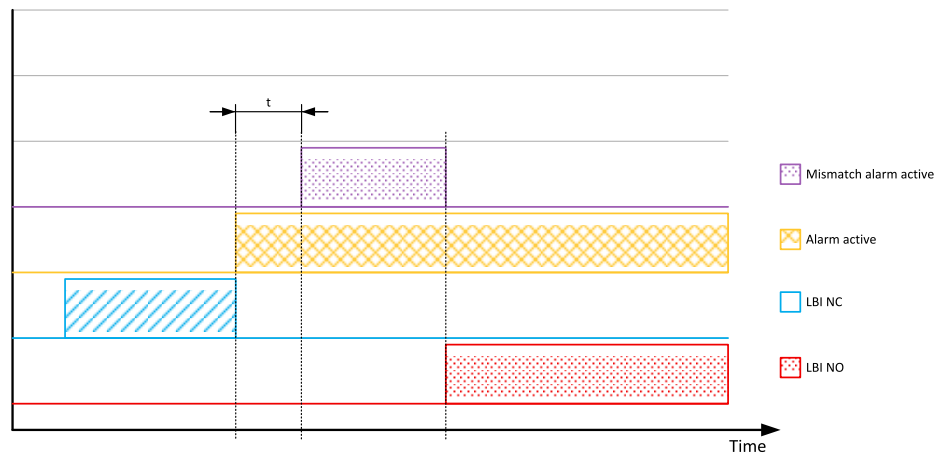


Image 5.33 Safety function mismatch

IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules, Modbus...)

5.3.40 Grid Codes specific functions

Grid code module is a part of firmware responsible for completing Grid code requirement tasks. Version of this module is stored in value **Grid Codes ver** (page 624).

The following description is related mainly for Germany and other European Union countries Grid code connection rules.

Active power feed-in at over and under frequency	215
Load reduction	218
Moving average values	221
Mains protections generator unit	222
PAV, E monitoring	223
Monitoring of mains frequency gradients (ROCOF)	225
Dynamic mains support (VRT)	225
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Connection conditions and synchronization	241
New power factor and reactive power limitation	243
PforQ function	245
New ramps used for Gen-set loading/unloading	248
Grid codes features in MINT application	250
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🔍 back to Functions

Active power feed-in at over and under frequency

Function is evaluated only in parallel to mains state.

Frequency is evaluated from value with 0.001 accuracy.

Function ENABLED / DISABLED

Function can be switched to enabled or to disabled in case the user decide whether is this function needed or not.

In case the function is ENABLED, than is evaluated as described in this chapter.

In case the function is DISABLE the function will not be more evaluated, no event or alarm will be in this case active.

Power reduction by over frequency

Reduction of power has to generally start by 50.2 Hz of mains frequency. The starting point could be adjustable till 50.5 Hz. Unit must be able to reduce the active power till the frequency 51.5 Hz.

51.5 Hz in this case responds to 48 % of **InstalledPower** (page 346). If the unit is able to ride under the 48 % of nominal power the curve continuous with same gradient also by frequency >51.5 Hz.

Anyway the norm allows, that the unit could disconnect from the mains in case the frequency is >51.5 Hz.

Note: *Technical possibilities of Gen-sets by frequency >51.5 Hz can be solved with other configuration features (MinPowerPTM, PLC logic etc.)*

Function is defined by user sensor curve adjusted in configuration tool till the maximum possible frequency.

The curve is adjusted according to following formula: $\Delta P = 20 * \text{InstalledPower (page 346)} * (50.2 - f_{\text{mains}}) / 50$

User Sensor curve name is PWROVRFREQ.

If the mains frequency reaches 50.2 Hz the actual active power value is frozen (**Pm (page 624)**) and from this value the power is decreased.

The actual power of Gen-set (value Pm) is decreased of a power which is related to ΔP in actual mains frequency.

While the power is reduced due to over frequency LBO: **PWROVERFREQ LIM (PAGE 834)** and the LBO: **MAINSFRQRise (PAGE 788)** are activated and setpoint **MainsFrqRise (page 463)** is used.

For the return from power reduction – this is meant that the frequency returns from over frequency, the setpoint **MainsFrqFall (page 463)** is used and LBO: **MAINSFRQFall (PAGE 787)** is active.

Power over frequency related setting

Power over frequency related setting:

- Setpoint : ActPwrRamps: **MainsFrqRise (page 463)**
- Setpoint: ActPwrRamps: **MainsFrqFall (page 463)**
- Setpoint: Grid Codes: **PwrOvUnFreq (page 468)**
- Values: Sync/Load ctrl: **ActPwrReq (page 618)**
- Values: Grid Codes: **PoF Curve (page 626)**
- GenConfig: User Sensors – PWROVRFREQ
- GenConfig: LBO: **PWROVERFREQ LIM (PAGE 834)**
- GenConfig: LBO: **MAINSFRQRise (PAGE 788)**
- GenConfig: LBO: **MAINSFRQFall (PAGE 787)**
- GenConfig: LBO: **RETovUNFreq (PAGE 840)**

In case of using Testing frequency:

- GenConfig: LAI: **TESTF (PAGE 896)**
- GenConfig: LAI: **TESTP (PAGE 896)**
- GenConfig: LAI: **TESTU (PAGE 897)**

Power increase by under frequency

If the frequency drops to 49.8 Hz the actual value of active power is saved and is taken as reference value for the under frequency curve.

The under frequency is watched till 47.5 Hz below this value could be the unit disconnected from the mains.

For this function is defined new user sensor curve – PWRUNDRFREQ.

The curve is adjusted according to following formula: $\Delta P = 20 * \text{InstalledPower (page 346)} * (49.8 - f_{\text{mains}}) / 50$

The actual power of Gen-set (value Pm) is increased for a power which is related to ΔP in actual mains frequency.

While the power is increased due to under frequency LBO: **PWRUNDERFREQ (PAGE 836)** and the LBO: **MAINSFRQFall (PAGE 787)** are activated and setpoint **MainsFrqFall (page 463)** is used.

For the return from power increasing – this is meant that the frequency returns from under frequency, the **MainsFrqRise (page 463)** is used and LBO: **MAINSFRQRise (PAGE 788)** is active.

Power increase has to be limited by **InstalledPower (page 346)**. If the Pm is equal or higher (higher could be because the active power is never stable and in fact oscillates around required value) the under frequency will not be realized.

When the frequency goes above the underfrequency limit (49.8 Hz) the state is actualized according to actual situation (e.g. if there is another power reduction active, the power will be reduced accordingly).

Power under frequency related setting

Power under frequency related setting:

- Setpoint: ActPwrRamps: **MainsFrqRise** (page 463)
- Setpoint: ActPwrRamps: **MainsFrqFall** (page 463)
- Setpoint: Grid Codes: **PwrOvUnFreq** (page 468)
- Values: Sync/Load ctrl: **ActPwrReq** (page 618)
- Values: Grid Codes: **PuF Curve** (page 626)
- GenConfig: User Sensors – **PWRUNDRFREQ**
- GenConfig: LBO: **PWRUNDERFREQ** (PAGE 836)
- GenConfig: LBO: **MAINSFRQRISE** (PAGE 788)
- GenConfig: LBO: **MAINSFRQFALL** (PAGE 787)
- GenConfig: LBO: **RET OV UNFREQ** (PAGE 840)

In case of using Testing frequency:

- GenConfig: LAI: **TESTF** (PAGE 896)
- GenConfig: LAI: **TESTP** (PAGE 896)
- GenConfig: LAI: **TESTU** (PAGE 897)

Return from over/under frequency

The situation after return from over or under frequency is defined as special Event which has his own setting of priority **RetOvUnFreqPr** (page 462) and ramp time **RetOvUnFreq** (page 462).

There is also setpoint which defines the length of time how long should be hold the Event Setpoint **RetOvUnFreqT** (page 469).

There is also setpoint which defines the delay when the Event **RetOvUnFreq** (page 462) itself is even activated Setpoint **RetOvUnFreqDel** (page 469), during this active delay there is not allowed to ramp with the active power according to any ramp only in case there is active another event with higher priority.

The LBO which indicates active event **RET OV UNFREQ** (PAGE 840) is active immediately after coming from Over or Under frequency except the Time and Delay ($LBO(1) = \text{Setpoint RetOvUnFreqDel} + \text{Setpoint RetOvUnFreqT}$)

Function in mains controller

In this chapter, only differences from Gen-set controller are described.

Value Pm

The value saved into Pm / P Mom is taken from TotRunPact / Total Running P (in Gen-set controller it is Act power).

Active power reduction

The reduction of active power is calculated from the value TotRunPnomAll / Running Nominal Power Of All (in Gen-set controller it is InstalledPower), Pm and PoF Curve (this value is the same as in Gen-set controller).

Active power increase

The active power increase is calculated from the value TotRunPnomAll / Running Nominal Power Of All (in Gen-set controller it is InstalledPower), Pm and PuF Curve (this value is the same as in Gen-set controller).

Active power is increased until TotRunPnomAll / Running Nominal Power Of All is reached.

Simulation of mains frequency

The possibility to simulate the mains frequency on the mains controller can be activated only if the mains controller is in OFF mode and no Gen-set is connected to the bus. Then the setpoint GridCodesTest can be switched to the position TEST. The alarm Wrn TestPQF is active during the test.

End of critical mains states and return to normal state

When the mains frequency returns from over or under frequency, it means mains frequency is back over 49.8 Hz and under 50.2 Hz the transitional period from the critical to normal state must be initialized.

This transitional period is fixed to 600 s.

During this period is active the LBO: RETOVUNFREQ (PAGE 840) and the setpoint RetOvUnFreq (page 462) is used.

Load reduction

Load reduction via Binary inputs

Controller enables remote power control of the Gen-set. This mechanism is dedicated for purposes when e.g. utility company wants to control the Gen-set power on predefined power levels.

Reduction is based on combination of:

- Power levels which are adjusted by Setpoints: LoadReduct1 (page 467), LoadReduct2 (page 467), LoadReduct3 (page 468), LoadReduct4 (page 468). Which corresponds with LBI: LOADREDUCT 1 (PAGE 723), LOADREDUCT 2 (PAGE 723), LOADREDUCT 3 (PAGE 724), and LOADREDUCT 4 (PAGE 724).
- Activation of set of LBI: LOADREDUCT 1 (PAGE 723), LOADREDUCT 2 (PAGE 723), LOADREDUCT 3 (PAGE 724), and LOADREDUCT 4 (PAGE 724).
 - In case none of these LBIs are activated, Gen-set power is (if no other requirement occur) regulated on value % of InstalledPower (page 346) given by setpoints mentioned above.
 - In case more LBI's activated at once, Gen-set power will be reduced to lower kW
- Activation of LBI: LOAD REDUCTION (PAGE 721)
 - This LBI is general condition for activation of power limitation.

IMPORTANT: The event Load Reduct must be active also after deactivation of the LBI: LoadReduct 1-4, that means that the event Load Reduct is not active only during reducing the power but also during increasing the power on the actual request. In case the Load reduction is controlled via LAI LOAD REDUCTION (PAGE 885) all changes (up or down) on the LAI must be provided according Load Reduct ramp and the event must be active during load ramping. The ramp Load Reduct is only not used in case there is active another event with higher priority.

- Required load reduction is lower than actual power
 - This is mainly in situations when other "loading ramp" is activated and Gen-set ramps from 0 or low power and then would Load reduction not reduce but increase the actual power.
- Example:** There was Mains fail and after synchronization to the Mains Gen-set starts to increase the load via slow load ramp. If there comes requirement for Load reduction 60 % when the actual power is 10 %, the actual loading ramp is active till the actual power comes over the required Load reduction. If the Load reduction is deactivated and there is still active previous ramp timer, Gen-set is loaded due to previous ramp.

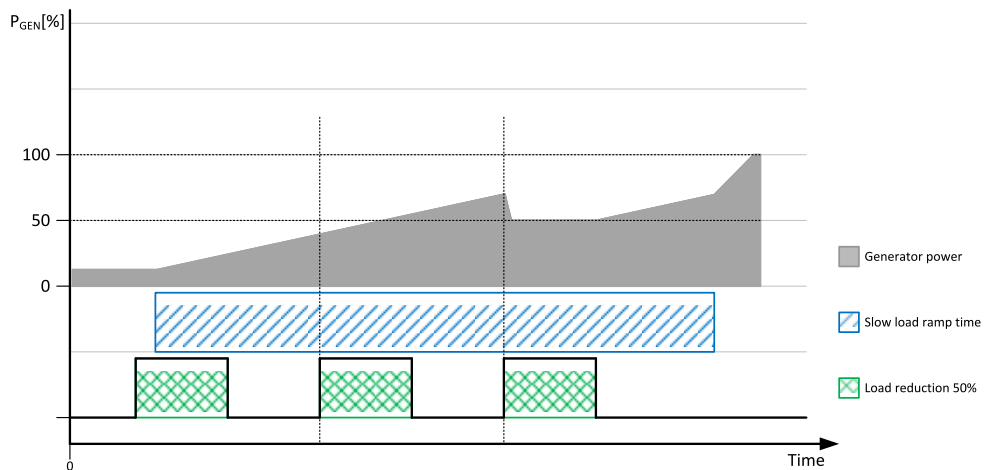


Image 5.34 Load reduction

Load reduction via Binary input – statistic values

There are counters as statistic value which indicates how many times was activated any level of power reduction.

We store the data of running hours and minutes in the reduced levels, which are available for network supervisors.

If the actual power is lower than actual required reduction the average statistic values will not be filled, we monitor definitely only the situation when is the gen-set forced to reduce his power.

We store following statistic data:

- during the actual month
 - data are every 1.day of next month in 0:00 moved in to the statistics of "last month"
 - data are every 1.day of next month in 0:00 automatically reset
- statistic of last month
 - this value is actualized every 1.day of next month in 0:00
- long term statistic
 - statistic from the first switching on or from the reset command till the end of data range

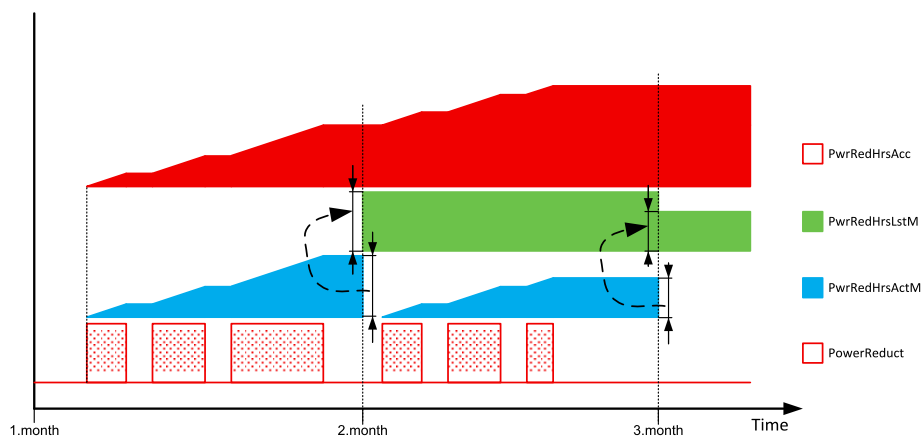


Image 5.35 Principal of statistic values

Load reduction via Binary input related setting

- Setpoint: ActPwrRamps: **LoadReductPr** (page 459)
- Setpoint: ActPwrRamps: **LoadReduct** (page 464)
- Setpoint: Grid Codes: **LoadReduct1** (page 467)
- Setpoint: Grid Codes: **LoadReduct2** (page 467)
- Setpoint: Grid Codes: **LoadReduct3** (page 468)
- Setpoint: Grid Codes: **LoadReduct4** (page 468)
- LBI: **LOADREDUCT 1** (PAGE 723)
- LBI: **LOADREDUCT 2** (PAGE 723)
- LBI: **LOADREDUCT 3** (PAGE 724)
- LBI: **LOADREDUCT 4** (PAGE 724)
- LBI: **LOAD REDUCTION** (PAGE 721)
- LBO: **LOADREDUCT** (PAGE 786)
- LBO: **LOAD REDUCT ON** (PAGE 785)

Load reduction via Analog inputs

Controller enables remote power control of the Gen-set. This mechanism is dedicated for purposes when e.g. utility company wants to control the Gen-set power on predefined power levels.

Reduction is based on combination of:

- Power levels are changed according to actual value of configured LAI: **LOAD REDUCTION** (PAGE 885).
 - LAI: **LOAD REDUCTION** (PAGE 885) can be configured in GenConfig either as standard analog input or as analog value in PLC logic
- Activation of LBI: **LOAD REDUCTION** (PAGE 721)
 - this LBI is general condition for activation of power limitation.
- Required load reduction is lower than actual power
 - this is mainly in situations when other "loading ramp" is activated and Gen-set ramps from 0 or low power and then would Load reduction not reduce but increase the actual power.

Example: There was Mains fail and after synchronization to the Mains Gen-set starts to increase the load via slow load ramp. If there comes requirement for Load reduction 60 % when the actual power is 10 %, the actual loading ramp is active till the actual power comes over the required Load reduction. If the Load reduction is deactivated and there is still active previous ramp timer, gen-set is loaded due to previous ramp.

Note: If there is also configured LBI: Load reduct 1-4, the lower requested value is required.

IMPORTANT: In case the power reduction based on LAI: **LOAD REDUCTION** (PAGE 885) is active the power reduction statistic is not fulfilled.

Load reduction via analog input related setting

Setpoint: ActPwrRamps: **LoadReduct** (page 464)

Setpoint: ActPwrRamps: **LoadReductPr** (page 459)

LAI: **LOAD REDUCTION** (PAGE 885)

LBI: **LOAD REDUCTION** (PAGE 721)

LBO: **LOADREDUCT** (PAGE 786)

LBO: **LOAD REDUCT ON** (PAGE 785)

Moving average values

10-minutes average from gen P

- Means the window from which the average is counting is moving all the time
- Will be started to calculate in the moment, when the GCB breaker is closed and will be stopped to be calculated in the moment when the GCB is opened.
- When the GCB is opened, the value will be reset to 0
- **ActPwr10minAvg** (page 592)

10-minutes average from gen Q

- Means the window from which the average is counting is moving all the time
- Will be started to calculate in the moment, when the GCB breaker is closed and will be stopped to be calculated in the moment when the GCB is opened.
- When the GCB is opened, the value will be reset to 0
- **RctPwr10minAvg** (page 594)

10-minutes average from gen S

- Means the window from which the average is counting is moving all the time
- Will be started to calculate in the moment, when the GCB breaker is closed and will be stopped to be calculated in the moment when the GCB is opened.
- When the GCB is opened, the value will be reset to 0
- **AppPwr10minAvg** (page 595)

10-minutes average from mains U (ph-N)

- Means the window from which the average is counting is moving all the time
- Will calculate all the time when **FixVoltProtSel** (page 353) = PHASE-NEUTRAL or **FixVoltProtSel** (page 353) = BOTH + PH-N
- When controller is switched off, the value will be reset to 0
- **MainsV10L1-L2** (page 608), **MainsV10L2-L3** (page 609), **MainsV10L3-L1** (page 609)

10-minutes average of mains U (ph-ph)

- Way of computing – similar to the Mains Avg V1, V2, V3.
- Will calculate only when **FixVoltProtSel** (page 353) = PHASE-PHASE or **FixVoltProtSel** (page 353) = BOTH + PH-PH
- **MainsV10L1-L2** (page 608), **MainsV10L2-L3** (page 609), **MainsV10L3-L1** (page 609)

1-minutes average from mains U (ph-ph)

- Means the window from which the average is counting is moving all the time
- Will calculate all the time when controller is powered on
- When controller is switched off, the value will be reset to 0
- **MainsV1L1-L2 (page 610), MainsV1L2-L3 (page 611), MainsV1L3-L1 (page 611)**

Mains protections generator unit

Protective disconnection devices are installed at the generator unit.

Available protections are:

- Rise-in-voltage protection $U>$ and $U>>$
- Under-voltage protection $U<$ and $U<<$
- Rise-in-frequency protection $f>$ and $f>>$
- Under-frequency protection $f<$ and $f<<$
- Vector Shift
- ROCOF1-4
- Q&U Protection

Note: Tripping values and times are specified from network authority.

Q&U Protection

Q-U protection watches the behavior of Gen-set in case of the drop of the mains voltage.

In case the voltage drops the capacitive mode of generator units in the network could still deteriorate the whole situation.

Gen-set must be disconnected from the mains in case the mains voltage drops below the certain value of nominal mains voltage AND the simultaneously is generated the capacitive reactive power from the Gen-set (generator is under excited).

Breaker must be disconnected after the required delay.

When the protection is evaluated alarm in alarm list and in history is activated.

While the alarm is active the closing of the breaker is disabled, the mains or generator parameters will be forced as "not OK".

User could decide whether wants to open the GCB or MCB breaker (only for SPtM application – **Q&U Prot CBsel (page 471)**).

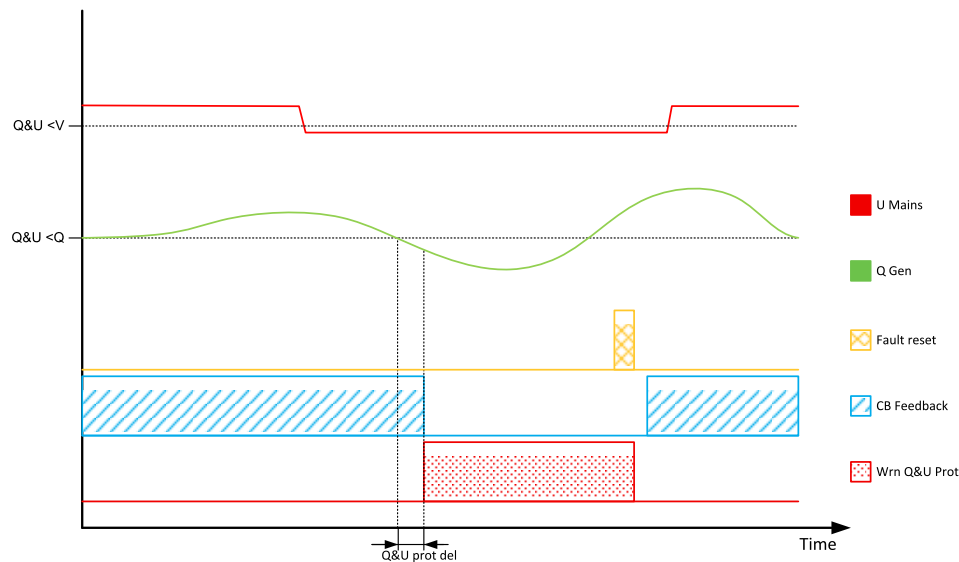


Image 5.36 Q&U Protection

Note: In the norm is mentioned, that the protection is activated if the Q is above the adjusted level, but we have to be aware, that the requirement is written in load point of view, but we adjust the protection from generator point of view, that's why we recognize when the Q is below the adjusted level.

In case the protection is active the breaker GCB or MCB gets opened and the Q&U protection alarm message is activated.

P_{AV, E} monitoring

The $P_{AV, E}$ function (required by the 4105:2018 norm) is related to export of power to the mains. It prevents the Gen-set from exporting more power than the setpoint **Pave (page 423)** (feed-in limitation). When more power is exported for time given by the curve P_{mom}/P_{ave} Max, the Gen-set is disconnected from the mains. If this setpoint is set to 0 (OFF), the function is disabled and all Pave outputs are deactivated (LBOs, values, alarms). The function is enabled only when MCB and GCB are closed (i. e. only in the parallel operation) and the **Pave (page 423)** setpoint is not 0 (OFF). The function is implemented in archives SPtM, SPI and Combi.

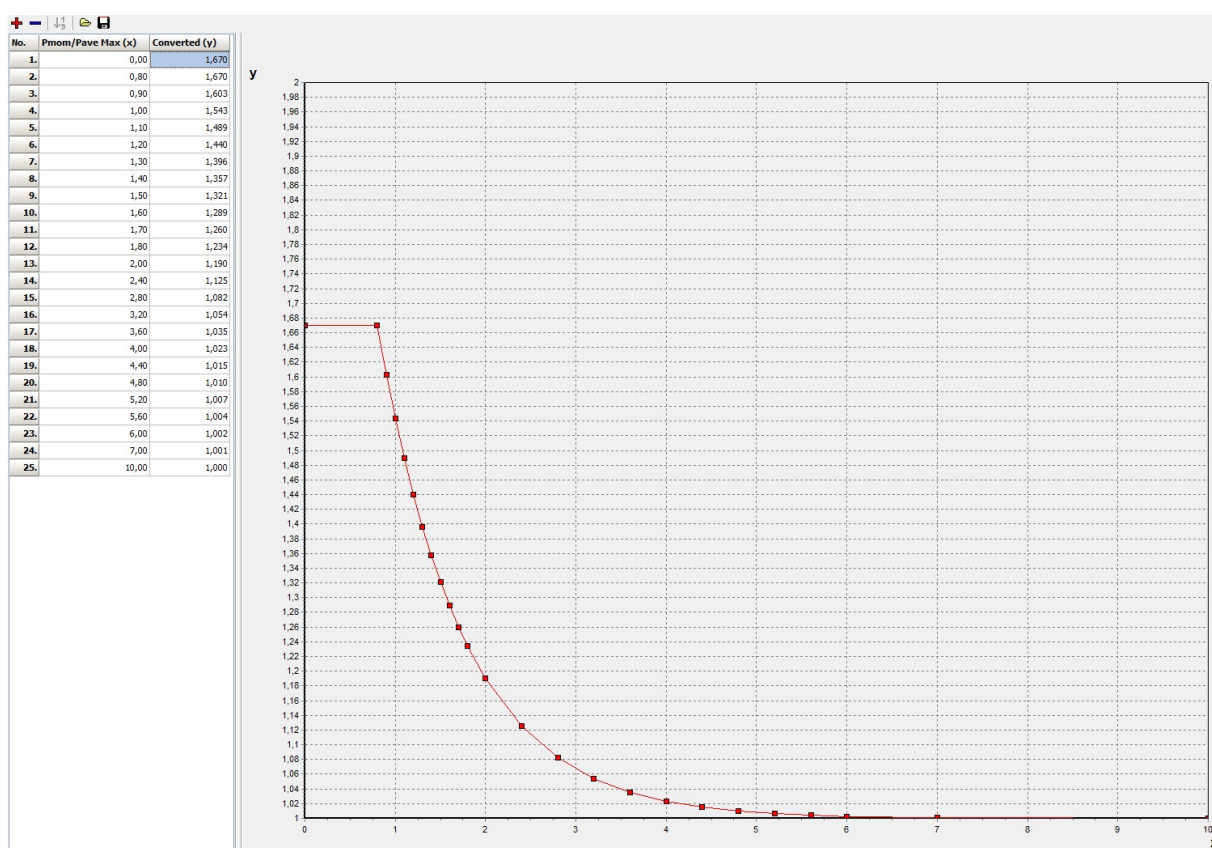
The norm requires all 3 phases measurement of exported power. This means that the function must be evaluated in cooperation with other ComAp device, ideally IntelliPro SYNC because it has fast shared analog output (SHAOUT) transmitting period (20 ms). This period can be set by putting the setpoint SHAOUT Period (in IntelliPro SYNC) to the position Fast. The exported power is sent from this device over the CAN2 bus using shared analog output (SHAOUT) and shared analog input (SHAIN). The SHAIN can be connected to the **PMOM (PAGE 891)** (exported power measured in all 3 phases), which has resolution dependent on the selected power format. If this LAI is not configured or the value is invalid, the LBO: **PAVE FLS (PAGE 828)** is active.

Note: For more information about using ComAp's shared virtual peripherals to send signals among the controllers see **Shared virtual inputs and outputs on page 160**.

There is a value **Pmom/Pave (page 634)** which provides the ratio between **PMOM (PAGE 891)** and **Pave (page 423)**. This value is internally inverted because of ComAp export/import sign convention (export is negative). For example, $P_{ave} = +20$ kW, $P_{mom} = -10$ kW, $P_{mom}/P_{ave} = +0.5$ (not -0.5). For proper calculation of this value, the Gen-set controller and IntelliPro SYNC must be set to the same power format. This is necessary because the setpoint **Pave (page 423)** uses the power format selected in the Gen-set controller and the value sent via LAI: **PMOM (PAGE 891)** uses the power format selected in IntelliPro SYNC.

The value **Pmom/Pave (page 634)** is compared against predefined curve Pmom/Pave Max.

- On the x-axis there is time with 2 decimal places which describes the tripping time of the function (protection)
- On the y-axis there is the ratio Pmom/Pave Max with 3 decimal places
- If the actual value of **Pmom/Pave (page 634)** gets higher than Pmom/Pave Max curve value, the GCB or MCB is opened
- This means that the value **Pmom/Pave (page 634)** is constantly monitored and if it gets higher than 1.000, the corresponding tripping time is calculated based on the curve Pmom/Pave Max and the value **Pmom/Pave (page 634)**
- For example, **Pmom/Pave (page 634)** gets to 1.067 and from the curve the tripping time is 3 seconds. However in the next measured sample the value **Pmom/Pave (page 634)** will get higher, e.g. to 1.6 which overwrites the tripping time, being calculated from the original moment when the **Pmom/Pave (page 634)** crossed the value 1.000 (this is similar to OVRT function, or LVRT function)



If the value **Pmom/Pave (page 634)** gets above the curve Pmom/Pave Max, then we need to trip the breaker within 200 ms (including the transmission time from Mains controller/relay to the Gen-set controller). This means:

- Alarm: Pave is issued (history record + open breaker with CB selection for SPtM / MGCB)
- **The protection must be internally evaluated as Mains protection, due to this request the setpoint Pave CBsel will be removed and there will be all the time opened just MCB (in SPI application of course only GCB)**
- This situation is indicated by the LBO: Pave, which is activated for 5 seconds (because after tripping, Pmom will drop below the curve)
- The value from SHAIN is updated every 40 ms or less

- The value P_{mom}/P_{ave} is compared against the curve P_{mom}/P_{ave} Max every 20 ms
- The command to trip the breaker is processed in the 20 ms (fast) loop

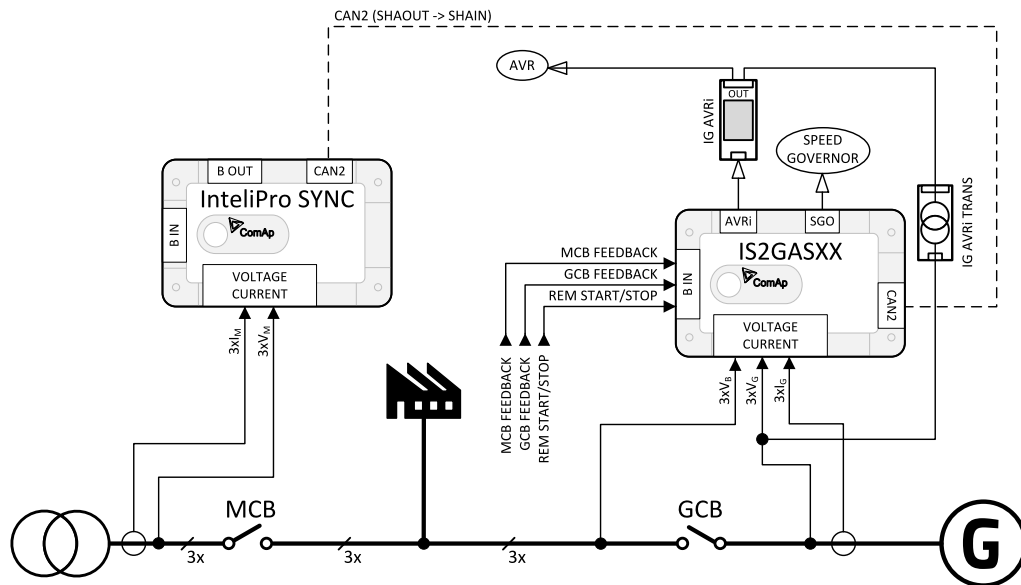


Image 5.37 typical application of the $P_{AV, E}$ function

Monitoring of mains frequency gradients (ROCOF)

Unit has to be able to fast react in case the frequency changes faster than values adjusted by following setpoints.

In other cases the Gen-set unit is not allowed to disconnect from mains.

We have new set of ROCOF setpoints.

The first set of ROCOF setpoints is already implemented protection which remains with the same behavior, there is only changed the name to ROCOF1...

Setpoints ROCOF2-4... are completely new implemented according to VDE 4110 requirements.

ROCOF function is generally evaluated from frequency measured with 0.01 accuracy.

Note: The ROCOF1 protection window is based on number of measured samples, the ROCOF2-4 protection window is based on fixed time.

Dynamic mains support (VRT)

Under Dynamic mains support means keeping the generator voltage during short mains failures on medium or high voltage site for an unwished disconnection of big power sources which could reduce mains unbalances.

To activate both protections new setpoint: Grid Codes: **DynamicSupport (page 471)** has to be in position Enabled.

We have 4 types of evaluated VRT (Voltage ride through).

Note: Previous Grid code requirements required this function. The function was called LVRT (Low voltage ride through). This functionality remain with the same features and except this there are other new requirements. Because we have to Low and High voltage ride through, the function is called now FRT (Fault Ride Through).

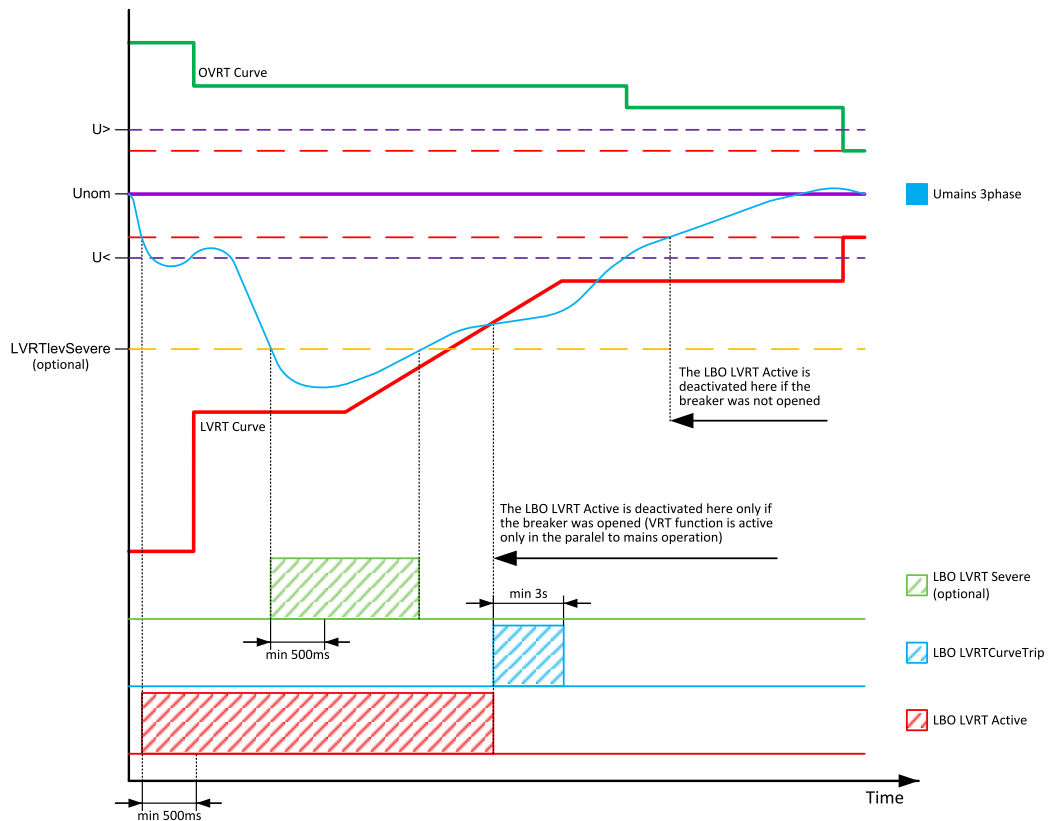


Image 5.38 Required VRT curves

FRT = VRT

In case the voltage is below (LVRT) or above (OVRT) the curve the alarm VRT Trip is activated (the alarm type is selected by the setpoint **DynSupProtType** (page 471)). The **LBO LVRT CURVETrip** (PAGE 787) or **OVRT CURVETrip** (PAGE 828) is activated for minimum 3 seconds after activation.

Evaluation of the LVRT and OVRT curve depends on the setting of setpoint which defines types of selected protections. (In current controllers is for this available setpoint **FixVoltProtSel** (page 353)). This setpoint selects that the VRT is evaluated either from PHASE-PHASE, PHASE-NEUTRAL, or even BOTH voltages at the same time.

Evaluation of the function

The Dynamic network support is evaluated only in the Parallel to Mains operation. In the Island operation the Dynamic network support is not evaluated, which means the function and LBOs activation is blocked. This means, if the Gen-set loses the mains connection, the evaluation of the related VRT functions is terminated, the corresponding LBOs are reset, maintaining the required duration of the LBOs.

If any of the mentioned curves is not present in the controller archive, then such a "VRT" is not being evaluated. This will be a typical situation, as in different countries will be different requirements. The voltages used for evaluation of the function depend on which curves are configured and also on the position of the setpoint: **FixVoltProtSel** (page 353), based on the following table.

Configured curves	FixVoltProtSel	Voltages used for Protection
LVRT-3 phase	PHASE-NEUTRAL	All 3 ph-N voltages
	PHASE-PHASE	All 3 ph-ph voltages
	BOTH + PH-N	All 3 ph-ph voltages or all 3 ph-N voltages
	BOTH + PH-PH	All 3 ph-ph voltages or all 3 ph-N voltages
LVRT-2 phase	PHASE-NEUTRAL	Any 2 ph-N voltages
	PHASE-PHASE	Any 2 ph-ph voltages
	BOTH + PH-N	Any 2 ph-ph voltages or any 2 ph-N voltages
	BOTH + PH-PH	Any 2 ph-ph voltages or any 2 ph-N voltages
LVRT-1 phase	PHASE-NEUTRAL	Any 1 phase of the 3 ph-N voltages
	PHASE-PHASE	Any 1 phase of the 3 ph-ph voltages
	BOTH + PH-N	Any 1 phase of the 3 ph-ph voltages or any 1 phase of the 3 ph-N voltages
	BOTH + PH-PH	Any 1 phase of the 3 ph-ph voltages or any 1 phase of the 3 ph-N voltages
LVRT-3 phase & LVRT-2 phase	PHASE-NEUTRAL	Logical OR of LVRT-3 phase and LVRT-2 phase behaviour
	PHASE-PHASE	Logical OR of LVRT-3 phase and LVRT-2 phase behaviour
	BOTH + PH-N	Logical OR of LVRT-3 phase and LVRT-2 phase behaviour
	BOTH + PH-PH	Logical OR of LVRT-3 phase and LVRT-2 phase behaviour
LVRT-2 phase & LVRT-1 phase	PHASE-NEUTRAL	Logical OR of LVRT-2 phase and LVRT-1 phase behaviour
	PHASE-PHASE	Logical OR of LVRT-2 phase and LVRT-1 phase behaviour
	BOTH + PH-N	Logical OR of LVRT-2 phase and LVRT-1 phase behaviour
	BOTH + PH-PH	Logical OR of LVRT-2 phase and LVRT-1 phase behaviour
LVRT-3 phase & LVRT-2 phase & LVRT-1 phase	PHASE-NEUTRAL	Logical OR of LVRT-3 phase, LVRT-2 phase and LVRT-1 phase behaviour
	PHASE-PHASE	Logical OR of LVRT-3 phase, LVRT-2 phase and LVRT-1 phase behaviour
	BOTH + PH-N	Logical OR of LVRT-3 phase, LVRT-2 phase and LVRT-1 phase behaviour
	BOTH + PH-PH	Logical OR of LVRT-3 phase, LVRT-2 phase and LVRT-1 phase behaviour

Configured curves	FixVoltProtSel	Voltages used for Protection
OVRT	PHASE-NEUTRAL	Any 1 phase of the 3 ph-N voltages
	PHASE-PHASE	Any 1 phase of the 3 ph-ph voltages
	BOTH + PH-N	Any 1 phase of the 3 ph-ph voltages or any 1 phase of the 3 ph-N voltages
	BOTH + PH-PH	Any 1 phase of the 3 ph-ph voltages or any 1 phase of the 3 ph-N voltages

Activation of the LVRT and OVRT function

Activation of the LVRT function is indicated by the LBO: **LVRT ACTIVE (PAGE 787)**. It is activated in the moment when the voltage drops below the level given by the last point of the LVRT curve. It is deactivated in the moment when the voltage goes above the last point of the LVRT curve OR when the Gen-set is not in the Parallel to Mains operation.

Activation of the OVRT function is indicated by the LBO: **OVRT ACTIVE (PAGE 828)**. It is activated in the moment when the voltage goes above the level given by the last point of the OVRT curve. It is deactivated in the moment when the voltage drops below the last point of the OVRT curve OR when the Gen-set is not in the Parallel to Mains operation.

The LBO: **LVRT ACTIVE (PAGE 787)** and the LBO: **OVRT ACTIVE (PAGE 828)** is implemented in the 20ms (fast) loop, because the PF/Q regulation (based on the setpoint **DynSupPF/Qctrl (page 472)**) is required to be evaluated in the fast loop.

Activation of the LVRT or OVRT function as described in this section does not mean that the breaker will be opened or an alarm will be issued. It means that the time related to LVRT / OVRT curves (x-axis) starts to be counted from zero. When the mains voltage(s) drop below / go above the curve, an alarm will be issued (the alarm type is selected by the setpoint **DynSupProtType (page 471)**).

PF/Q regulation when LVRT or OVRT is active

When the LVRT or OVRT function is active and the setpoint **DynSupPF/Qctrl (page 472)** is set to position STOPPED, the regulation of PF/Q will be stopped. This means that the output of AVRi (value **VoltRegOut (page 634)**) will be constant. The regulation will be started again when LVRT or OVRT is deactivated (described in the chapter **Activation of the LVRT and OVRT function (page 228)**) or the setpoint **DynSupPF/Qctrl (page 472)** is changed to ACTIVE. This feature is implemented in the 20ms (fast) loop.

VRT curves conditions

1. Time axis of the VRT curves is in seconds, with 2 decimal places, not configurable. Maximum length of the curve is expected to be 120.00 seconds.
2. The voltage axis (y-axis) is by default with 1 decimal place (resolution 0.1). Customer can change the resolution of these voltage axes to 1 or 0.01 and the curve shall be providing the "correct" value.
3. The LVRT curve, y-axis shall be always smaller than 100.0%. Values equal or higher than 100.0% will activate alarm type Wrn:
 - a. Wrn 3pLVRTCrvFail in case of LVRT-3 phase curve
 - b. Wrn 2pLVRTCrvFail in case of LVRT-2 phase curve
 - c. Wrn 1pLVRTCrvFail in case of LVRT-1 phase curve
4. The OVRT curve, y-axis shall be always higher than 100.0%. Values equal or lower than 100.0% means

invalid and will activate the alarm Wrn OVRTCrvFail.

5. Conditions must be valid in case the Setpoint **DynamicSupport** (page 471) is set to ENABLE

3-pole undervoltage failure ride through

Function is called LVRT and the function is defined as dynamic curve which says, that if the mains voltage is on and above the curve the control system is not allowed to release the mains protection.

3-phase means, that the function is evaluated in case all phases are below the curve.

IMPORTANT: As it is mentioned above the evaluation depends on the selected type of voltage protection.

Below the curve it is possible to release the mains protection but it is not "must". The type of issued alarm can be selected by the setpoint **DynSupProtType** (page 471). The selected alarm type is written to the history as a prefix in the alarm name.

LVRT function is in configuration defined as App Curve LVRT-3phase.

The curve is called **LVRT-3phase**. If the curve is not configured, the 3-pole undervoltage failure ride through is not evaluated.

2-pole undervoltage failure ride through

Function is called LVRT and the function is defined as dynamic curve which says, that if the mains voltage is on and above the curve the control system is not allowed to release the mains protection.

2-phase means, that the function is evaluated in case any 2 phases are below the curve.

IMPORTANT: As it is mentioned above the evaluation depends on the selected type of voltage protection. In that case are watched 2 phases from either L1-N, L2-N, L3-N or L1-L2, L2-L3, L3-L1 or even both.

Below the curve it is possible to release the mains protection but it is not "must". The type of issued alarm can be selected by the setpoint **DynSupProtType** (page 471). The selected alarm type is written to the history as a prefix in the alarm name.

LVRT function is in configuration defined as App Curve LVRT-2phase.

The curve is called **LVRT-2phase**. If the curve is not configured, the 2-pole undervoltage failure ride through is not evaluated.

1-pole undervoltage failure ride through

Function is called LVRT and the function is defined as dynamic curve which says, that if the mains voltage is on and above the curve the control system is not allowed to release the mains protection.

1-phase means, that the function is evaluated in case any 1 phase is below the curve.

IMPORTANT: As it is mentioned above the evaluation depends on the selected type of voltage protection. In that case is watched 1 phase from either L1-N, L2-N, L3-N or L1-L2, L2-L3, L3-L1 or even both.

Below the curve it is possible to release the mains protection but it is not "must". The type of issued alarm can be selected by the setpoint **DynSupProtType** (page 471). The selected alarm type is written to the history as a prefix in the alarm name.

LVRT function is in configuration defined as App Curve LVRT-1phase.

The curve is called **LVRT-1phase**. If the curve is not configured, the 1-pole undervoltage failure ride through is not evaluated.

Overvoltage failure ride through

The overvoltage ride through is evaluated as 1-phase.

1-phase means, that the function is evaluated in case any 1 phase is above the curve.

IMPORTANT: As it is mentioned above the evaluation depends on the selected type of voltage protection. In that case is watched 1 phase from either L1-N, L2-N, L3-N or L1-L2, L2-L3, L3-L1 or even both.

The definition is that, if the overvoltage is still on and below the curve the control system is not allowed to release the mains protection. The selected alarm type is written to the history as a prefix in the alarm name.

If the voltage is above the curve is possible to release the mains protection but not "must". The type of issued alarm can be selected by the setpoint **DynSupProtType** (page 471).

OVRT is in configuration defined by App Curve OVRT.

The curve is called **OVRT**. If the curve is not configured, the overvoltage failure ride through is not evaluated.

Undervoltage/Overvoltage after 5 s of VRT

If the mains voltage is 5 seconds after the beginning of VRT still out of the voltage band which is given by the last point of the LVRT curve and the last point of the OVRT curve, there could be still the circuit breaker threaten by release of their protection evaluated unit.

In that case we have to correct the situation by changing the actual power to keep the circuit breaker close.

Controller has to be switched into special control mode, where it watches the actual generator current and compares it with the nominal current. In case the generator current is higher than the nominal current then the actual active power P must be reduced until the generator current is not higher than nominal.

The reduction of the actual active power P and the LBO: **PostVRT** (PAGE 830) are active when all following conditions are fulfilled:

- More than 5 seconds have passed from the activation of LVRT or OVRT (the activation is indicated by the LBO: **LVRT ACTIVE** (PAGE 787) and LBO: **OVRT ACTIVE** (PAGE 828)).
- Less than 65 seconds have passed from the activation of LVRT or OVRT (the activation is indicated by the LBO: **LVRT ACTIVE** (PAGE 787) and LBO: **OVRT ACTIVE** (PAGE 828)).
- LVRT or OVRT is still active.
- The generator current is higher than the nominal current.
- The Gen-set is in the Parallel to Mains operation.

When there is no reason to reduce the power (Voltage is in limits, time 60 seconds is counted), the power must be back in previous load within 6 seconds, this must be solved with extra event.

Behavior in MINT application

For MINT application is this function solved in cooperation with Mains and Gen-set controller, because the Mains controller doesn't have a information whether the Gen-set breaker is overloaded or not.

In MINT application Mains controller reacts on the VRT and send this information (via shared signals) to Gen-set controller, the Gen-set controller will correct his local baseload during the signal from mains controller to keep the Gen-set current in correct range as is described above.

After these 60 seconds the signal from mains controller is deactivated and Gen-sets are so far controlled from mains controller and the overload protection is standardly evaluated.

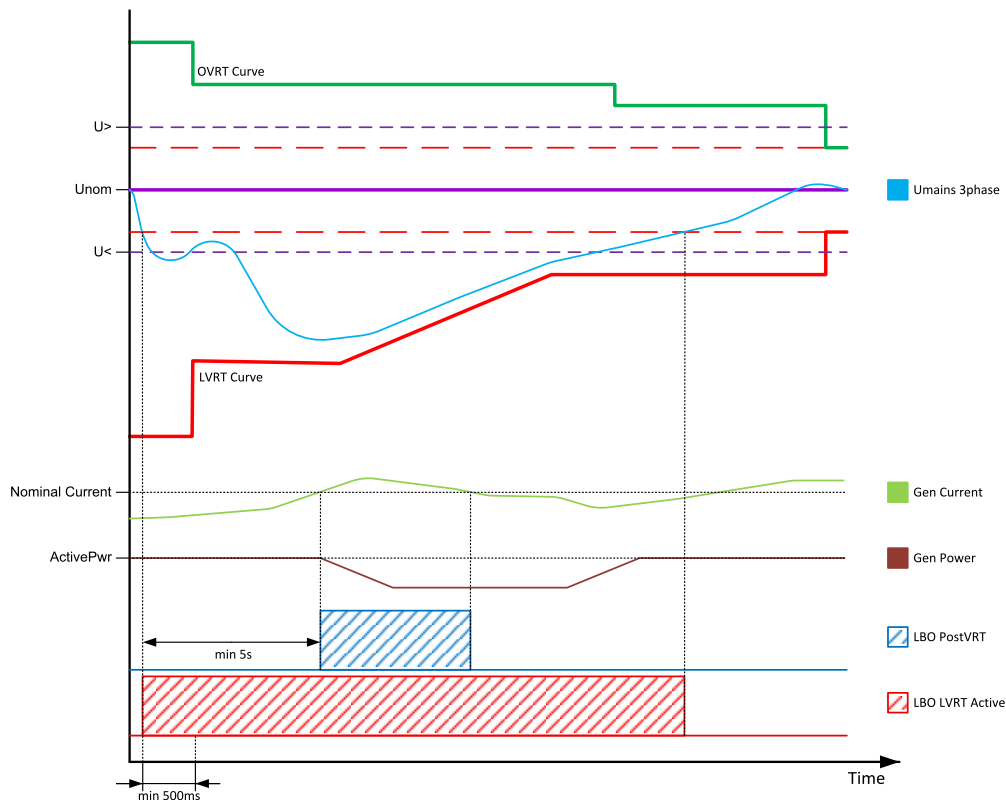


Image 5.39 Post VRT graph

Reactive power control

PF control based on actual Gen-set power

PF(Pm) regulation

Reactive power shall be able to adjust itself automatically in correspondence to predefined PF upon a change in the active power.

For activation of this function setpoint: Process Control: **PF/Qctrl PtM (page 328)** has to be switched to PF (Pm). In this case the power factor is controlled based on actual generator power. In this case the required power factor will be controlled via User sensor curve PF(P) prepared in GenConfig.

If there is requirement for control the power factor from imported/exported power to the mains, setpoint: Process Control: **PF/Qctrl IM/EX (page 329)** has to be switched to ENABLED.

Actual required value of power factor is visible in values: **PF(P) Curve (page 625)** and **Required PF3dc (page 636)**.

The curve is defined as:

- > x-axis – **Act power (page 592)/InstalledPower (page 346)*100**
- > y-axis – **Required PF (page 636)**

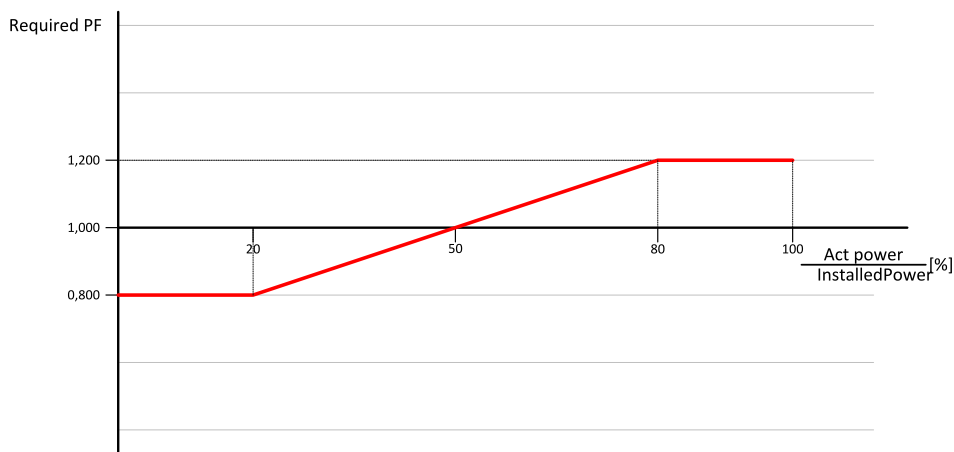


Image 5.40 PF(Pm) curve example

Note: In case the setpoint **PF/Qctrl ANEXT** (page 329) is switched to **ENABLED** the **Wrn PF(P)Fail** is immediately activated because the **PF'(Pm)** mode is not able to control via **LAI**. The actual mode is internally "forced" to the mode **PF control** and this mode will be active until the reason of this protection is not anymore and the alarm is confirmed.

Note: The **Wrn PF(P)Fail** gets active also when the **PF(P)** curve is not configured or the resolution of the curve is other than 0.001.

PF-Import/Export(Pm) regulation

If there is requirement for control of the power factor based on imported/exported power to the mains, setpoint: Process Control: **PF/Qctrl PtM** (page 328) has to be switched to **PF(Pm)** and the **PF/Qctrl IM/EX** (page 329) has to be switched to **ENABLED**.

Because this function works for imported and exported power as well, x-axis is used in range -100 % to +100 % of nominal power to mains (**P mains** (page 606)).

Y-axis shows power factor measured on the mains site.

Actual required value of power factor is visible in values: **PF(P) Curve** (page 636) and **Required PF** (page 636).

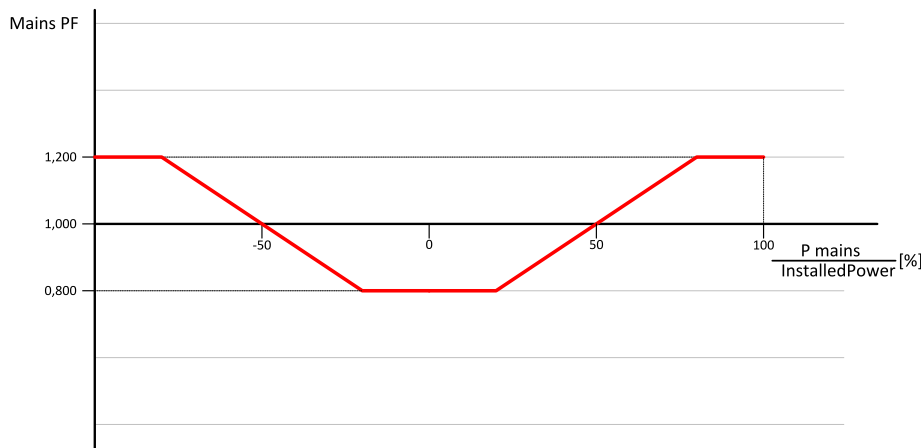


Image 5.41 PF-IM/EX(Pm) curve example

In case import/export mode is chosen and the setting is not correct or the Mains import is not measured. The alarm Wrn PFQ IE Fail gets active and the requested value is taken from setpoint **Base PF** (page 326).

Q control

Q control – fixed Q required

There is requirement for capacitive or inductive required reactive power.

For activation of this function setpoint: Process Control: **PF/Qctrl PtM** (page 328) has to be switched to Q control.

Required reactive power can be adjusted with setpoint: Process Control: **Base Q** (page 326) and actual relative value of required reactive power is visible in Values: Voltage/PF Control: **Required Qrel** (page 635).

Fixed Q required via analog input

Required reactive power can be also adjusted via analog value.

For activation of this function setpoint: Process Control: **PF/Qctrl PtM** (page 328) has to be switched to Q control and **PF/Qctrl ANEXT** (page 329) has to be switched to ENABLED.

Required reactive power can be adjusted with LAI: **PFCTRL:ANExBQ** (PAGE 889).

In case the LAI: **PFCTRL:ANExBQ** (PAGE 889) is not configured or contains invalid value than BASEQ control is used and the Wrn QctrlFail is activated.

Q – Import/Export

In the mode setpoint: Process Control: **PF/Qctrl PtM** (page 328) – Q control, **PF/Qctrl IM/EX** (page 329) – ENABLED the controller controls reactive power to maintain constant imported or exported reactive power.

Required reactive power is set by fixed setpoint: Process Control: **Import Q** (page 327).

Note: In case of Import/Export functions has to be used either current measurement on L3 on mains site or LAI: **PFCTRL:I/E-QM** (PAGE 890)) and the setpoint: Process Control: **I/E-Qm meas** (page 330) must be set accordingly otherwise the alarm Wrn PFQ IE Fail gets active and the requested value is taken from setpoint Base Q.

Analog External Q – Import/Export

In the mode setpoint: Process Control: **PF/Qctrl PtM** (page 328) – Q control, **PF/Qctrl IM/EX** (page 329) – ENABLED, **PF/Qctrl ANEXT** (page 329) – ENABLED the controller controls reactive power to maintain constant imported or exported reactive power given by logical analog inputs.

Required reactive power is set by external value configured in GenConfig: LAI: **PFCTRL:ANEXI/E** (PAGE 890).

Note: In case of Import/Export functions has to be used either current measurement on phase L3 on mains site or LAI: **PFCTRL:I/E-QM** (PAGE 890) and the setpoint: Process Control: **I/E-Qm meas** (page 330) must be set accordingly.

Q(Um) control

Q(Um) – regulation

Gen-set reactive power is regulated based on actual mains voltage when the setpoint: Process Control: **PF/Qctrl PtM** (page 328) is switched to Q(Um).

To enable the Q(Um) regulation mode it is required to set the value SAMAX (maximal apparent power of a generator) which is given by setpoint: Process Control: **Samax** (page 346). Q(Um) regulation is then given by configured curve Q(Um) adjusted as User sensor curve in GenConfig.

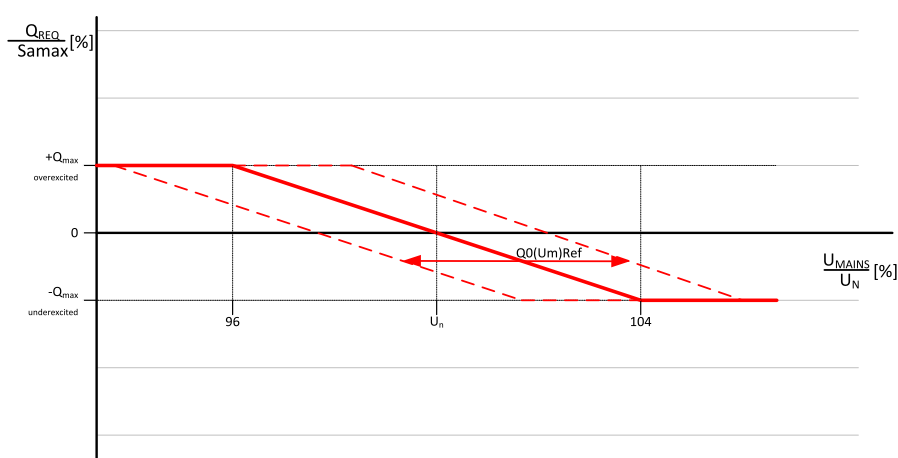


Image 5.42 Q(Um) regulation

Axis X is ratio of actual mains voltage **Mains V** (page 604) or if there is measurement of middle voltage and the LAI: **MAINSMidVOLT** (PAGE 886) is configured then related mains voltage is visible as value **Mains Mid V** (page 611) with nominal mains voltage given by setpoint: Basic settings: **MainsNomMidV** (page 360).

Axis Y is ratio of required reactive power with setpoint **Samax** (page 346).

Mains voltage can be measured on Mains Voltage terminals and specified by setpoint: Basic settings: **Mains V** (page 604) or Mains medium voltage measured via LAI: **MAINSMidVOLT** (PAGE 886) configured in GenConfig and specified by setpoint: Basic settings: **MainsNomMidV** (page 360).

Increasing or decreasing of the mains voltage causes the change of required reactive power, this value is visible in values: Grid Codes: **Q(Um) Curve** (page 624) which shows the immediate value.

Actual reactive power is changed according to ramp which is defined by setpoint: Grid Codes: **Q Ramp** (page 472) and actual value is visible in values: Voltage/PF Control: **Required Qrel** (page 635).

Note: In case the Q(Um) curve is not configured or is wrongly adjusted the Base Q control mode is used and the **Wrn Q(Um)Fail** alarm is activated or the curve resolution is other than 1.

Q(Um) curve offset

The Q(Um) curve can be moved by adjusting the setpoint **Q0(Um)ref** (page 474), this setpoint moves the reference point of mains nominal voltage.

There is implemented **Q(Um)DeadBand** (page 474) which is deadband for measured mains voltage in case

the mains voltage changes to fast.

Q(Um) curve offset via analog input

By configuration LAI **PFCTRL:ANEXQ0UMREF** (PAGE 892) can be the Q(Um) curve moved via analog input.

The **PF/Qctrl PtM** (page 328) must be switched to Q(Um), **PF/Qctrl ANEXT** (page 329) – must be switched to ENABLED.

Q-Import/Export(Um) – regulation

Imported or exported mains reactive power Q_m is changed based on actual mains voltage.

This mode is activated by the setpoint: Process Control: **PF/Qctrl PtM** (page 328) – Q(Um), **PF/Qctrl IM/EX** (page 329) – ENABLED.

To enable the Q(Um) regulation mode it is required to set the value **SAMAX** (maximal apparent power of a generator) which is given by setpoint: Process Control: **Samax** (page 346). Q(Um) regulation is then given by configured curve Q(Um) adjusted as User sensor curve in GenConfig.

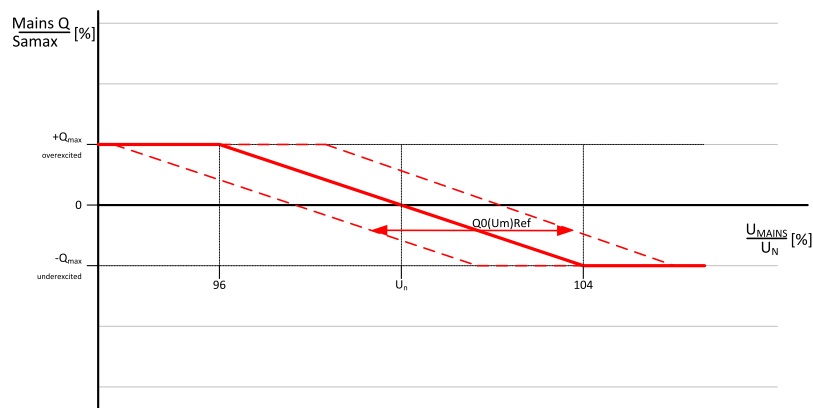


Image 5.43 Q(Um) regulation

Axis X is ratio of actual mains voltage **Mains V** (page 604) or if there is measurement of middle voltage and the LAI: **MAINSMIDVOLT** (PAGE 886) is configured then related mains voltage is visible as value **Mains Mid V** (page 611) with nominal mains voltage given by setpoint: Basic settings: **MainsNomMidV** (page 360).

Axis Y is ratio of required reactive power with setpoint **Samax** (page 346).

As mains voltage is used either nominal voltage measured on Mains Voltage terminals and specified by setpoint: Basic settings: **MainsNomV** (page 352) and **Vm VT ratio** (page 350) or nominal middle voltage measured via LAI: **MAINSMIDVOLT** (PAGE 886) configured in GenConfig and specified by setpoint: Basic settings: **MainsNomMidV** (page 360) and **VmMid VT ratio** (page 350).

Increasing or decreasing of the mains voltage cause the change of required reactive power, this value is visible in values: Grid Codes: **Q(Um) Curve** (page 624) which shows the immediate value.

Note: If the **QUCurve** is not configured, power factor is controlled as chosen mode Q control and the **Wrn Q (Um)Fail** is activated or the curve resolution is other than 1.

Actual reactive power is changed according to ramp which is defined by setpoint: Grid Codes: **Q Ramp** (page 472) and actual value is visible in values: Voltage/PF Control: **Required Qrel** (page 635).

Q(Um) import/export curve offset

The Q(Um) curve can be moved by adjusting the setpoint **Q0(Um)ref** (page 474), this setpoint moves the reference point of mains nominal voltage.

There is implemented **Q(Um)DeadBand** (page 474) which is deadband for measured mains voltage in case the mains voltage changes to fast.

Q(Um) import/export curve offset via analog input

By configuration LAI **PFCTRL:ANEXQ0UMREF** (PAGE 892) can be the Q(Um) curve moved via analog input.

The **PF/Qctrl PtM** (page 328) must be switched to Q(Um), **PF/Qctrl ANEXT** (page 329) – must be switched to ENABLED, **PF/Qctrl IM/EX** (page 329) – must be switched to ENABLED.

Q(P) – Q control based on actual Gen-set power

Q(P) regulation

Reactive power shall be able to adjust itself automatically in correspondence to predefined Q upon a change in the active power.

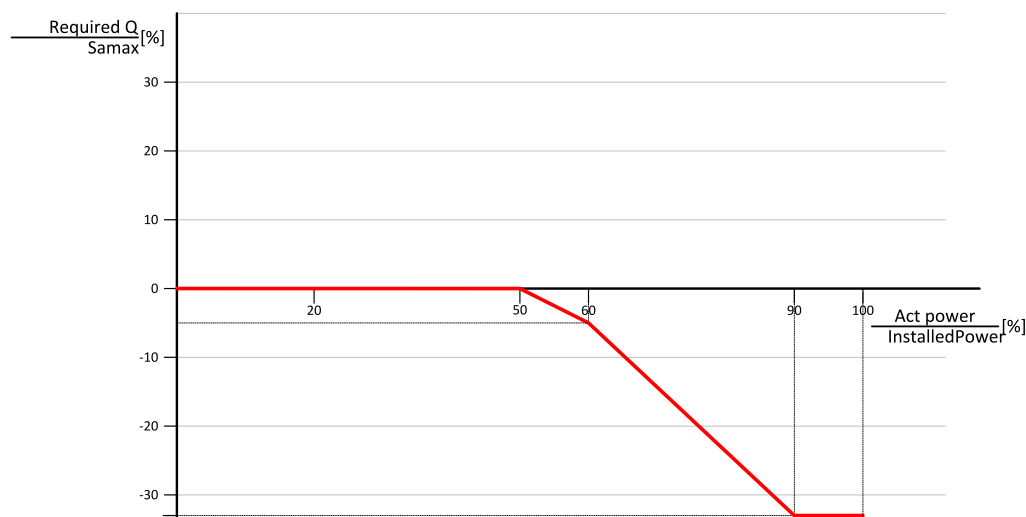
For activation of this function setpoint: Process Control: **PF/Qctrl PtM** (page 328) has to be switched to Q(P). In this case the power factor is controlled based on actual generator power. In this case the required power factor will be controlled via User sensor curve Q(P) prepared in GenConfig.

The curve is defined as:

- > x-axis – **Act power (page 592)/InstalledPower (page 346)*100**
- > y-axis – **Required Q (page 635)**

If there is requirement for control the power factor from imported/exported power to the mains, setpoint: Process Control: **PF/Qctrl IM/EX** (page 329) has to be switched to ENABLED.

Actual required value of power factor is visible in values: **Q(P) Curve (page 625)** and **Required Q (page 635)**.



Note: In case the setpoint **PF/Qctrl ANEXT** (page 329) is switched to ENABLED the **Wrn Q(P)Fail** is immediately activated because the Q(Pm) mode is not able to control via LAI. The actual mode is internally "forced" to the mode Q control and this mode will be active until the reason of this protection is not anymore and the alarm is confirmed.

Note: The **Wrn Q(P)Fail** gets active also when the Q(P) curve is not configured or the curve resolution is other than 1.

Q-Import/Export(P) regulation

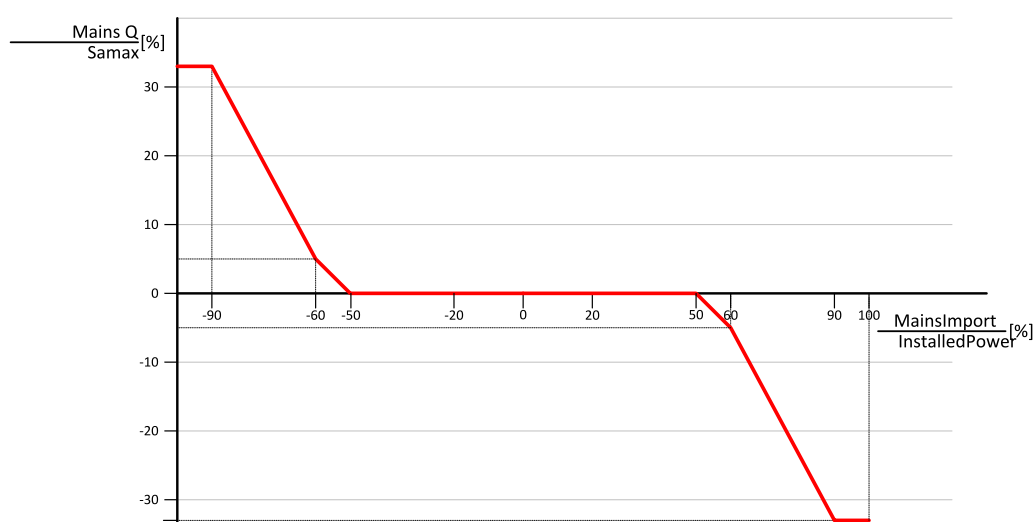
If there is requirement for control of the reactive power based on imported/exported power to the mains, setpoint: Process Control: **PF/Qctrl PtM (page 328)** has to be switched to Q(P) and the **PF/Qctrl IM/EX (page 329)** has to be switched to ENABLED.

Because this function works for imported and exported power as well, x-axis is used in range -100 % to +100 % of nominal power to mains (**P mains (page 606)**).

Y-axis shows power factor measured on the mains site.

Actual required value of power factor is visible in values: **Q(P) Curve (page 625)** and **Required Q (page 635)**.

Note: In case import/export mode is chosen and the setting is not correct or the Mains import is not measured. The alarm **Wrn PFQ IE Fail** gets active and the requested value is taken from setpoint **Base PF (page 326)**.



Qref/Ulim

Qref/Ulim – regulation

Gen-set reactive power is regulated based on actual mains voltage when the setpoint: Process Control: **PF/Qctrl PtM (page 328)** is switched to Qref/Ulim.

To enable the Q(Um) regulation mode it is required to set the value SAMAX (maximal apparent power of a generator) which is given by setpoint: Process Control: **Samax (page 346)**. Q(Um) regulation is then given by configured curve Q(Um) adjusted as User sensor curve in GenConfig.

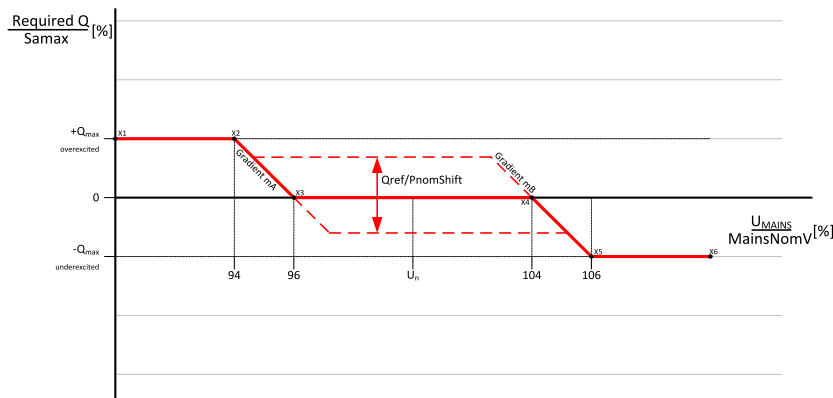


Image 5.44 Q(Um) regulation

Axis X is ratio of actual mains voltage **Mains V** (page 604) or if there is measurement of middle voltage and the LAI: **MAINSMidVOLT** (PAGE 886) is configured then related mains voltage is visible as value **Mains Mid V** (page 611) with nominal mains voltage given by setpoint: Basic settings: **MainsNomMidV** (page 360) .

Axis Y is ratio of required reactive power with setpoint **Samax** (page 346).

Mains voltage can be measured on Mains Voltage terminals and specified by setpoint: Basic settings: **MainsNomV** (page 352) and **Vm VT ratio** (page 350) or Mains medium voltage measured via LAI: **MAINSMidVOLT** (PAGE 886) configured in GenConfig and specified by setpoint: Basic settings: **MainsNomMidV** (page 360) and **VmMid VT ratio** (page 350).

Increasing or decreasing of the mains voltage causes the change of required reactive power, this value is visible in values: Grid Codes: **QrefUlim Curve** (page 625) which shows the immediate value.

Actual reactive power is changed according to ramp which is defined by setpoint: Grid Codes: **Q Ramp** (page 472) and actual value is visible in values: Voltage/PF Control: **Required Qrel** (page 635).

Note: In case the Qref/Ulim curve is not configured or is wrongly adjusted the Base Q control mode is used and the Wrn QrfUlimFail alarm is activated or the curve resolution is other than 1.

Qref/Ulim curve offset

The Qref/Ulim curve can be moved by adjusting the setpoint **Qref/PnomShift** (page 475), this setpoint moves the reference point of mains nominal voltage.

There is implemented **QrefUlimDdBand** (page 476) which is deadband for measured mains voltage in case the mains voltage changes to fast.

Qref/Ulim curve offset via analog input

By configuration LAI **PFCTRL:ANEXQREF/PNOM** (PAGE 893) can be the Qref/Ulim curve moved via analog input.

The **PF/Qctrl PtM** (page 328) must be switched to Qref/Ulim, **PF/Qctrl ANEXT** (page 329) – must be switched to ENABLED.

Qref/Ulim-Import/Export – regulation

Imported or exported mains reactive power Qm is changed based on actual mains voltage.

This mode is activated by the setpoint: Process Control: **PF/Qctrl PtM** (page 328) – Qref/Ulim, **PF/Qctrl IM/EX** (page 329) – ENABLED.

To enable the Q(Um) regulation mode it is required to set the value SAMAX (maximal apparent power of a generator) which is given by setpoint: Process Control: **Samax** (page 346). Q(Um) regulation is then given by configured curve Q(Um) adjusted as User sensor curve in GenConfig.

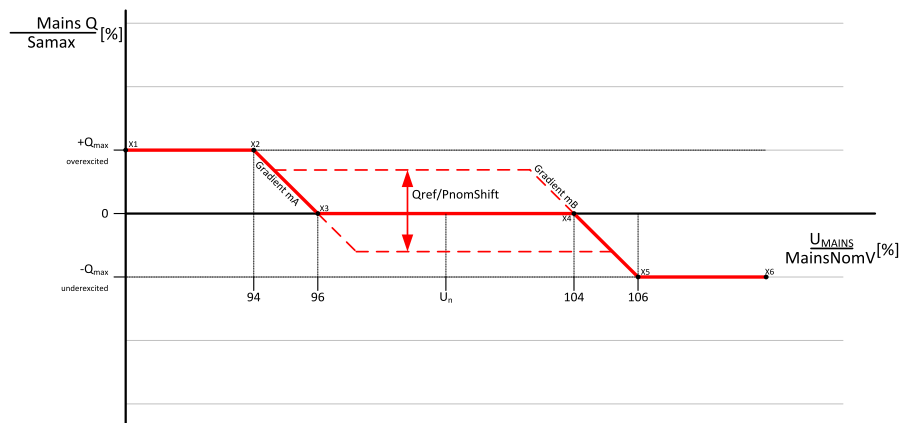


Image 5.45 Q(Um) regulation

Axis X is ratio of actual mains voltage **Mains V** (page 604) or if there is measurement of middle voltage and the LAI: **MAINSMidVOLT** (PAGE 886) is configured then related mains voltage is visible as value **Mains Mid V** (page 611) with nominal mains voltage given by setpoint: Basic settings: **MainsMidVolt** (page 886).

Axis Y is ratio of required reactive power with setpoint **Samax** (page 346).

As mains voltage is used either nominal voltage measured on Mains Voltage terminals and specified by setpoint: Basic settings: **MainsNomV** (page 352) and **Vm VT ratio** (page 350) or nominal middle voltage measured via LAI: **MAINSMidVOLT** (PAGE 886) configured in GenConfig and specified by setpoint: Basic settings: **MainsNomMidV** (page 360) and **VmMid VT ratio** (page 350).

Increasing or decreasing of the mains voltage cause the change of required reactive power, this value is visible in values: Grid Codes: **QrefUlim Curve** (page 625) which shows the immediate value.

Note: If the QUCurve is not configured, power factor is controlled as chosen mode Q control and the Wrn Qref/UlimFail is activated or the curve resolution is other than 1.

Actual reactive power is changed according to ramp which is defined by setpoint: Grid Codes: **Q Ramp** (page 472) and actual value is visible in values: Voltage/PF Control: **Required Qrel** (page 635).

Qref/Ulim import/export curve offset

The Qref/Ulim curve can be moved by adjusting the setpoint **Qref/PnomShift** (page 475), this setpoint moves the reference point of mains nominal voltage.

There is implemented **QrefUlimDdBand** (page 476) which is deadband for measured mains voltage in case the mains voltage changes too fast.

Qref/Ulim import/export curve offset via analog input

By configuration LAI **PFCTRL:ANEXQRFI/EPNOM** (PAGE 894) can be the Qref/Ulim curve moved via analog input.

The **PF/Qctrl PtM** (page 328) must be switched to Qref/Ulim, **PF/Qctrl ANEXT** (page 329) – must be switched to ENABLED, **PF/Qctrl IM/EX** (page 329) – must be switched to ENABLED.

P(Um) function

Active power request based on the actual mains voltage P(U)

Actual active power is controlled by the actual mains voltage.

Application curve

The active power regulation is based on the curve App Curve P(Um)

The curve defines the point of over voltage where the active power starts to be reduced.

When the function is enabled but the App Curve P(Um) is not configured or is invalid (the resolution is other than 1), the alarm P(Um)Fail (alarm type: Warning) will be issued.

There will be a new value value **Pmom/Pave (page 634)**. When the function is enabled, this value will show the actual calculated value of the P(Um) curve.

Event

- Setpoint **P(Um)Pr (page 463)** which defines the priority of the event in case there are more events active at the same time
- Setpoint **P(Um) (page 466)** which is a sets the requested ramp
- LBO **P(UM) (PAGE 833)** which is active in case there is power reduced by the mains voltage

Power ramp filter

In some grid code requirements can be requested, that the ramping of the active power is not due the linear ramp but due to PT1 filter.

Note: The *Wrn P(Um)Fail* gets active when the *P(Um)* curve is not configured or the resolution of the curve is other than 1.

Connection conditions and synchronization

Network reconnection conditions

Common requirements

Mains Voltage on the mains connection point must be between 90 % and 110 % Unom, value is based on the lowest value of phase-phase voltage.

Mains frequency on the mains connection point must be between 47.5 Hz and 50.2 Hz.

This requirements are present in the configuration as following setpoints.

- Grid Codes: **MainsSyncVMax** (page 477) [MainsSyncVMin - 130]% of Mains Nominal voltage. Parameter defines maximum allowable Mains voltage to be able to allow connection to the grid.
- Grid Codes: **MainsSyncVMin** (page 477) [10 - MainsSyncVMax]% of Mains Nominal voltage. Parameter defines minimum allowable Mains voltage to be able to allow connection to the grid.
- Grid Codes: **MainsSyncFMax** (page 478) [0.00 – 52.0] Hz. Parameter defines maximum allowable Mains frequency to be able to allow connection to the grid.
- Grid Codes: **MainsSyncFMin** (page 478) [47.5– 0.00] Hz. Parameter defines minimum allowable Mains frequency to be able to allow connection to the grid.
- Grid Codes: **MainsSyncDel** (page 478) [0 – 1800] s. This parameter defines the minimum time the mains voltage and frequency must stay in limits to allow connection to the grid.

In case the mains values are out of these limits, Gen-set will not be started and if the Gen-set is already running the Alarm **SyncNotAllowed** is activated and the Gen-set is forced to stop (Start/stop signal is deactivated). In the MAN mode, the Gen-set can be always started, regardless of these requirements.

IMPORTANT: These requirements are valid only in case the synchronization to the mains is ENABLED (ParallelEnable (page 337) = YES).

Note: In parallel mode is this protection no more evaluated.

Note: The alarm **SyncNotAllowed** is active only until the Gen-set is running, when the Gen-set is stopped the Alarm is deactivated.

Note: The value **SyncAllowTim** (page 621) shows time when the synchronization will be allowed.

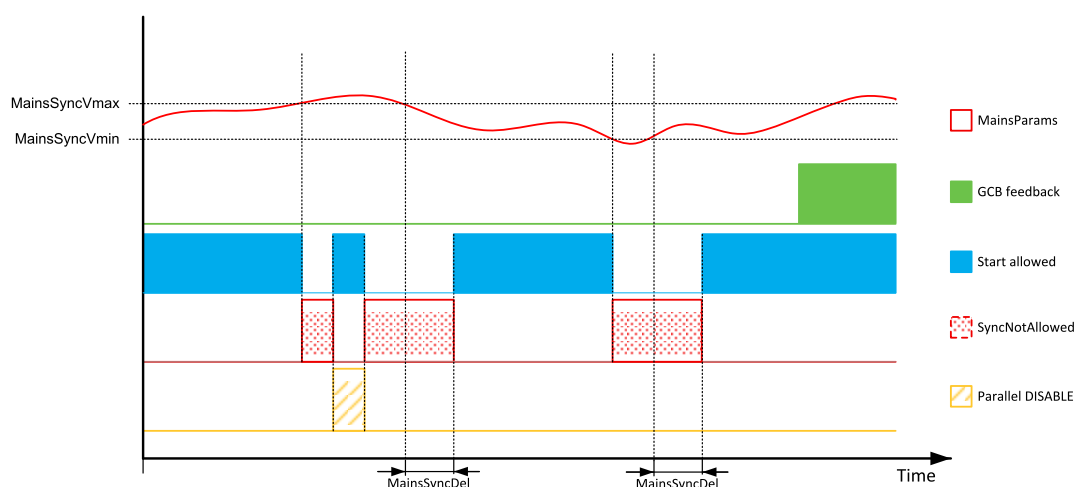


Image 5.46 MainsSyncAllow

Mains connection and synchronization after mains fail

When the mains fail happens (mains protection active) there is a requirement to prevent the connection to the unstable mains.

In this situation there are another limits to evaluate the stability of the mains.

The limits are given by following setpoints:

- Grid Codes: **MP SyncVMax (page 479)** [MainsSyncVMin – 130]% of Mains Nominal voltage. Parameter defines maximum allowable Mains voltage to be able to allow reconnection to the grid.
- Grid Codes: **MP SyncVMin (page 479)** [10 – MainsSyncVMax]% of Mains Nominal voltage. Parameter defines minimum allowable Mains voltage to be able to allow reconnection to the grid.
- Grid Codes: **MP SyncFMax (page 479)** [MainsSyncFMin – 52.0] Hz. Parameter defines maximum allowable Mains frequency to be able to allow reconnection to the grid.
- Grid Codes: **MP SyncFMin (page 479)** [47.5 – MainsSyncFMax] Hz. Parameter defines minimum allowable Mains frequency to be able to allow reconnection to the grid.
- Grid Codes: **MP SyncDel (page 480)** [0 – 1800] s. This parameter defines the minimum time the mains voltage and frequency must stay in limits to allow connection to the grid after mains failure.

After mains return the alarm **SyncNotAllowed** is activated. It is deactivated when the mains value are inside these limits for the time **MP SyncDel (page 480)**.

When the mains values go outside these limits, the **MP SyncDel (page 480)** time is reset until the values are back in the limits, then the timer starts to count again from beginning.

IMPORTANT: These requirements are valid only in case the synchronization to the mains is **ENABLED** (ParallelEnable (page 337) = YES).

Note: The value **SyncAllowTim (page 621)** shows time when the synchronization will be allowed.

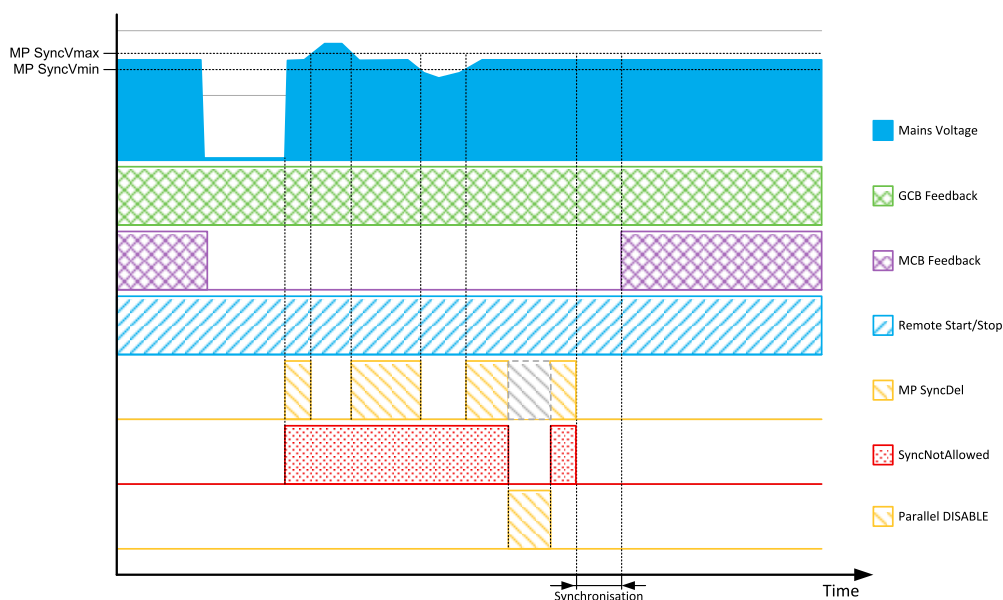


Image 5.47 Reconnection after mains fail MCB off and GCB on

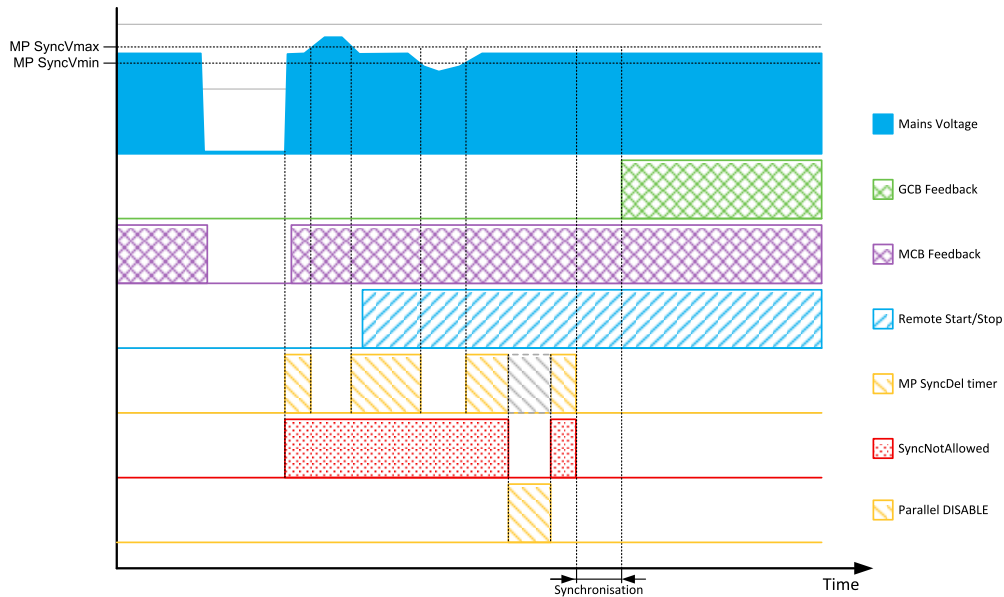


Image 5.48 Reconnection after mains fail MCB on and GCB off

New power factor and reactive power limitation

The alternator operation area was so far restricted by fix borders and it was possible to require PF in range 0.6L up to 0.8C.

It is possible to adjust the alternator operation area in more details, using the graphical curve in GenConfig: User sensors – curve: CapabilityQ L (for inductive operation area) and CapabilityQ C (for capacitive operation area).

The curves represent inductive and capacitive halves of the PQ diagram, where on the x-axis there is the ratio: $P_{actual}/P_{nominal}$ and on the y-axis there is the ratio: $Q_{actual}/Q_{nominal}$. The $P_{nominal}$ is defined by setpoint: Basic settings: **Nomin power (page 345)**, the $Q_{nominal}$ is defined by setpoint: Basic settings: **Samax (page 346)**.

The CapabilityQ L and CapabilityQ C curves have the following default shape, which correspond to the original limits of 0.6L and 0.8C.

Note: These curves can be adjusted based on the alternator operation area.

Note: The *Wrn CapabQLCrvFail* gets active when the Capability QL curve is not configured or the resolution of the curve is other than 1.

Note: The *Wrn CapabQCCrvFail* gets active when the Capability QC curve is not configured or the resolution of the curve is other than 1.

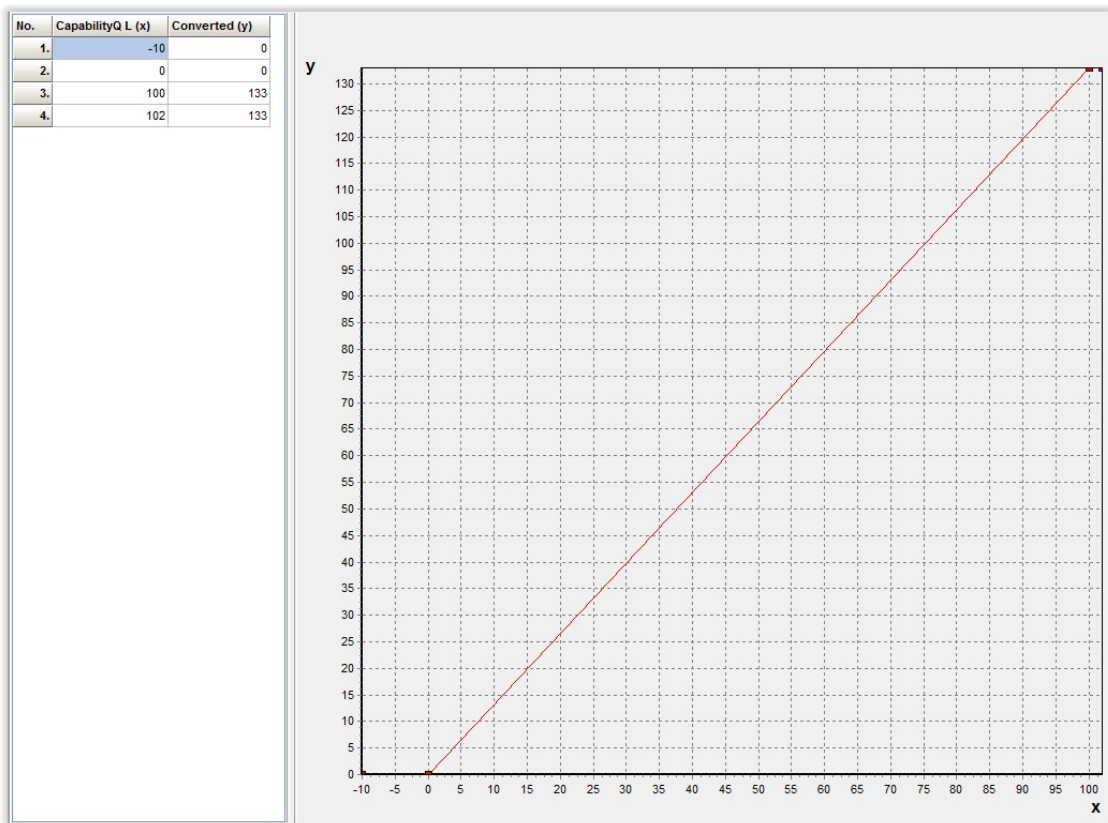


Image 5.49 CapabilityQ L

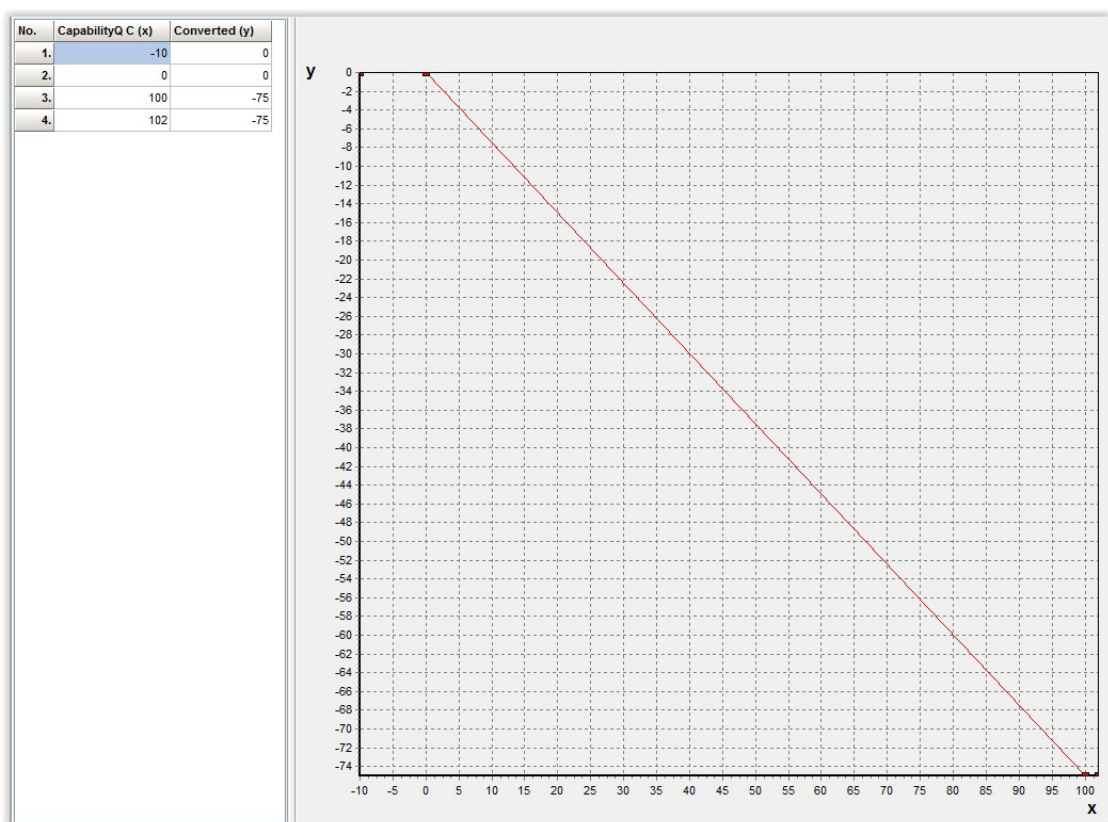


Image 5.50 CapabilityQ C

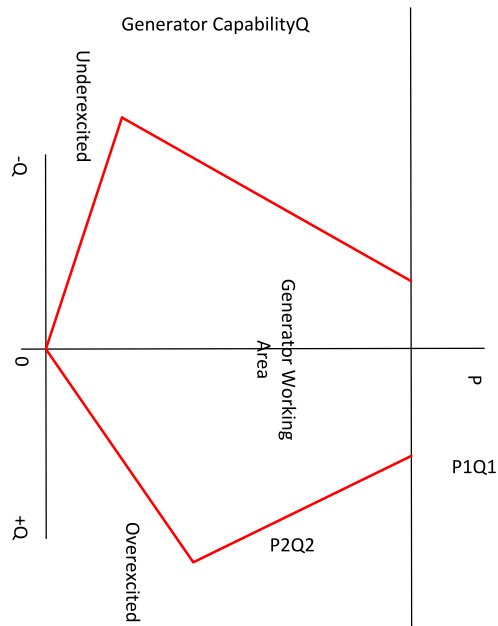


Image 5.51 Example of generator working area

PforQ function

The Grid codes connection requirements, namely for the Medium voltage system, require a possibility of Gen-set active power reduction in order to achieve given, required Reactive power.

This function, restricting the Active power in order to achieve the required Reactive power is enabled by setpoint: Grid Codes: **PforQ limit** (page 476) with options: ENABLED / DISABLED, by default set to DISABLED.

As first we have to define the generator operating area.

Reactive power establishment in case of nominal power

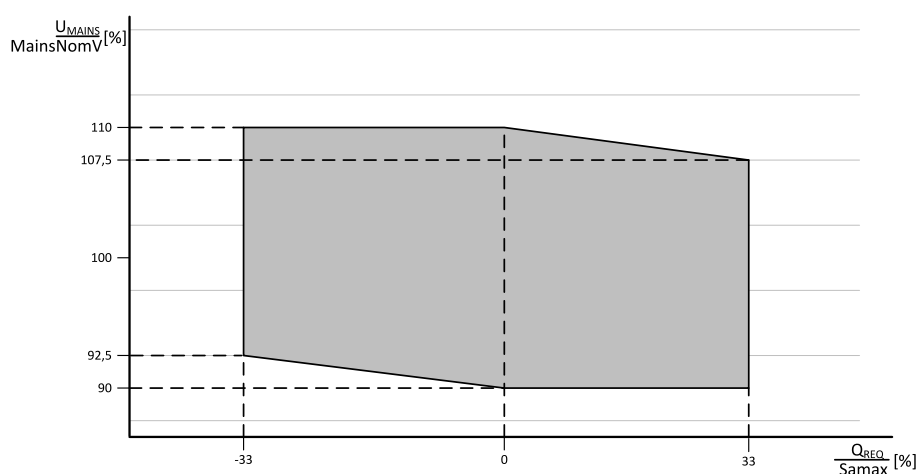


Image 5.52 UQ area

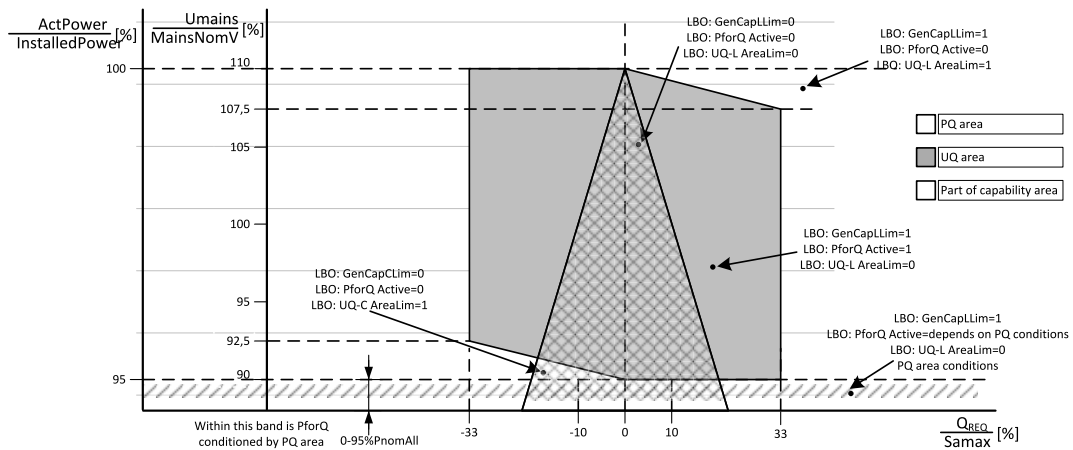


Image 5.53 PforQ in UQ area

Each unit has to be able to reach the above mentioned requirements.

The reactive power requirement is in dependent on the value of mains voltage in compare to nominal mains voltage.

Active power could be reduced only in case the dependence of reactive power on the mains voltage will be inside the grey area.

Area for function is defined by user curve configurable in GenConfig.

Nominal power is taken as 5% dead band around the setpoint nominal power.

We will have 2 curves, one for L part and one for C part

- > UQ-L curve – x is U_{mains} (%), y is Q (%)
- > UQ-C curve – x is U_{mains} (%), y is Q (%)

First part of value defines the required reactive power Q and second part defines the mains voltage reference to nominal U_{mains} .

This area defines which Q i have to be able to reach.

I have other inputs of Q regulation and this Q will be limited by this area.

Example: We have from some other function request to run the Gen-set with some capacitive value of Q (over excited, übererregt). Afterwards the mains voltage changes to 1.1 of nominal U_{mains} . In this case the working area UQ limits the Q, that i am not allowed to run any capacitive value of Q.

Note: The *Wrm UQcurveFail* gets active when the UQ curve is not configured or the resolution of the curve is other than 1.

Reactive power establishment in case the actual power is below the nominal power

When the actual power is under the nominal power the actual power is allowed to reduce only in case the final point will fulfill the P/Q diagram below:

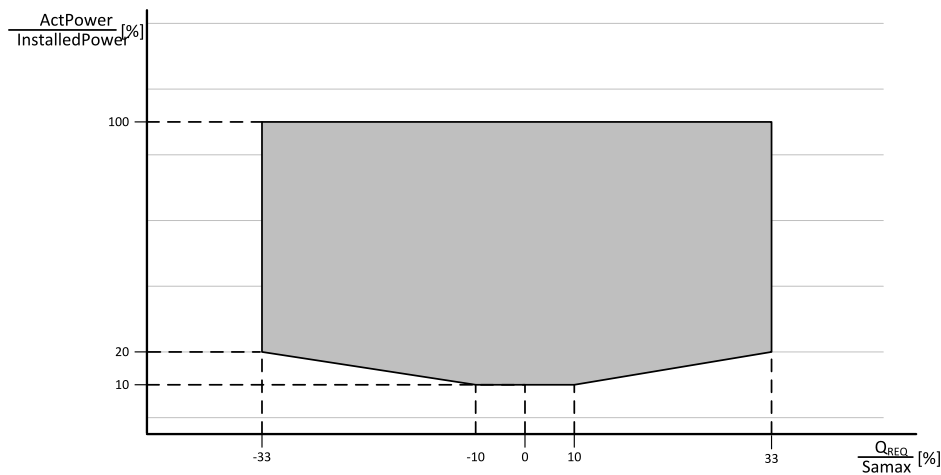


Image 5.54 PQ curve

Note: When the actual power is below the 0.1 of nominal power, the power reduction is not required but there is possible to keep the hatched area. (This is in case of Gen-sets mostly irrelevant because most of Gen-sets are limited on minimum running power)

The area is defined by next 2 user curves:

- PQ-L curve – x is P (%), y is Q (%)
- PQ-C curve – x is P (%), y is Q (%)

First part of value defines the required reactive power Q and second part defines the actual power value.

This area defines which Q i have to be able to reach.

I have other inputs of Q regulation and this Q will be limited by this area.

Generally the both areas are as limited areas to the adjusted generator working area in the configuration tool.

We can imagine the functionality as picture bellow

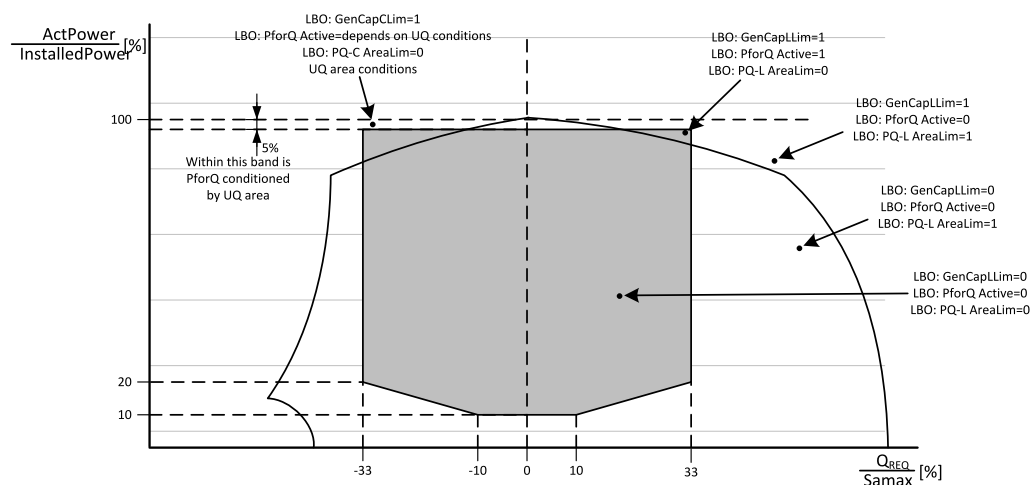


Image 5.55 PforQ with PQ area

Here is clearly visible, that the area allow us to run with 0.33C or L of Q until the nominal power, but because of the generator operating area it is not possible, we can reduce the power to reach the nearest point of Q by highest P.

In other words, this limitation also says, that I am not strictly forced to run or limit my active power to reach the Q which is higher than is in the grey area defined.

The power reduction ramp is defined by PforQ event.

Note: The Wrm PQcurveFail gets active when the PQ curve is not configured or the resolution of the curve is other than 1.

New ramps used for Gen-set loading/unloading

Active power ramps

Due to various requirements from Grid code authority we have to change the actual power request.

These events describes the situation when should be actual active power reduced to some of these requirements.

We have 12 different situations = Events when the active power has to be ramped either up or down. There is Always the LBO corresponding with this event.

- Event1 – LBO MAINSFRQRISE (PAGE 788) – activated in case the mains frequency is increasing in ranges 50.2 → 52.5 Hz and from 47.5 → 49.8 Hz.
- Event2 – LBO MAINSFRQFALL (PAGE 787) – activated in case the mains frequency has falling tendency in ranges 52.5 Hz → 50.2 Hz and from 49.8 → 47.5 Hz.
- Event3 – LBO LOADREDUCT (PAGE 785) – activated in case the load is reduce due to activation of LBI Load Reduct 1-4 or LAI Load Reduction and event is valid only until the actual power is equal to Load Reduct request. This behavior is due to connection to statistic.
- Event4 – LBO MAINSTRIPPER (PAGE 788) – activated after the mains trip after evaluation of mains protection
- Event5 – LBO PFORQ (PAGE 829) – activated in case the active power P has to be reduced to reach required Q
- Event6 – LBO SOFTUNLOAD (PAGE 842) – standard soft unload
- Event7 – LBO PWRREDUCTACTA (PAGE 834) – activated when the function Power reduction channel A is active
- Event8 – LBO PWRREDUCTACTB (PAGE 834) – activated when the function Power reduction channel B is active
- Event9 – LBO PWRREDUCTACTC (PAGE 835) – activated when the function Power reduction channel C is active
- Event10 – LBO POSTVRT (PAGE 830) – activated in case the LVRT or OVRT is active. In this case could be increased the current over the nominal value and it can lead to opening the breaker. To prevent this, the active power has to be reduced according to nominal current.
- Event11 – LBO RETOVUNFREQ (PAGE 840) – activated when there was a situation of over or under frequency and now is the mains frequency back in the safety range 49.8-50.2 Hz. In this situation is counted internal timer for 600 s. Any power change is possible with ramp given by this event.
- Event12 – LBO P(UM) (PAGE 833) – activated when the P has to be reduced to configured P(Um) curve

Priorities of the events

Each above mentioned event can be activated with different priority.

Because more events can occur at the same time there is a setpoint to define the priority of the event.
Higher number means lower priority.

1. RampEvtPrior1 – Setpoint **MainsFrqRisePr** (page 458)
2. RampEvtPrior2 – Setpoint **MainsFrqFallPr** (page 459)
3. RampEvtPrior3 – Setpoint **LoadReductPr** (page 459)
4. RampEvtPrior4 – Setpoint **MainsTripPerPr** (page 459)
5. RampEvtPrior5 – Setpoint **PforQPr** (page 460)
6. RampEvtPrior6 – Setpoint **SoftUnloadPr** (page 460)
7. RampEvtPrior7 – Setpoint **PwrReductAPr** (page 460)
8. RampEvtPrior8 – Setpoint **PwrReductBPr** (page 461)
9. RampEvtPrior9 – Setpoint **PwrReductCPr** (page 461)
10. RampEvtPrior10 – Setpoint **PostVRTPr** (page 462)
11. RampEvtPrior11 – Setpoint **RetOvUnFreqPr** (page 462)
12. RampEvtPrior12 – Setpoint **P(Um)Pr** (page 463)

General conditions of priorities and ramps

The "event" is active when:

- there is a valid reason to activate the event
- in case there are more events active at the same time, the lowest power reduction will win but with a ramp with highest priority

Example: There is active Soft Unload event (e.g. Prio 2) and simultaneously the Load Reduction event (e.g. Prio 1), the active power will be reduced in to zero but the first part to Load reduction level will be according Load reduction ramp and the rest to zero will be according Soft Unload ramp.

Example: There is Load reduction to 60% with ramp priority 2 and simultaneously comes the over frequency on the mains with power reduction to 80% with ramp priority 1, the power will be reduced to 60% according to ramp from PwrOverFrequency Event.

Loading ramp

As above mentioned, the events describes situations when should be the power reduced (except e.g. the MainsTripPer event or similar, where is the power not reduced).

In case of standard loading power there is used the standard setpoint which defines the loading ramp.

Types of the event ramps

There is possibility to change the type of ramp for each event.

In this moment we don't decide between 3 types of ramps FastLoadRamp / LoadRamp / SlowLoadRamp anymore but each event has own setpoint with time of ramp

1. RampEvtType1 – Setpoint **MainsFrqRise** (page 463)
2. RampEvtType2 – Setpoint **MainsFrqFall** (page 463)
3. RampEvtType3 – Setpoint **LoadReduct** (page 464)
4. RampEvtType4 – Setpoint **MainsTripPer** (page 464)
5. RampEvtType5 – Setpoint **PforQ** (page 464)
6. RampEvtType6 – Setpoint **SoftUnload** (page 465)
7. RampEvtType7 – Setpoint **PwrReductA** (page 465)

8. RampEvtType8 – Setpoint **PwrReductB** (page 465)
9. RampEvtType9 – Setpoint **PwrReductC** (page 466)
10. RampEvtType10 – Setpoint **PostVRT** (page 466)
11. RampEvtType11 – Setpoint **RetOvUnFreq** (page 462)
12. RampEvtType12 – Setpoint **P(Um)** (page 466)

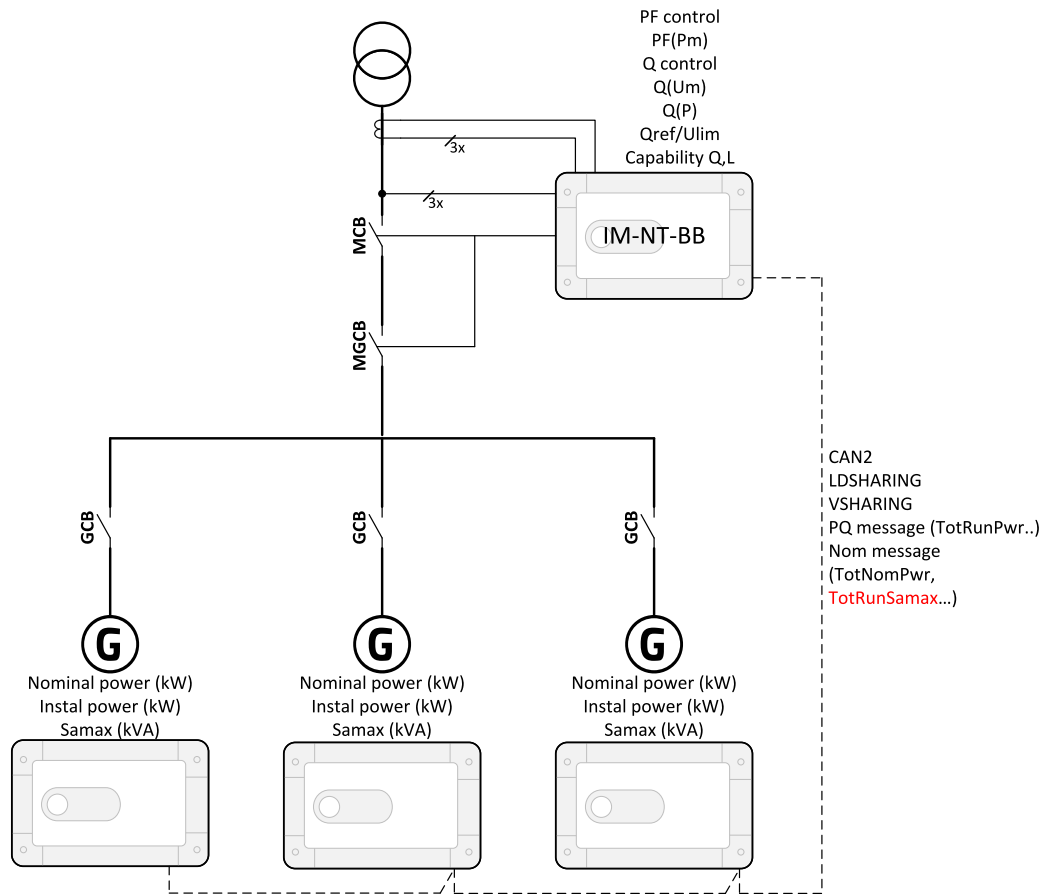
Grid codes features in MINT application

General

IMPORTANT: Implemented grid code features for MINT application will work only in cooperation with Mains controller.

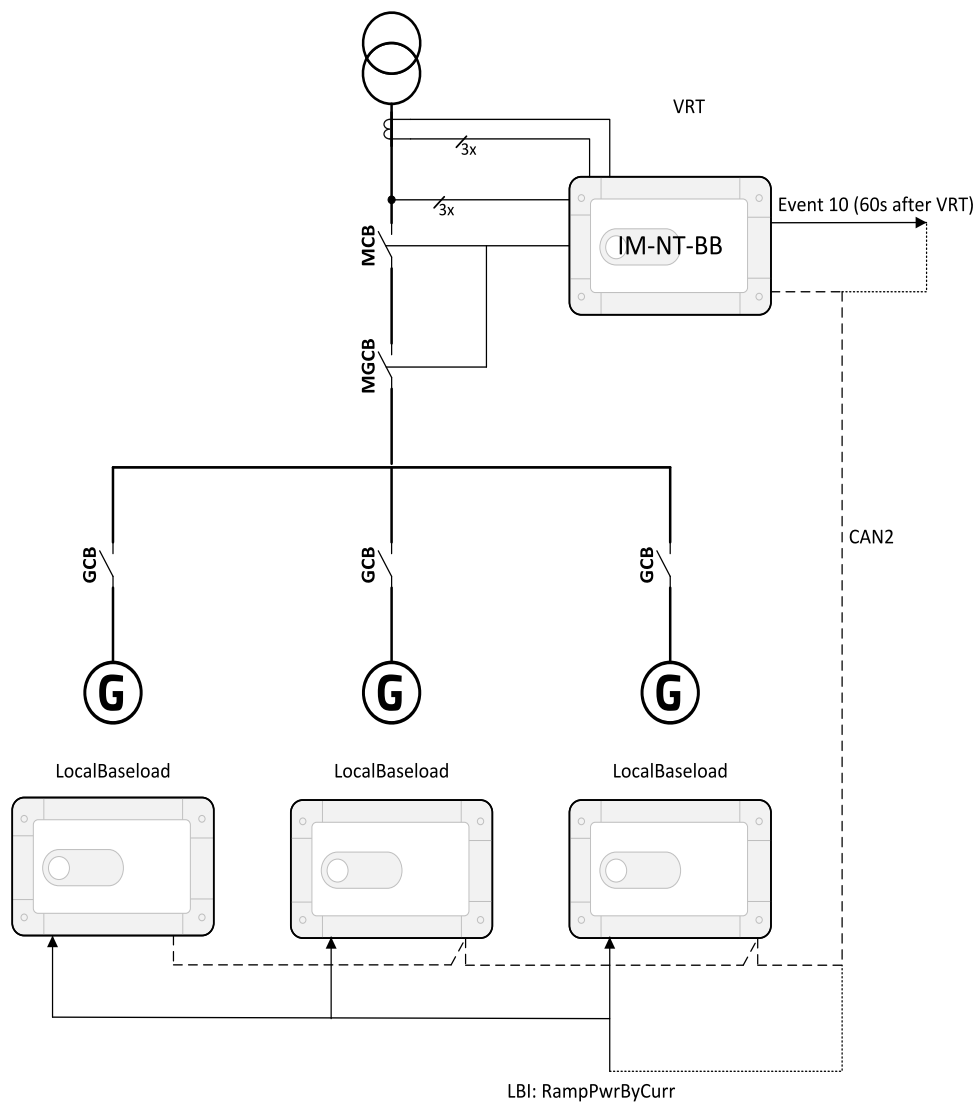
IMPORTANT: MINT application does not contain any mains measurements and that's why the evaluation of all functions related to mains features has to be evaluated in the mains controller.

IMPORTANT: To keep proper function with mains controller the control mode with mains controller must be set to LoadSharing and VArSharing type (Mains controller has active role in the application).



Instal power has range OFF...NominPwr, default value OFF, internally is value merged with derated power due to PMS
Samax has range OFF...32000kVA, default value is OFF, when this value is OFF the apparent power for PMS is standardly
calculated from Unom and Inom, when this value is >0 then is this value taken as reference for PMS.

Image 5.56 PF and Q control parallel to mains



After VRT must be the nominal current controlled on each gen-sets, this is able only due to „forcing“ the LocalBaseload

Image 5.57 VRT evaluation

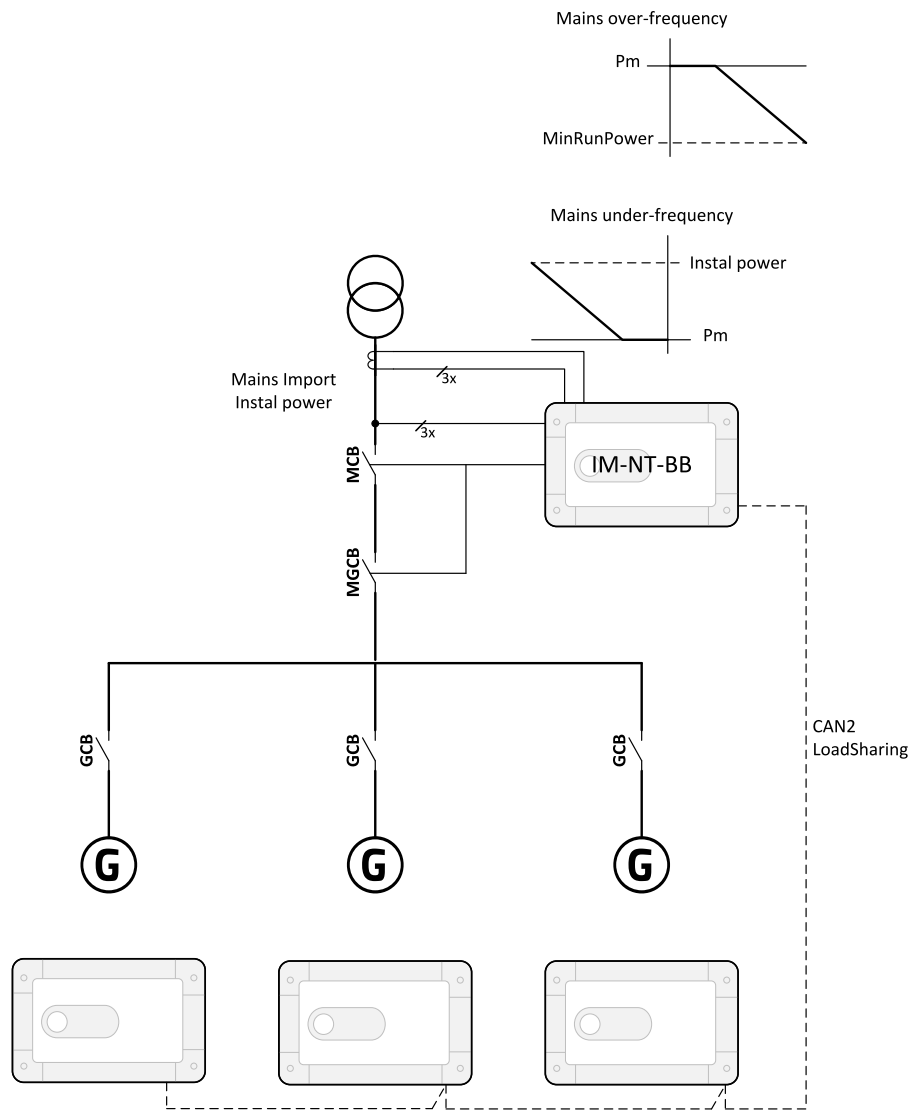


Image 5.58 Active power feed in case of over-/under- frequency

OPTIONAL

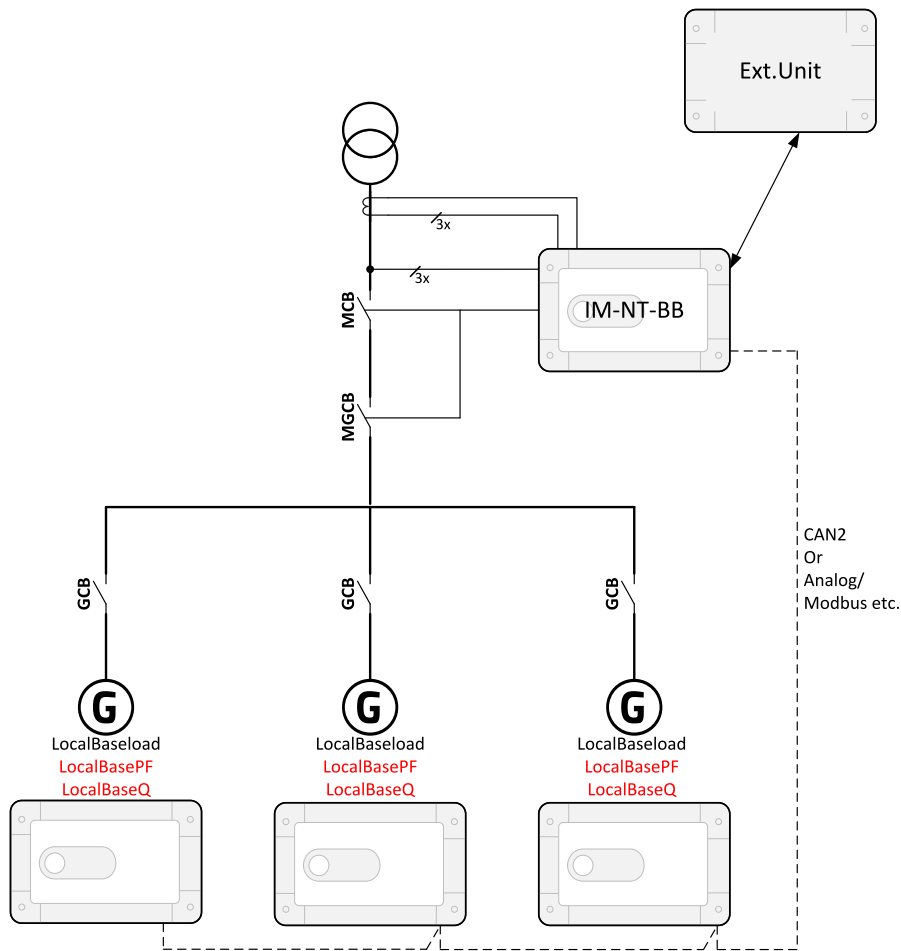


Image 5.59 Optional control of PF or Q with external unit

Shared parameters

Setpoint **#SysBaseQ (page 323)** is a new shared setpoint in mains controller, this setpoint will be implemented also in the MINT archive.

#SysPwrFactor (page 323) function is modified in case of setting of **#SysPFCtrl PtM (page 324)** = VSHARING but this change of behavior has influence only on the mains controller.

Setpoint **#SysPFCtrl PtM (page 324)** switches newly VSHARING/BASEPF/BASEQ

#SysBaseQ (page 323) is active only in case the **#SysPFCtrl PtM (page 324)** is switched to VSHARING (but in this case must be Q control mode active on IM) or BASEQ.

#SysPwrFactor (page 323) is active only in case the **#SysPFCtrl PtM (page 324)** is switched to VSHARING (but in this case must be PF control mode active on IM) or BASEPF.

#SysBaseQ controlled externally by analog input

When the Setpoint **#SysPFctrl PtM** (page 324) is switched to BASEQ mode and setpoint **SysBasePFQMode** (page 325) (this setpoint was originally named SysBasePFMode) is switched to EXTERNAL, the reactive power of the whole system (SysBaseQ) can be controlled by analog input: **MQ:ANExSysBQ** (PAGE 888). In that case is Setpoint **#SysBaseQ** (page 323) inactive.

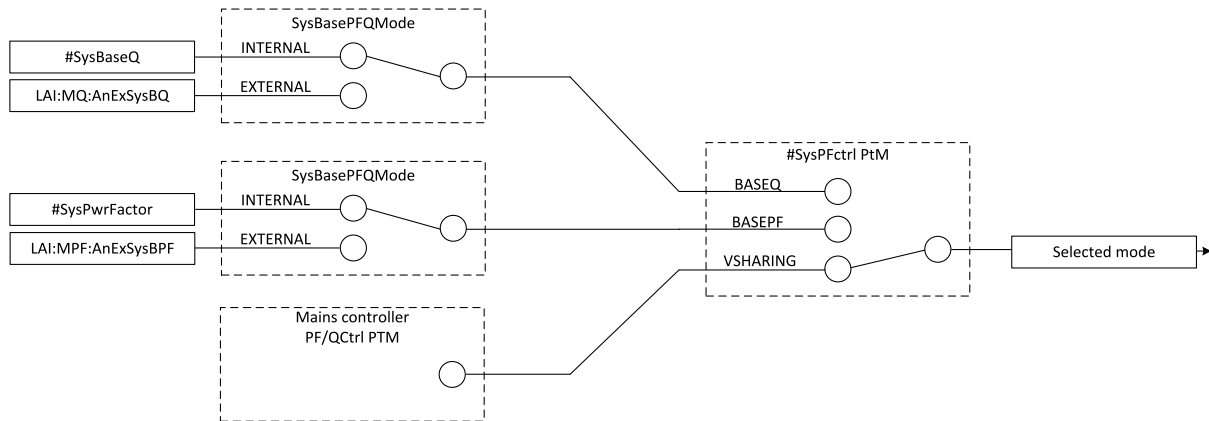


Image 5.60 PF and Q control in MINT application

Samax

Samax is maximal apparent power of generator.

Range of the setpoint is OFF;-32000...32000kVA

In case the Samax is OFF, the apparent power for kVA power management is calculated as usually from Unom and Inom.

In case the Samax is >0 (we expect that the user knows the correct value) the Samax is taken as reference for apparent power in kVA power management and the Inom will be for power management calculated from Samax and Unom.

Note: Samax is value written on the type label of the generator.

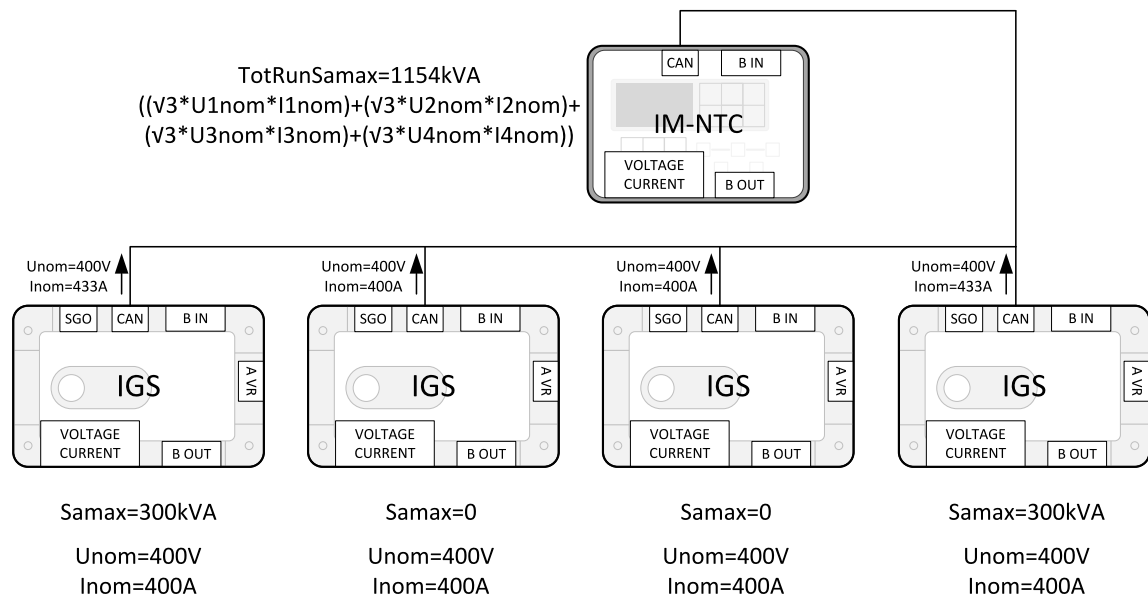


Image 5.61 Relationship between standardly calculated apparent power and apparent power set by Samax

InstalledPower

This setpoint defines the maximal installed power of Gen-set, this is actually the power which is Gen-set able to run in parallel to mains.

Range of the setpoint is OFF .. Nominal power (kW), default value is OFF

IMPORTANT: In MINT application is default value of this setpoint OFF which means, that in that case is taken Nominal power as the calculated value for Power management. In case the InstalledPower (page 346) is >0 this value is used as calculated value in to the Power management.

Function "after VRT"

Function VRT is fully evaluated in Mains controller.

The function which has to react on situation after VRT must be evaluated in cooperation with Gen-set controller.

There will be signal from mains controller which has to activate the concrete functionality in Gen-set controller.

This activation in Gen-set controller is done as LBI **REGCURRBYPWR** (PAGE 737).

By activation of this LBI, the controller switches his internal state to the mode, when his LocalBaseload starts to be influenced according to Nominal current of the Gen-set. In this mode is as first signed the actual power as a default value for LocalBaseload, then is this LocalBaseload internally forced according to LoadRamp so far, until the actual Gen-set current is ≤ Nominal current.

Local BasePF

This function has to set the required PF of the Gen-set independently on the **#SysPwrFactor** (page 323) requirement.

The range of the setpoint is OFF;0,001...1,999. In case the setpoint is on OFF, the Gen-set power factor is fully controlled by **#SysPwrFactor** (page 323) setting.

Function **LocalBasePF** (page 322) is available only in multiple parallel operation, that means **LocalBasePF** (page 322) is evaluated only in case the LBI: **MCB FEEDBACK** (PAGE 725) is active.

Local BaseQ

This function has to set the required Q of the Gen-set independently on the **#SysBaseQ** (page 323) requirement.

The range of the setpoint is OFF;1...32000. In case the setpoint is on OFF, the Gen-set power factor is fully controlled by **#SysBaseQ** (page 323) setting.

Format of the setpoint could be changed with change of power format (0.1 kVA, 1 kVA, 0.01 MVA)

Function **LocalBaseQ** (page 323) is available only in multiple parallel operation, that means **LocalBaseQ** (page 323) is evaluated only in case the LBI: **MCB FEEDBACK** (PAGE 725) is active.

If the **LocalBasePF** (page 322) and **LocalBaseQ** (page 323) is set on number >0 in that case has the **LocalBasePF** (page 322) priority.

Grid codes screens overview

Indication of power limitation

The Main Screen contains instruments showing that active power is limited by a grid codes event. IntelliVision 5 and IntelliVision 8 use a LED as the instrument, while IntelliVision 12Touch uses a pictogram (Exclamation mark). In both cases, these instruments (including the text) are shown only when the LBO: **PWRLIMITATION** (PAGE 834) is active.

Note: The LBO: **PWRLIMITATION** (PAGE 834) is activated not only by grid codes related functions, but also by other functions, such as: **Power derating** (page 127), **Overheat protection in T By PWR** (refer to the setpoint **Load ctrl PtM** (page 328)) and **Power reduction** (page 128) function.

Grid codes screens content

All screens can be easily edited by ScreenEditor (part of GenConfig). The default content and layout of grid codes screens for IntelliVision 5, IntelliVision 8 and IntelliVision 12Touch can be found below.

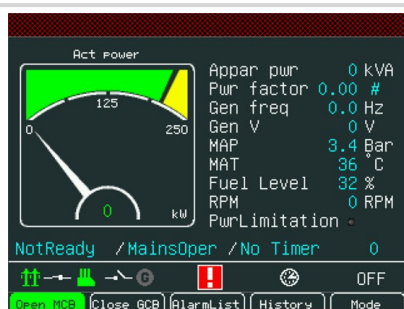
SPtM / SPI / Combi


Image 5.62 Main screen (SPtM/SPI)



Image 5.63 Main screen (Combi)

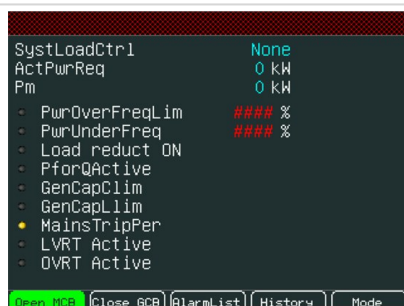


Image 5.65 Grid codes screen

Load control mode – SystLoadCtrl

Required active power - ActPwrReq

Actual saved value of active power - Pm

LED LBO PwrOverFreqLIM - PoF curve value

LED LBO PwrUnderFreq - PuF curve value

LED LBO Load reduct ON

LED LBO PforQActive

LED LBO GenCapClim

LED LBO GenCapLlim

LED LBO MainsTripPer

LED LBO LVRT Active

LED LBO OVRT Active

MINT


Image 5.64 Main screen

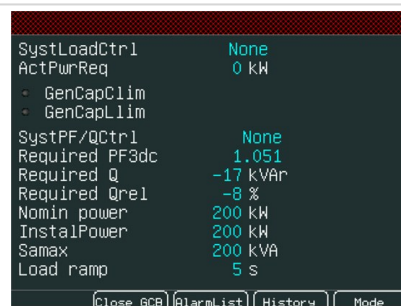


Image 5.66 Grid codes screen

Load control mode - SystLoadCtrl

Required active power - ActPwrReq

LED LBO GenCapClim

LED LBO GenCapLlim

SystPF/QCtrl - Value

Required power factor - Required PF3dc

Required reactive power - Required Q

Required relative reactive power - Required Qrel

Nomin power - Setpoint

InstalledPower - Setpoint

Samax - Setpoint


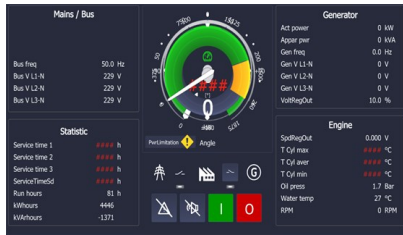


Load ramp - Setpoint

SPtM / SPI / Combi	MINT
<div><div><div>SystPF/QCtrl1None Required PF3dc0.000 Required Q0 kVAr Required Qrel0 % Q(Um) Curve0 kVAr Q(P) Curve0 kVAr QrefUlim Curve0 kVAr PF(P) Curve#### #PowerReduct143 #PowerReduct20 #PowerReduct30 #PowerReduct40</div><div>Open PCBClose GCBAlarmListHistoryMode</div></div></div> <div>Image 5.67 Grid codes values</div> <div>SystPF/QCtrl - Value Required PF3dc - Value Required Q - Value Required Qrel - Value Q(Um) Curve - Value Q(P) Curve - Value QrefUlim Curve - Value PF(P) Curve - Value #PowerReduct1 - Value #PowerReduct2 - Value #PowerReduct3 - Value #PowerReduct4 - Value</div>	

SPtM / SPI / Combi	MINT
	
Image 5.68 Main screen	Image 5.69 Main screen
	
Image 5.70 Grid codes screen	Image 5.71 Grid codes screen
Active Power Control SystLoadCtrl - Value ActPwrReq - Value Pm - Value LED LBO PwrOverFreqLIM - PoF curve value LED LBO PwrUnderFreq - PuF curve value LED LBO Load reduct ON LED LBO PforQActive	Active Power Control SystLoadCtrl - Value ActPwrReq - Value Speed request - Value SpeedReq RPM - Value

SPtM / SPI / Combi	MINT
Reactive Power Control SystPF/QCtrl - Value Required PF3dc - Value Required Q - Value Required Qrel - Value Q(Um) Curve - Value Q(P) Curve - Value QrefUlim Curve - Value PF(P) Curve - Value LED LBO GenCapClim LED LBO GenCapLlim	Reactive Power Control SystPF/QCtrl - Value Required PF3dc - Value Required Q - Value Required Qrel - Value LED LBO GenCapClim LED LBO GenCapLlim
Other Nomin power - Setpoint InstalledPower - Setpoint Samax - Setpoint Q Ramp - Setpoint Load ramp - Setpoint LED LBO LVRT Active LED LBO OVRT Active	Other Nomin power - Setpoint InstalledPower - Setpoint Samax - Setpoint Load ramp - Setpoint

InteliVision 12Touch

SPtM / SPI / Combi	MINT
 <p>Image 5.72 Main screen (Combi)</p>	 <p>Image 5.73 Main screen</p>
 <p>Image 5.74 Grid codes screen</p>	 <p>Image 5.75 Grid codes screen</p>
Active Power Control SystLoadCtrl - Value ActPwrReq - Value Pm - Value	Active Power Control SystLoadCtrl - Value ActPwrReq - Value Speed request - Value

SPTM / SPI / Combi	MINT
P(Um)Curve - Value LED LBO PwrOverFreqLIM - PoF curve value LED LBO PwrUnderFreq - PuF curve value LED LBO Load reduct ON LED LBO PforQActive	SpeedReq RPM - Value
Reactive Power Control SystPF/QCtrl - Value Required PF3dc - Value Required Q - Value Required Qrel - Value Q(Um) Curve - Value Q(P) Curve - Value QrefUlim Curve - Value PF(P) Curve - Value LED LBO GenCapClim LED LBO GenCapLlim	Reactive Power Control SystPF/QCtrl - Value Required PF3dc - Value Required Q - Value Required Qrel - Value LED LBO GenCapClim LED LBO GenCapLlim
Other Nomin power - Setpoint InstalledPower - Setpoint Samax - Setpoint P(Um) - Setpoint Q&U Protection - Setpoint DynamicSupport - Setpoint PforQlimit - Setpoint Q Ramp - Setpoint Load ramp - Setpoint LED LBO LVRT Active LED LBO OVRT Active	Other Nomin power - Setpoint InstalledPower - Setpoint Samax - Setpoint Load ramp - Setpoint

Application curve

There are many application curves related to various Grid Codes requirements.

We have to control if they are correctly configured to allow the proper functions.

Due to different requirements for the Grid code function there are also different requirements for the check if the curve is correctly configured and how we aware the user in case the configuration is not correct.

List of related application curves

Grid code function	Application curve	Resolution	Invalid configuration	Action when invalid
Power over frequency	App Curve PWROVRFREQ	0.01	other resolution than 0.01 missing curve (Setpoint PwrOvUnFreq=ENABLED)	Wrn PwrOvrFreqFail
Power under frequency	App Curve PWRUNDRFREQ	0.01	other resolution than 0.01 missing curve (Setpoint PwrOvUnFreq=ENABLED)	Wrn PwrUndFreqFail
LVRT-3phase	App Curve LVRT-3phase	0.1	other resolution than 1-0.01 y-axis has values above 100% (DynamicSupport = ENABLED)	Wrn 3pLVRTCrvFail
LVRT-2phase	App Curve LVRT-2phase	0.1	other resolution than 1-0.01 y-axis has values above 100% (DynamicSupport = ENABLED)	Wrn 2pLVRTCrvFail
LVRT-1phase	App Curve LVRT-1phase	0.1	other resolution than 1-0.01 y-axis has values above 100% (DynamicSupport = ENABLED)	Wrn 1pLVRTCrvFail
OVRT	App Curve OVRT	0.1	other resolution than 1-0.01 y-axis has values under 100% (DynamicSupport = ENABLED)	Wrn OVRTCrvFail
Capability (PQ diagram of alternator)	App Curve Capability	1	other resolution than 1 missing curve	Wrn CapabQLCrvFail Wrn CapabQCCrvFail
UQ area (P for Q function)	App Curve UQ curve	1	other resolution than 1 missing curve (Setpoint PforQlimit=ENABLED)	Wrn UQcurveFail
PQ area (P for Q function)	App Curve PQ curve	1	other resolution than 1 missing curve	Wrn PQcurveFail

Grid code function	Application curve	Resolution	Invalid configuration	Action when invalid
			(Setpoint PforQlimit=ENABLED)	
PF(Pm)	App Curve PF(P)	0.001	other resolution than 1 missing curve (Setpoint PF/Qctrl PTM=PF (Pm))	Wrn PF(Pm)Fail
Q(Um)	App Curve Q(Um)	1	other resolution than 1 missing curve (Setpoint PF/Qctrl PTM=Q (Um))	Wrn Q(Um)Fail
Qref/Ulim	App Curve Qref/Ulim	1	other resolution than 1 missing curve (Setpoint PF/Qctrl PTM=Qref/Ulim)	Wrn QrfUlimFail
Q(P)	App Curve Q(P)	1	other resolution than 1 missing curve (Setpoint PF/Qctrl PTM=Q (P))	Wrn Q(P)Fail
Pave protection	App Curve Pmom/Pave Max	0.001	other resolution than 0.001 missing curve (Setpoint Pave>0)	Wrn PaveFail
P(Um)	App Curve P(Um)	1	other resolution than 1 missing curve (Setpoint P (Um)Function#DISABLE)	Wrn P(Um)Fail

Single fault tolerance function

Single fault tolerance requirements are provided in controller with external watchdog placed on the base box. Watchdog monitors the processor activity in real time and if the processor is not active for specific time, watchdog will provide hardware reset of processor.

Dedicated LBO's will be deactivated according to VDE-AR-N 4105 till 100 ms.

Note: Detection time of processor activity is 62.5 ms.

Controller is equipped with Single fault tolerance test function.

The functionality can be tested via LBI: **WATCHDOG TEST (PAGE 754)**

On the rising edge of this LBI will controller deactivate the 10 ms heart beat of processor and processor has to be restarted.

For next test the LBI has to be again switched from 0 to 1.

Note: If the LBI is 1 during controller switched on, the watchdog test will not be provided, as the LBI test function reacts only to rising edge.

IMPORTANT: In case the RTC battery is not present in the controller or the RTC battery is flat (Alarm indication "RTCbatteryFlat") the Single fault tolerance function is not guaranteed.

5.3.41 Asynchronous generator control

Applications

There are two default archives (applications) in IntelliSys Gas supporting control of gen-sets with asynchronous generator:

- ASYNC-SPI (default archive IS2GASXX-ASYNC-SPI-x.x.x.x.ant)
- ASYNC-MINT (default archive IS2GASXX-ASYNC-MINT-x.x.x.x.ant)

These archives (applications) are based on the standard SPI and MINT archives. Differences are described in the following chapters.

Process control

Only the Parallel to Mains Operation is supported. The setpoints **Island enable (page 337)**, **ParallelEnable (page 337)** and **Synchro enable (page 338)** are not visible. They are internally set like this:

- **Island enable (page 337)** = NO
- **ParallelEnable (page 337)** = YES
- **Synchro enable (page 338)** = FORWARD

Async-SPI

When there is not healthy voltage on the Mains or the MCB is open, the alarm **OfL GCBCloseBlock** is active (alarm type: **Off load**).

When healthy voltage is restored, the alarm **OfL GCBCloseBlock** is deactivated and the time **Mains ret del (page 428)** starts to be counted (only in AUT and SEM modes, Timer text: **RPMmatchEn**). When it elapses, RPM matching is allowed.

Async-MINT

When the MCB is open, the alarm **OfL GCBCloseBlock** is active (alarm type: **Off load**).

Healthy voltage on the Bus is not a condition for activation / deactivation of the alarm (difference from Async-SPI).

Note: In the standard MINT application, GCB cannot be closed when there is not healthy voltage on the Bus and MCB is closed at the same time. This behaviour remains the same in Async-MINT.

Engine control - Conditions

In comparison with standard applications, some conditions for successful engine start, engine running and engine stop are removed.

- Successful start conditions
 - The condition Value **Gen V (page 599)** > 25% of **GenNomV (page 351)** is removed
- Engine running conditions
 - The condition Value **Gen V (page 599)** > 15 V is removed
- Successful stop conditions
 - The condition Value **Gen V (page 599)** < 15 V is removed
 - The condition Value **Gen freq (page 598)** = 0 Hz is removed

Start over GCB

There is only one condition for successful engine start when this type of start is used:
Value **RPM (page 591)** > Setpoint **Y/D RPM (page 379)**.

Engine start

There are two types of engine start:

- Standard start sequence with starter
- Start over GCB

The start type is selected by the setpoint **Engine Start (page 378)**.

Standard start sequence with starter

When **Engine Start (page 378)** = *Starter*, standard start sequence with activation of the LBO: **STARTER (PAGE 844)** is performed.

GCB can be closed via RPM matching, which can be started only when there is healthy voltage on the Mains / Bus. The command to close the GCB can be issued when the actual engine speed is in the **Slip Freq Win / RPM window (page 455)** at least for the time adjusted by the setpoint **Dwell time (page 446)**. This condition is indicated by the LBO: **IN SYNCHRONISM / IN RPM WINDOW (PAGE 783)**. Active RPM matching is indicated by the LBO: **FORWARDSYNCHRO / RPM MATCHING (PAGE 774)** and value **Breaker state (page 652)** = RPM matching. Voltage and frequency are not conditions for GCB closing.

In Async applications, there is no **Max Stab Time (page 382)** (the setpoint is removed). RPM matching can be started when **Min stab time (page 382)** is counted down.

The **Timer text (page 652)** = *RPMMTOut* when RPM matching is currently active (when the timer *RPM match TOut* is counting).

If RPM matching is not successful within the time **Sync timeout / RPM match TOut (page 452)**, the alarm *Stp RPM match fail* is issued.

There is only one attempt for RPM matching (the setpoint **Sync attempts (page 453)** is removed).

When the Mains / Bus parameters get out of limits, RPM matching is interrupted.

Start over GCB

When **Engine Start (page 378) = Close GCB**, the LBO: **STARTER (PAGE 844)** is not activated during the start sequence. The **Idle time (page 381)** and **Min stab time (page 382)** are not counted down during this type of start.

When any *Off Load* alarm is active, this type of start is not allowed. When any *Off Load* alarm is activated during this type of start, engine is immediately stopped.

The LBO: **Y/D (PAGE 866)** is open at the beginning of the start sequence.

Manual opening / closing of the GCB is blocked during the start sequence.

When the **Prestart time (page 379)** elapses, the GCB is closed (automatically closed also in MAN mode) and the **Engine state (page 652)** is switched into *Cranking* (if preventilation is not used) or *SDVentil* (if preventilation is used).

If the engine speed **Y/D RPM (page 379)** is not reached within the time **MaxCrank Time (page 380)**, the **Engine state (page 652)** is switched into *Pause* and GCB is opened. When the time **CrnkFail pause (page 381)** elapses, the **Engine state (page 652)** is switched back into *Cranking* and GCB is closed again.

There is no *Ventil* phase for this type of engine start (ventilation of unburned fuel when stop command comes during cranking with gas).

Additional condition for activation of preventilation (the *SDVentil* phase): It is used also when stop command came during cranking (during previous start attempt).

When the engine speed reaches **Y/D RPM (page 379)**, the LBO: **Y/D (PAGE 866)** is closed, the **Engine state (page 652)** is switched into *Soft load* and controller starts to regulate power.

The LBO: **Y/D (PAGE 866)** is opened at the beginning of the stop sequence (but after **Cooling time (page 384)** has elapsed).

Evaluation of the start type

The application behaves differently only when the LBO: **STARTING (PAGE 844)** is active or in the engine states *Ready* and *NotReady*. In all other situations, the application behaves the same for **Engine Start (page 378) = Starter** and **Engine Start (page 378) = Close GCB**.

This means, that when the engine is successfully started over GCB and then the GCB is opened from any reason (for example, manually in the MAN mode), speed regulation will get active. The GCB can be then closed again by RPM matching.

Regulations

Voltage and PF/Q

Asynchronous generator is not able to regulate voltage or PF/Q. All regulations of these values are removed, including VAr sharing.

Speed regulation

Engine speed is regulated to the value:

- **SynchroSpeed (page 620)**, when RPM matching is active
- **Nominal RPM (page 355)**, when RPM matching is not active

The speed regulation loop uses the gain factor **RPM gain** (renamed from **Freq gain**) and integration factor **RPM int** (renamed from **Freq int**).

Measurements

The engine RPM is never calculated from the generator frequency. The range of the setpoint **Gear Teeth** (page 355) is changed to 1 .. 500 (there is no option *FGen* → *RPM*).

There is no change in any other measurements. Voltage and PF/Q measurements also stay the same.

Protections and alarms

Alarm Pickup fail

In standard applications, there are two conditions for activation of this alarm:

- The engine speed (**RPM (page 591)**) doesn't correspond to the generator frequency
 - This condition is *removed* from Async applications
 - It is removed because RPM cannot be calculated from the asynchronous generator frequency
- The engine is considered to be running but there are no RPM (**RPM (page 591)** < 2)
 - This condition is still *present* in Async applications
 - It is used because the RPM sensor can get broken so RPM drops to zero
 - Always the engine running conditions for **Engine Start (page 378)** = Starter are used
 - This means that this alarm is evaluated also when conditions like **OIL PRESS (PAGE 888)**, **D+ Function (page 388)** or **LB1 RUNINDICATION 1 (PAGE 739)** / **RUNINDICATION 2 (PAGE 739)** / **RUNINDICATION 3 (PAGE 740)** are fulfilled

Generator protections

The generator protections are enabled with delay adjusted by the setpoint **GenerProt del (page 399)**. This delay starts to be counted when the GCB is closed.

The generator protections are disabled when the GCB is opened (immediately, without any delay).

Reverse power

When the LBI: **REVERSEPWRBLCK (PAGE 739)** is active, this protection is disabled.

Excitation Loss

Asynchronous generator has no excitation. This protection is removed.

OfL GCBCloseBlock

This alarm is described in the chapter **Process control (page 265)**. It also blocks engine start when **Engine Start (page 378)** = Close GCB.

It is not possible to override this protection by the LBI: **SD OVERRIDE (PAGE 744)**.

Stp RPM match fail

This alarm is activated when RPM matching is not successful (analogy to the alarm *Stp Sync fail* in standard applications).

🔍 back to Controller setup

6 Communication

6.1 Modbus Communication	269
6.2 Possible Connections per Port	272

🔍 [back to Table of contents](#)

Get more information on communication (Modbus, remote commands etc.) in the latest version of **IGS-NT Communication Guide** (communication remains the same). The Communication Guide also contains a chapter exclusive for IntelliSys Gas regarding Modbus commands.

6.1 Modbus Communication

Modbus protocol was implemented into the controllers to enable the customer to design its own supervision software.

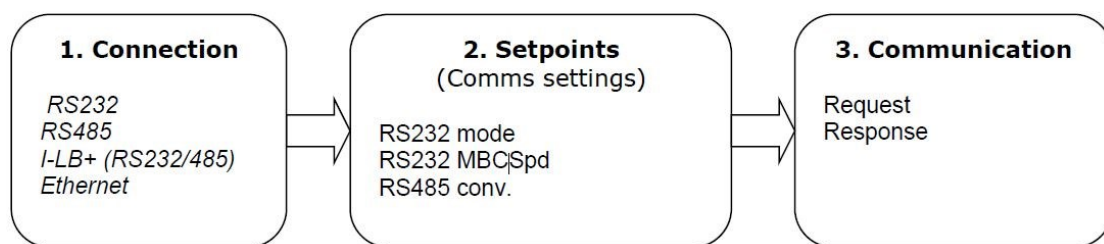


Image 6.1 Modbus Step by Step

6.1.1 Modbus communication via RS232 – single controller

Controller's configuration:

- Comms settings:RS232(1) mode = MODBUS-DIRECT
- Comms settings:RS232(1)MBCSpd = select of Modbus communication speed
- Comms settings:RS485(1)Conv. = DISABLED

6.1.2 Modbus communication via RS485

Controller's configuration:

- Comms settings:RS232(1) mode = MODBUS-DIRECT
- Comms settings:RS232(1)MBCSpd = select of Modbus communication speed
- Comms settings:RS485(1)Conv. = ENABLED

Note: The RS232/RS485 converter is included in the IG-NTC, IG-EEC and IS-NT controllers (no external RS232/RS485 converter is needed).

Note: RS485 communication line has to be terminated by 120 Ω resistors at both ends – follow converter user manual. RS485 communication can be used for monitoring and controlling of many controllers via IntelliMonitor.

6.1.3 Modbus communication via RS485 – multiple controllers

Controller's configuration:

- Comms settings:RS232(1) mode = MODBUS-DIRECT
- Comms settings:RS232(1)MBCSpd = select of Modbus communication speed
- Comms settings:RS485(1)Conv. = ENABLED

6.1.4 Modbus communication via I-LB+

I-LB+ configuration:

- Jumpers P13, P14 = select of Modbus communication speed
- Jumper P16 = Modbus
- Jumper P17 = Address 1 or Address 2
- Jumper P18 = Direct

Note: To use I-LB Modbus communication connect Modbus jumper in I-LB unit (P16). Additionally, you can choose the communication speed using the speed selection jumpers (P13, P14). Their combination allows the speed selection of 9600/19200/38400/57600 bps.

6.1.5 Modbus communication via IB-NT

Modbus communication needs to be enabled in settings via IB-NT config.

Modbus is available as Modbus TCP or Modbus RTU over RS485.

Note: For more information regarding IB-NT please see documentation www.comap-control.com.

6.1.6 Data reading

The function Read Multiple Registers has to be used for data reading. The terminal sends a query and from the controller receives either the normal response containing the requested data or the exceptional response indicating a read error.

- It is possible to use function 3 for reading (*Read Multiple Registers*).
- It is not possible to read from the middle. The register number must correspond with the beginning of the data object. The only exception are the objects of "multipacket values" (registers 46367 - 46491) and "data part of the history record" (registers 46543 - 46667).
- All read registers must be implemented. If an unimplemented register appears among the read registers, the controller returns an error message.
- Even unnamed values can be included among read registers. The read value must be treated as meaningless.
- The length of a block is 127 registers.

6.1.7 Data writing

All data can be written by the function Write Multiple Registers. Data up to 2 bytes can be written by the function Write Single Register, too. The terminal sends a query containing a written data and the controller either confirms it (normal response) or refuses it (exceptional response).

- For writing it is possible to use function 6 (*Write Single Register*) or function 16 (*Write Multiple Registers*).
- Using function 16 it is possible to write maximum 16 registers at once.
- Data cannot be written from the middle. Register number must correspond with the beginning of the data object. Written data must be complete to perform writing of all requested data objects.
- Writing to EEPROM is executed using a queue. The queue is common for writing from all terminals. The request for next writing is accepted in case that there is empty space in the queue. Otherwise the controller returns an error message and the terminal must repeat the request.
- All written registers must be implemented. If an unimplemented register appears among the read registers, the controller returns an error message.
- It is possible to include also unnamed registers in the written sequence. The controller confirms this writing but writing of unnamed registers is not performed.

6.1.8 Modbus TCP

- Direct connection
 - ETH
 - Port 502
- Bridge connection
 - IB-NT
- Transfer mode TCP/IP
- Function codes
 - 3 (Read Multiple Registers)
 - 6 (Write Single Register)
 - 10 (Command)
 - 16 (Write Multiple Registers)
- The response to an incoming message depends on the network performance and on the controller configuration. Typical response time is 25 ms.
- Connection timeout is set to 15 seconds. If no message comes within the timeout then controller close the connection.

Note: Data structure is the same as Modbus RTU. Modbus TCP adds 6 bytes header before data. CRC calculation is not used in Modbus TCP.

6.2 Possible Connections per Port

Port type	Number of Connections	Available Connections
RS232(1)	1	IV 8 PC Modbus terminal Modem
RS485(1)	3	IV 8 IV 5
RS485(1)	1	IV 8 PC Modbus terminal Modem
RS232(2)	1	IV 8 PC Modbus terminal Modem
RS485(2)	1	IV 8 PC Modbus terminal Modem
CAN1	45	AIN (9x) BIN (12x) AOUT (4x) BOU (12x) DENOX20 (1x) ECON3 (1x) ECON4 (1x) Other specialized HW
CAN2	35	Controllers IV 8 I-LB+ InternetBridge-NT
USB	1	PC
Ethernet	2	Standard Ethernet Connection

Note: RS232(1) - RS485(1) can be switched and only one port at a time is available for universal communication (it is possible to use RS485 for internal display communication while still using RS232).

 [back to Communication](#)

7 Troubleshooting

This chapter provides list of typical problems you may come across when installing / operating the IG/IS/IM-NT controllers. It also incorporates the section **How to...** (page 292) with examples of some non-standard or interesting applications of these controllers and **List of Possible Events** (page 294) which contains information about alarm messages which can be displayed by a controller.

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7.1 Communication

7.1.1 RS232(x) communication doesn't work

Solution:

- Setpoint RS232 (x) mode is set to different setting than DIRECT – change its setting to DIRECT.
- Converter to RS485 is active at this communication channel – change setpoint RS485(x)conv. to DISABLED position.
- Earthing problem exists between the PC and the controller, i.e. the battery negative potential has different levels in the two devices. IG/IS/IM-NT controllers has a built-in protection which disconnects battery negative (GND) from the RS232 terminal. Re-activation takes some time (~ 1 min) after you disconnect the cable (component cools down).

You can temporarily disconnect your laptop PC from the grid (e.g. if you intend to download controller configuration only). You can disconnect the earth wire from your PC. The best solution is to use the RS232 galvanic separation device, e.g. one of those which are mentioned in the chapter **Communication** (page 269).

7.1.2 RS232(2) / RS485(2) / USB communication doesn't work

Solution:

- Relates to IG-NTC/EEC versions of IG-NT family and to IS-NT / IS-NT-BB. Controller FW version is lower than 2.0 and/or controller was shipped from ComAp before September 2006. It is necessary to download new FW into the communication sub-processor. It can be done by sending unit to ComAp or by downloading the latest version of Peripheral modules upgrade package and following procedure described in the attached document.

7.1.3 Problem accessing controller after configuration programming error

Problem:

- It can happen that remote configuration programming attempt fails (e.g. due to bad phone line condition) and from that moment on controller shows on its display !CONTROLLER CONFIGURATION ERROR".

Solution:

- In this stage, even with damaged configuration, controller is still able to receive another phone call with another attempt to program configuration.
- However, if the situation is to be solved locally (i.e. a local technician intends to re-program the configuration), it is possible to switch the RS232(1) port back to the DIRECT connection mode by simultaneous pressing up+left+right arrows on the controller.
- It is strongly recommended not to upgrade controller firmware using a remote connection, because in case of programming failure problem has to be solved locally using boot jumper programming procedure. For more information about this procedure **see Unsuccessful controller programming on page 274.**

7.1.4 Modem TC35i does not respond to SMS commands

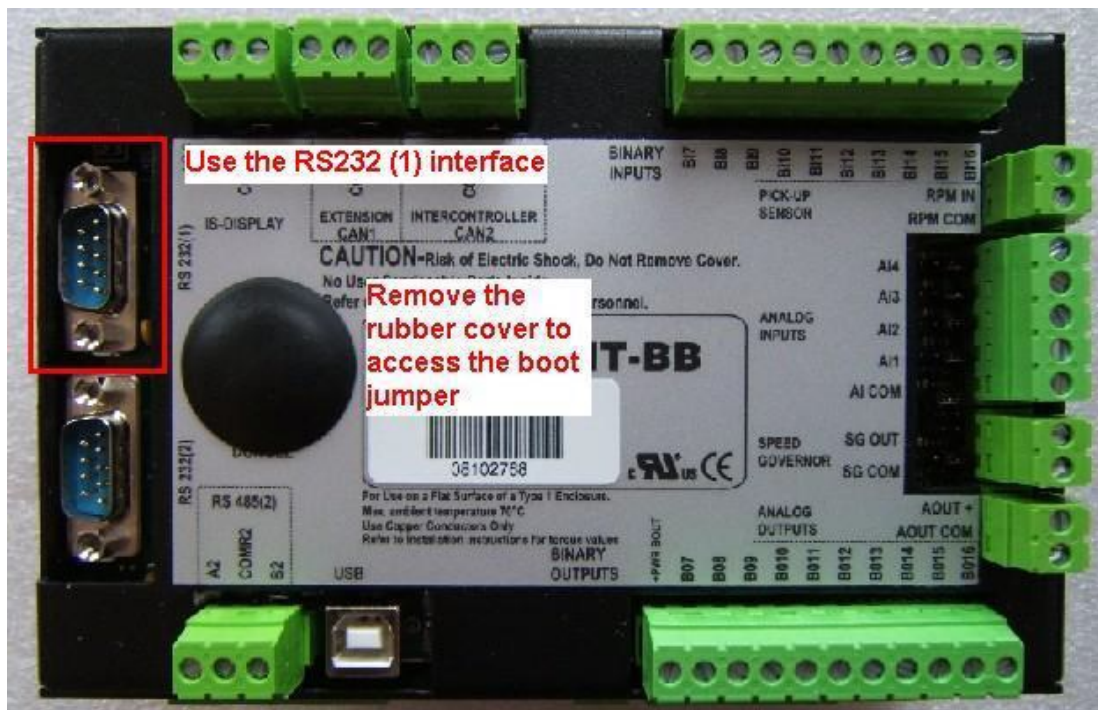
Solution:

- Send AT+CPMS="MT","MT","MT" command via hyperterminal or using the RS232()MdmIni parameter.
- Send AT+CPMS="SM","SM","SM" command via hyperterminal or using the RS232()MdmIni parameter.
- Restart the modem.

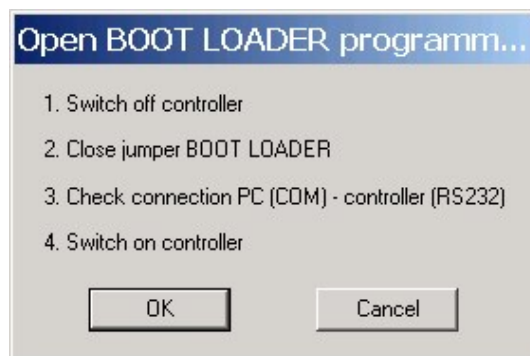
7.1.5 Unsuccessful controller programming

It is necessary to use the boot jumper for controller programming in case of unsuccessful controller firmware programming. It may for instance happen due to an accidental cable disconnection, computer failure or remote connection drop out. If controller firmware programming was not successful, it is not possible to open connection to a controller, it does not respond and controller screen is blank. In such case you need to use this procedure for controller programming:

1. Close connection to controller and start GenConfig
2. Check communication port setting in GenConfig. Go to Options – Select connection and select the right communication port. It is necessary to use the RS232(1) controller interface, boot jumper programming does not work with the RS232(2) or USB controller interface.



3. Go to File – Firmware upgrade and Cloning... – FW upgrade (default configuration)... and select firmware you would like to upload into a controller.
4. Follow instructions in the notification window:



Opened BOOT LOADER jumper is marked on the picture (there are three different possibilities)

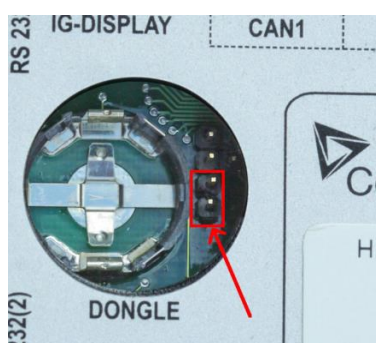


Image 7.1 IG-NTC and IS-NT

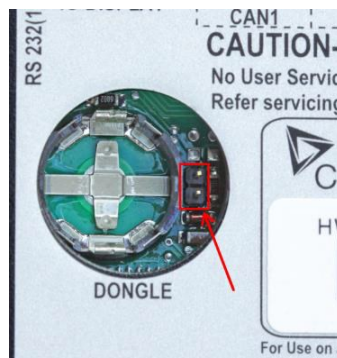


Image 7.2 IG-NT

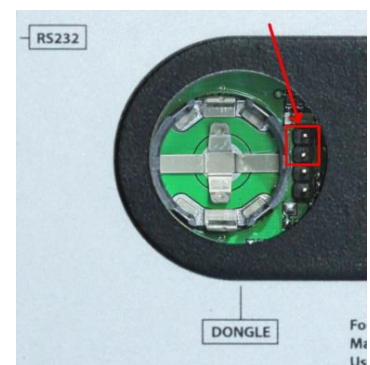


Image 7.3 IGS-NT(C)-BB

5. Close the jumper for programming.
6. Follow instructions in the notification window after programming



7. It is possible to configure and program controller in the standard way after this procedure is done.

7.1.6 How to check that CAN communication between controllers works

Check strings CAN16 and CAN32 to see if controller communicates with other controllers via the CAN2bus (Intercontroller&Monitoring CAN2). Use IntelliMonitor, go to Values – Info to check state of the strings. These strings contains information about addresses of other controllers which communicates with a particular controller. Position of each controller in the strings is given by setpoint **Comms setting: Contr. address**.

Strings looks like this if you are checking strings on controller with **Comms setting: Contr. address** set to 1 and controller does not communicate with any other controllers via CAN2:

```
CAN16      1000000000000000
CAN32      0000000000000000
```

Strings looks like this if you are checking strings on controller with **Comms setting: Contr. address** set to 1 and controller communicates with controllers with *Contr. address* set to 2, 16 and 31:

```
CAN16      I 0000000000000000
CAN32      0000000000000000 0
```

Strings Reg16 and Reg32 are available directly on controller screens if MINT, Combi or COX application is used in controller. These strings contains information about addresses of controllers which belongs into the same logical group as controller which displays this information. Strings Reg16 and Reg32 contains the similar information, however the symbol "I" is displayed only for controllers, that belong to the same logical group as this controller.

For more information about logical groups see description of **Pwr management: Control group**, *GroupLinkLeft* and *GroupLinkRight* setpoints (these setpoints are part of the **ProcessControl** group in the COX application).

7.1.7 CAN communication does not work

Problem:

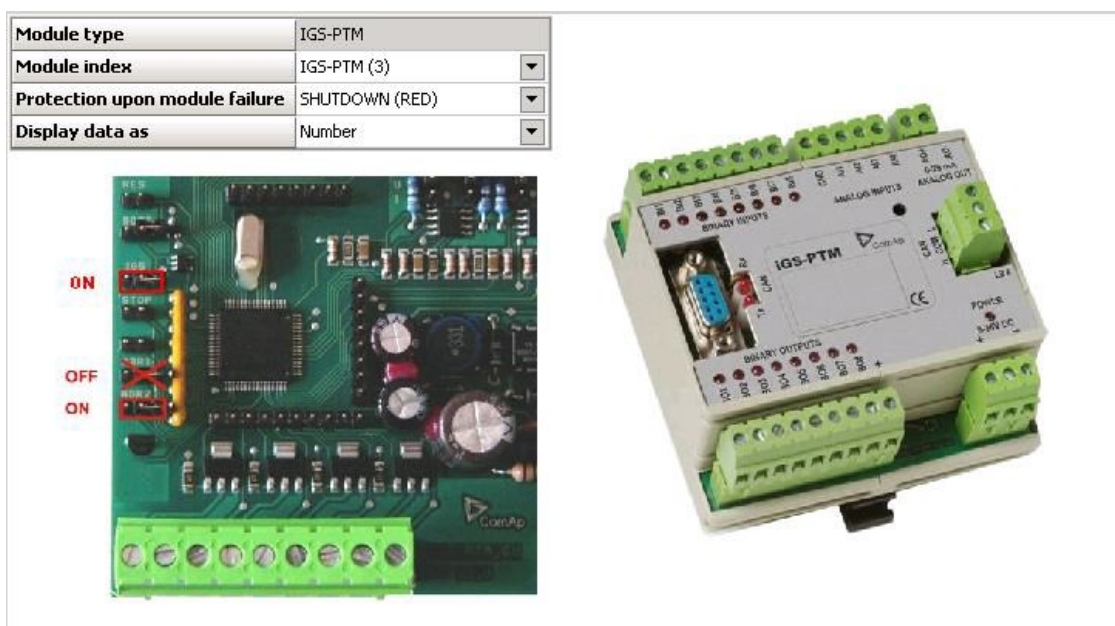
- > CAN communication (either via CAN1 or CAN2 interface) does not work.

Solution:

- > Check if CAN bus is properly terminated. Measure resistance between the H and L CAN terminals when all devices connected to a CAN bus are switched off. Resistance between the H and L should be about 60 Ω, because two 120Ω resistors has to be used to terminate CAN bus at the both ends of a CAN line. See *External modules connection* chapter in [IGS-NT Global Guide](#) for information about CAN bus connection.

IMPORTANT: Be aware that some ComAp devices has a built in 120Ω resistor which is connected to a CAN bus if jumper next to a CAN interface is closed! Make sure that the terminating resistor jumper is closed only in devices which are at the ends of a CAN line.

- Check if each device connected to a CAN bus has a unique CAN address.
 - In case of the CAN2 bus it means that **Comms settings: Contr. address** setpoint has to be set to a unique number in each controller which is connected to the CAN2 bus. See *Addresses of Modules on CAN2* chapter in [Inteli Communication Guide](#) for information about setting of CAN addresses in ComAp communication modules and InteliVision to avoid conflict between addresses.
 - In case of devices connected to the CAN1 bus make sure that addresses are set according to instructions which are displayed upon module configuration on the GenConfig card Modules. On the picture is example of information which is displayed about IGS-PTM module jumpers setting. Similar information is displayed for all extension modules.



- Check wiring topology of the whole CAN bus cable. The topology must be linear (straight), not "star type" and must not contain any loops.

7.2 Controller interface

7.2.1 Setpoints setting cannot be changed

Solution:

- Setpoints are password protected and password is not entered. Go to menu -> Users/Password and log in. If your user profile has sufficient access rights, setpoints editing will be unblocked. System administrator can change controller configuration to give you access to setpoints.
- Password is entered (= user is logged in), but setpoints cannot be changed. That means these are probably blocked by some higher protection level than the current user has got. You need to log in as a user with sufficient access rights or contact system administrator to give you access to setpoints.
- Access lock function is active. Switch the Access lock function off.

7.2.2 Controller does not react to buttons pushing

Problem:

- Controller does not react to Start, Stop, Fault & Horn reset, GCB, MCB, MGCB or controller mode ←,→ buttons pushing.

Solution:

- Controller is not in MAN or SEM (IS-NT only) mode, switch it to one of these modes.
- There are active alarms in controller alarm list. Button function can not be performed because of an alarm activity. Get rid of an alarm first and use a button again.
- Setpoint **Basic settings:Local buttons** is set to position EXTBUTTONS, which means that only external control using Binary inputs is enabled. Set this setpoint to position PANEL or BOTH to be able to control Gen-set using its panel buttons.
- Access lock function is active. Switch the Access lock function off.

7.2.3 Controller mode cannot be changed

Problem:

- Controller mode cannot be changed.

Solution:

- The **Basic settings:ControllerMode** Setpoint is password protected and password is not entered. Go to menu -> Users/Password and log in. If your user profile has sufficient access rights, setpoint will be unblocked. System administrator can change controller configuration to give you access to commands and setpoints.
- Function for controller mode forcing is active. Go to Measurement IO / Binary inputs and check if Binary input with Remote OFF, Remote MAN, Remote AUT or Remote TEST function is active. If present and active (check also input polarity using GenConfig – input function can be inverted), controller mode cannot be changed from mode selected with a Binary input function. It is necessary to change Binary input state or disconnect Binary inputs from controller to be able to change controller mode. There may not be Binary input with one of the above mentioned functions.

Check the LBI card in GenConfig to see if e.g. PLC output is used to force controller into a particular mode:

Modules	I/O	Setpoints	Commands	Protections	History	User Sensors	Languages	Translator	PLC Editor	LBI	LAI	Miscellaneous
No.	Name	Negation	Source									
1.	GCB feedback	No	GCB feedback									
2.	MCB feedback	No	MCB feedback									
3.	Rem start/stop	No	Remote S/S									
4.	Emergency stop	Yes	Emergency stop									
5.	Test on load	-	-									
6.	Remote OFF	No	PLC output									
7.	Remote MAN	-	-									
8.	Remote SEM	-	-									
9.	Remote AUT	-	-									
10.	Remote TEST	-	-									
11.	Oil Press	-	-									
12.	AccessLock.int	-	-									
13.	AccessLock.ext	-	-									

Source	Used
Bin inputs CU	
Bin outputs CU	
Log Bout	
Info	
PLC	
PLC output	
PLC-BOUT 1.2	
PLC-BOUT 1.3	
PLC-BOUT 1.4	
PLC-BOUT 1.5	
PLC-BOUT 1.6	
PLC-BOUT 1.7	
PLC-BOUT 1.8	

7.2.4 Some setpoints cannot be changed even if correct password is used

Solution:

- Force value function is probably configured to a setpoint and activated. If the function is active (i.e. alternative value is forced), the original value is not visible and cannot be changed. To modify the original value, deactivate the Force value function(s) related to this setpoint first.
 - Letter F is displayed next to a setpoint if its setting is changed using the Force value function.
 - You can check in GenConfig if Force value is configured to a setpoint which can not be changed and how it is activated.

7.2.5 Unknown alarm is displayed

Problem:

- Alarm which can not be found in this guide is displayed by controller.

Solution:

- All texts which are displayed by controller can be changed using Translator in GenConfig.
- Try to find an alarm text on the Translator card, use the Ctrl+F function to find an alarm text and match it with the default English text. Check PLC functions Force protect setting and customized protections (see card Protections in GenConfig) to find alarm messages which are not listed in the **List of Possible Events** (page 294).

7.2.6 INIT is displayed and controller mode cannot be changed

Problem:

- The unit shows "INIT" and does not work, controller mode can not be changed. This situation occurs after controller reset. Reason of the problem are either incorrectly set setpoints or flat RTC battery.

Solution:

- A new firmware containing new setpoints was uploaded into a controller. Use IntelliMonitor online connected to the controller to check all setpoints and fix setting of those which are set in a wrong way. You have to change at least one setpoint setting. If all setpoints are correct, change one of them and put it back to the original value to recalculate the checksum. It may be necessary to switch controller off and on after changing setpoints setting. You can tick Reset from Init state function in Options in GenConfig to avoid repeating of this problem (Init state reset is done automatically by GenConfig if this function is active).
- The RTC backup battery is flat. Send a controller to your distributor for battery exchange if the RTCbatteryFlat message is displayed^{*)}.

Note: *)

For IG-NT-BB, IG-NTC-BB, IS-NT-BB, IS-NTC-BB, IM-NT-BB and IM-NTC-BB controllers send a controller to your distributor for battery exchange. For IG/IS-NT, IG/IS-CU, ID-DCU, IL-NT, IC-NT, ID-Lite and ID-Mobile controllers send a controller to your distributor for battery exchange, or you can exchange battery by yourself, but ComAp would not be responsible for controller damage caused by battery exchange then.

7.2.7 Wrong display HW message

Problem:

- "WRONG DISPLAY HW" message is displayed if wrong display hardware is detected.

Solution:

- It is necessary to send IS-Display/IG-Display to ComAp for repair if the message is displayed.

7.2.8 Configuration table error

Problem:

- "Configuration table error" message is displayed by controller. There are two possible reason:
 - Controller configuration upload was not done properly (typical reason is cable disconnection during configuration upload)
 - Controller was set up incorrectly during production

Solution:

- Try to upload your configuration into controller again. Use one of default configuration files if it does not help (in case that the original configuration is corrupted).
- In case that configuration uploads does not help, connect IntelliMonitor to the controller and check if it is in the INIT state. It is necessary to send controller to ComAp for repair if the message is displayed and controller is in the INIT state. In case that IntelliVision is used, these two messages has the same meaning as "Configuration table error":
 - Comm. error (24492:080000F7)
 - Timeout (24571:080000BC)

7.2.9 Display is blank and LEDs are neither blinking nor glowing

Problem:

- There is nothing displayed by controller, display back-light is off and LEDs are not flashing or glowing.

Solution:

- There is no power supply voltage. Check the power supply voltage.
- Boot jumper is closed, switch controller off, open the jumper and switch controller on.

7.2.10 Display is showing "Unsupported code page"

Problem:

- The following message is shown on the display: Unsupported code page

Solution:

- The language used in the controller is not supported in the display (unsupported languages with graphical characters). In this case, change the language of the controller and contact ComAp to get more information about supported graphical languages (by default Chinese and Korean).

7.3 External display problems

7.3.1 No reaction to pushing command buttons or setting adjustments

Problem:

- It is not possible to adjust any setpoint setting and issue any command using IG-NT panel, IG/IS-Display module or IntelliVision (IV).

Solution:

- Access lock input is active for that particular terminal, therefore this terminal can be used only for monitoring. You can check this by looking on the first measurement screen (press Esc to enter menu and select Measurement).

Symbols displayed if access lock is active

IS-Display	"Crossed hand" symbol is displayed in the upper left corner
IG-Display and IG-NT	Lock symbol is displayed in the upper right corner
IntelliVision	"Crossed hand" symbol is displayed in the upper right corner of the Status bar part of measurement screens (see <i>Operator Interface</i> chapter in an IntelliVision Global Guide for information about the Status bar part of measurement screens)

Binary input function	Locked display module
AccessLock int	IG-NT/EE internal display, IS-Display and IV with Terminal address = 1
AccessLock D#2	IG-Display, IS-Display and IV with Terminal address = 2
AccessLock D#3	IS-Display and IV with Terminal address = 3

7.3.2 IntelliVision / IntelliVision 8 and image retention

Problem:

- In general LCD screens are susceptible to image retention at varying degrees. Image retention is caused by a parasitic capacitance build up within the LCD cell, which prevents the liquid crystal molecules from returning to their normal relaxed state.
- Image retention (reversing burn-in) can be observed during using IntelliVision, when retention of the main screen, which is displayed for most of the time, is strongly visible also on other screens. This image retention is not permanent change. After some time it fades.

Solution:

- DECREASE BRIGHTNESS of screen to approx. 50-60 %.
 - This solution helps to decrease recovery time of a screen to less than 2 minutes, when an image retention fades (the time can be longer if is used IV in too hot or too cold environment).
 - There are two brightness settings available:
 - Day mode
 - Night mode (especially for Marine applications)
 - Changing the modes can be done by holding the ESC button for 1 second.
 - Display brightness can be adjusted in range from 0 % to 100 % in both modes. Brightness of the display can be increased / decreased by holding **Esc** button and repeated pushing ↑ ↓. See the picture below:



- Push **ESC + PgUp** buttons or **ESC + PgDn** buttons to select mode which should be adjusted.

7.4 Synchronization, Load control

7.4.1 Gen-set voltage is increasing / decreasing over/under the limits during synchronization

Problem:

- When Gen-set is synchronizing to the Bus/Mains its voltage goes out of limits and GCB is opened due to over/undervoltage protection.

Solution:

- Check Setpoints *GenNomV* or *GenNomVph-ph* if they are adjusted to proper value.
- If the voltage is adjusted properly check if the same value is in *MainsNomV / BusNomV* or *MainsNomVph-ph / BusNomVph-ph*.

IMPORTANT: These values need to be adjusted to the same value even if nominal voltages of Gen-set and Bus/Mains are different!

- See the example below for proper adjustment of system with different nominal voltages on Mains/Bus and Gen-set.

Example: Both Setpoints *GenNomV* or *GenNomVph-ph* and *MainsNomV / BusNomV* or *MainsNomVph-ph / BusNomVph-ph* must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. Gen-set nominal is 231 V but Bus/Mains nominal is 240 V.

- In this case both setpoints need to be adjusted to 231 V and setpoints of corresponding protections for Bus/Mains need to be set asymmetrically.
- For 240 V on Bus/Mains it is typical to open MCB when voltage reaches 254 V or 225 V.
- Since the setpoint for Mains/Bus nominal voltage is adjusted to 231 V corresponding protection setpoints need to be adjusted to $\text{Mains} > \text{V} / \text{Bus} > \text{V} = 106\%$ and $\text{Mains} < \text{V} / \text{Bus} < \text{V} = 97\%$ (hence the desired values are reached).

7.4.2 GCB is opened before the Load ramp time is over

Problem:

- After reverse synchronization and during generator unloading is GCB opened before the Load ramp time is over.

Solution:

- **AMF settings:** *BreakerOverlap* time is shorter than the **Sync/Load ctrl:** *Load ramp time* setting. Set *Breaker overlap* to the same or longer time than *Load ramp* Setpoint.

- GCB is opened during generator unloading as soon as generator power level given by Setpoint **Sync/Load ctrl**: *GCB open level* is reached. Decrease the *GCB open level* setting to avoid premature GCB opening.
- Load in island was much lower than gen-set nominal power. The real time of load ramp is $Load\ ramp \times P_{initial_island} / N_{omin\ power}$; controller switches off GCB immediately (with 1s delay) as soon as generator power gets below the *GCB open level*.

7.4.3 Sync fail alarm is issued

Solution:

- Setpoint **Sync/Load ctrl**: *Sync timeout* is set to too short time -> set it to a longer time to allow controller to match all synchronizing conditions.
- Speed governor or AVR control is not setup correctly. See chapters **Speed governors interfaces** (page 913) and **AVR interfaces** (page 902).

7.4.4 MGCB is not closed even all conditions are fulfilled

Solution:

- IM-NT Bus protect: Bus >V Hst, Bus <V Hst, Bus >f, Bus <f do not have the same settings as IG/IS-NT generator control unit (use the same settings for generator and mains control unit).
- IM-NT and other Gen-sets are not in the same logical group. See Setpoints **Pwr Management: Control group** (Controller cannot see each other via CAN bus).

7.4.5 IM-NT BTB connects dead buses together

Problem:

- It happens, because even dead buses are evaluated by controller as "healthy". Reason is that either Setpoints **BusL protect**: *BusL Volt prot* and *BusLfreq prot* are set to DISABLED or Setpoints **BusR protect**: *BusR Volt prot* and *BusRfreq prot* are set to DISABLED. These settings means that controller does not evaluate if bus is healthy according to bus voltage and frequency protections Setpoints setting, because bus voltage and frequency check are simply disabled.

Solution:

- Change setting of at least one above mentioned Setpoint (*BusxVolt prot* and/or *Busxfreq prot*) to ENABLED (in both **BusL protect** and **BusR protect** groups) to avoid connecting of dead buses.

7.5 Power management

7.5.1 Gen-set doesn't share load with other Gen-sets

Solution:

- Check if the Gen-set is not running in the local BaseLoad mode. This mode is active if setpoint **ProcessControl**: *LocalBaseload* is set to other value than OFF. If this setpoint is not set to OFF then the Gen-set is taken out of Load sharing and Power management.

7.5.2 Running Hours Equalization does not work properly

Problem:

- Gen-set's priority switching based on engine running hours (**Pwr management**: *PriorAutoSwap* is set to RUN HOURS EQU) does not work properly and some or all Gen-sets has the same priority. It means that

Gen-sets with the same priority behaves as one large Gen-set and runs at the same time.

Solution:

- This problem is caused by incorrect priority switching system initialization. Follow these steps to get rid of the problem:
 - Set `#PriorAutoSwap` Setpoint to DISABLED
 - Set Priority Setpoints in all controllers to unique numbers
 - Set `#PriorAutoSwap` Setpoint to RUN HOURS EQU

7.5.3 Load shedding is active although not all Gen-sets are loaded

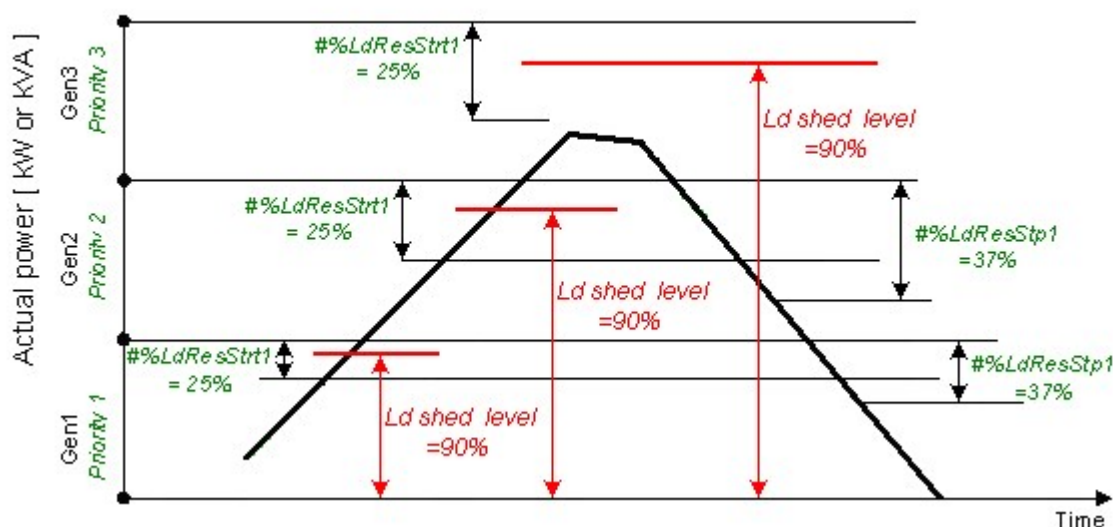
Problem:

- Load shedding outputs (LdShed stage 1,2 and 3) are active although not all available Gen-sets are loaded (running and connected to bus). The reason is that Load shedding and Power management control systems are independent and it is necessary to set controller properly to avoid this situation.

Solution:

- Use controller power management in “relative” mode. It means that **Pwr management: #Pwr mgmt mode** has to be set to REL (%). Make sure that **Pwr management: #LdResStrt x** is set below **Load shedding: Ld shed level** so idle Gen-set is started before load shedding output is activated.

Example: Example of correct Power management and Load shedding setting is on this picture:



You can see that the **Pwr management: #LdResStrt1** limit is crossed first when system load goes up and request to start additional Gen-set is issued before the load shedding request. However, it is not enough to set limits in the suggested way to make system work properly. It is important to set **Pwr management: #NextStrt del** much shorter than **Load shedding: Ld shed delay** so there is enough time for starting Gen-set to start, synchronize and take over load before a load shedding output is activated.

7.5.4 MGCB is not closed although Gen-sets are running

Problem:

- All available Gen-sets are running and connected to bus (GCB's are closed), but IM-NT does not close MGCB .

- Reason of the problem is that Act Reserve (Actual load reserve) value is not higher than value of currently used **Pwr management:LoadResStrt x** setpoint (Binary input functions *Load res x* can be used for switching between *LoadResStrt x* setpoints). Act Reserve has to exceed a *LoadResStrt x* value so IM-NT evaluates system reserve as sufficient to connect load to Gen-sets (this evaluation is not done when system should run in parallel with mains).
- Check state of the Syst res OK signal in IntelliMonitor (go to Values/Log Bout/LogBout 4) to see if Act Reserve is evaluated by IM-NT as sufficient enough (condition for MGCB closing is $\text{ActReserve} > \text{LoadResStrt x}$)

Solution:

- Check if setpoint **Pwr management: Pwr management** is set to ENABLED in Gen-set controllers (there is no such setpoint in IM-NT itself). Act Reserve value (P_{BNom}) in IM-NT is based on information it receives from Gen-sets power management system. There is no information about available power sent from Gen-sets controllers to IM-NT if **Pwr management** is set to DISABLED.
- Decrease value of a currently used **Pwr management:#LoadResStrt x** Setpoint so available Act Reserve (P_{BNom}) is higher than the *#LoadResStrt x* setpoint. Do that if you consider available Act Reserve power sufficient enough to cover a system load.
 - You can use alternative *#LoadResStrt x* setpoint with setting low enough to enable MGCB closing (use a *Load res x* Binary input function for switching to a different *LoadResStrt x* setpoint).
- Set **Pwr management:#LoadResStrt x** setpoint to a negative value if you can not set **Pwr management:Pwr management** setpoint to ENABLED in Gen-sets controllers (e.g. IGS-NT-LSM+PMS dongle is not used in Gen-set controllers and power management function is not available then). It is necessary to fulfill the following condition to enable MGCB closing:

	$P_{\text{BNom}} > P_{\text{Akt}} + \text{Reserve}$
P_{BNom}	Sum of the nominal power of all running Gen-sets (displayed as Act Reserve value by IM-NT)
P_{Akt}	System load
Reserve	Selected setpoint <i>#LoadResStrt x</i>

Setting Setpoint *Pwr management* to DISABLED in Gen-set controllers means that P_{BNom} is always 0 in IM-NT (no power information is received from Gen-set controllers) and it is necessary to set *#LoadResStrt x* to a negative value to meet the condition for MGCB closing.

It is sufficient to set *#LoadResStrt x* to -1 if only one MGCB needs to be closed (P_{Akt} is always 0 before the first MGCB breaker is closed). However, this setting is not sufficient if several MGCB should be closed and it is necessary to set *#LoadResStrt x* to a lower value.

Example: It is necessary to set a *#LoadResStrt x* setpoint to -101 (or a lower value) to achieve second MGCB closing if P_{Akt} is 100 after closing of the first MGCB:

- $P_{\text{BNom}} > P_{\text{Akt}} + \text{Reserve}$
- $0 > 100 + (-101)$

7.6 PC software

7.6.1 There is no history in .ant file

Solution:

- IntelliMonitor / Settings / History – the Typical program setting is to "Site monitored from this computer only". If this is not true, i.e. some other computer may be connected sometimes to the site (controller), it may read out the history records and after this computer is connected again, there appear to be no records in the archive. In such a case (especially can happen with remote, e.g. modem connections), please switch to "Site monitored from more computers", which ensures proper history reading. The first option provides faster history reading if there are only few new records, but with more computers accessing the same site leads to the above mentioned behavior.
- Archive was saved with GenConfig tool with version lower than 2.1. GenConfig is offline tool for configuration purposes, so archives saved using this tool does not contain actual history data. That's why history is not saved at all with this tool. Starting from version 2.1, GenConfig is able to read history from controller and save it as part of controller configuration file.

7.6.2 History is not complete

Problem:

- Some history records which are available in controller are not included in downloaded history.

Solution:

- This problem is caused by IntelliMonitor setting. It happens if history reading is set to *Site monitored from this computer only* and more computers are used to read data from a controller. IntelliMonitor with *Site monitored from this computer only* setting reads only history records which were not downloaded during the last connection and records are missing if the last connection was done using a different computer.
- Go to Settings -> History and change setting from *Site monitored from this computer only* to setting which matches your needs. Recommended settings are *Site monitored from more computers* or *Service tool* (see [IntelliMonitor Global Guide](#) for more information).

7.7 Electrical measurement

7.7.1 Controller measures wrong generator / mains / bus voltages or currents

Problem:

- Controller measures wrong generator / mains / bus voltages or currents, because setpoint **Basic settings:CT ratio prim / Im3ErFICTp / VT ratio / Vm VT ratio** is set to a wrong value. Setpoint setting does not match CT / VT ratio of used measurement transformer.

Solution:

- Change it to correct value according to the VT/CT specification.
- For IS-NT-BB or IG-xxC HW types, setpoint **Basic settings:CT ratio sec / Im3ErFICTs / VgInpRangeSel / VmInpRangeSel** is set to a wrong secondary voltage / current range. Set it to correct range (5 A or 1 A, 120 V or 277 V).

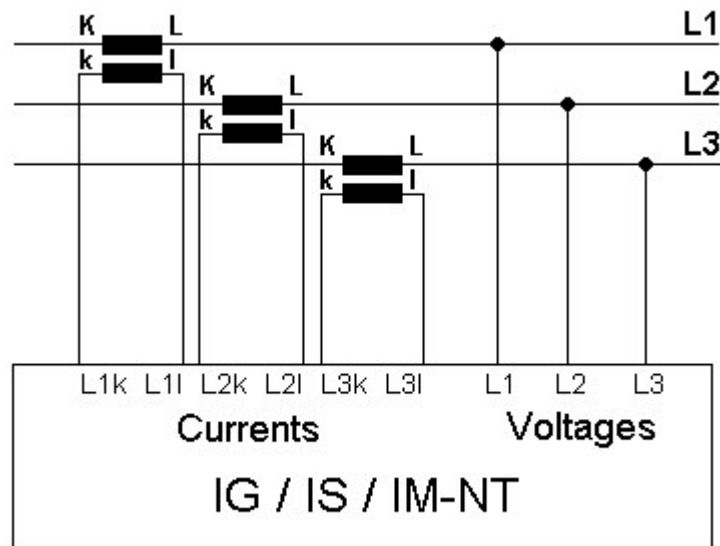
7.7.2 Power measurement does not work

Problem:

- It may happen that controller measures correct generator / mains / bus voltages and currents values, but active and reactive power values displayed by controller are not correct or even zero. Power Factor (PF) value is incorrect too and there is a big difference in PF between phases (e.g. phase L1 power factor is 0.9 and in phase L2 power factor is 0.2).

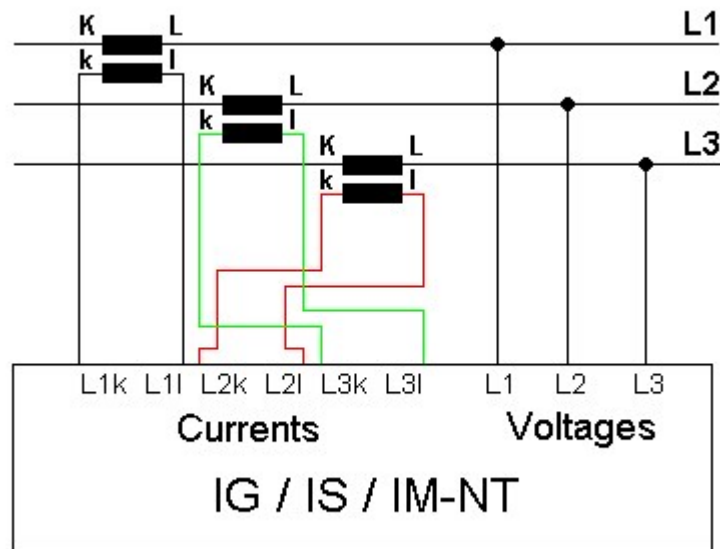
Solution:

- Solution is to adjust CTs connection, it means changing polarity of CTs and/or swapping their order.
- Correct voltage and current measurement connection:



- Imagine that a generator is loaded with a load bank which burns 100 kW in each phase. Load bank Power Factor (PF) is 1. If power in each phase is 100 kW, total generator power (P_{TOT}) displayed by controller is 300 kW. Calculation is as follows:
 - $U_{L1}=U_{L2}=U_{L3}= 400 \text{ V}$
 - $I_{L1}=I_{L2}=I_{L3}= 250 \text{ A}$
 - $PF_{L1}=PF_{L2}=PF_{L3} = 1$
 - $P_{L1}=P_{L2}=P_{L3}= U_{L1} \times I_{L1} \times PF_{L1} = 400 \times 250 \times 1 = 100 \text{ kW}$
 - $P_{TOT}=P_{L1}+P_{L2}+P_{L3}= 100+100+100= \mathbf{300 \text{ kW}}$

Example: Example of incorrect connection with CTs swapped between phases L2 and L3:



In this case 100 kW is still burned in each load bank phase, but PF in phases L2 and L3 is not 1 from controller point of view. PF in phases L2 and L3 is -0.5 due to phase shift between voltages and currents which is caused by CTs swapping. The result is that total generator power displayed by controller is 0 kW. Calculation is as follows:

$$U_{L1}=U_{L2}=U_{L3}= 400 \text{ V}$$

$$I_{L1}=I_{L2}=I_{L3}= 250 \text{ A}$$

$$PF_{L1}=1$$

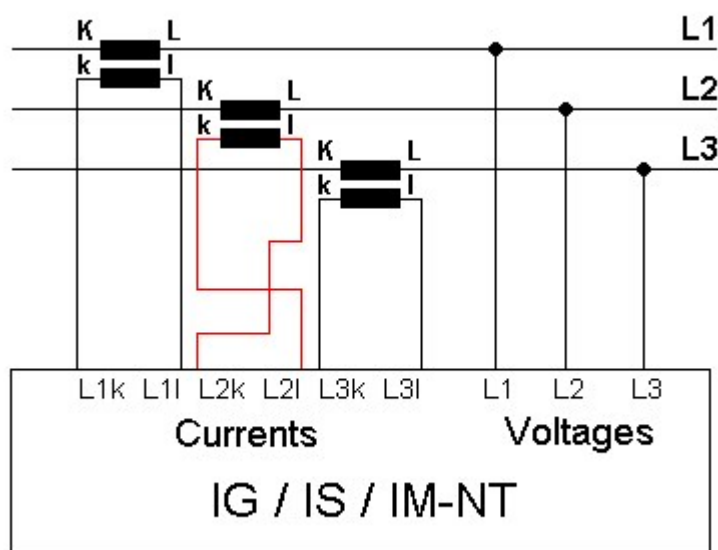
$$PF_{L2}=PF_{L3}= -0.5$$

$$P_{L1}= U_{L1} \times I_{L1} \times PF_{L1} = 400 \times 250 \times 1 = 100 \text{ kW}$$

$$P_{L2}=P_{L3}= U_{L2} \times I_{L2} \times PF_{L2} = -50 \text{ kW}$$

$$P_{TOT}=P_{L1}+P_{L2}+P_{L3}= 100+(-50)+(-50)= \mathbf{0 \text{ kW}}$$

Example: Example of incorrect connection with wrong CT polarity in phase L2:



In this case 100 kW is still burned in each load bank phase, but PF in phase L2 is not 1 from controller point of view. PF in phase L2 is -1, because current goes in the opposite way due to wrong CT polarity. The result is that total generator power displayed by controller is 100 kW. Calculation is as follows:

$$U_{L1}=U_{L2}=U_{L3}= 400 \text{ V}$$

$$I_{L1}=I_{L2}=I_{L3}= 250 \text{ A}$$

$$PF_{L1}=PF_{L3}=1$$

$$PF_{L2}= -1$$

$$P_{L1}=P_{L3}= U_{L1} \times I_{L1} \times PF_{L1}=400 \times 250 \times 1= 100 \text{ kW}$$

$$P_{L2}=U_{L2} \times I_{L2} \times PF_{L2}= 400 \times 250 \times (-1)= -100 \text{ kW}$$

$$P_{TOT}=P_{L1}+P_{L2}+P_{L3}= 100+(-100)+100= \mathbf{100 \text{ kW}}$$

Note: Many different combinations of incorrect CTs connection are possible so check both, order of CTs and their polarity. Reactive power measurement is affected by incorrect CTs connection in similar way as active power measurement.

7.8 Other

7.8.1 SummerTime Mode causing time rollback and time desynchronization

Problem:

- Multiple controllers are used on CAN bus and some of them have FW 2.6.3 (IGS-NT-Std) or 2.9.1 (IM-NT) and others have older versions of FW. SummerTime Mode is active (i.e. it is not set to DISABLE).

Controllers are not powered and time change is about to be done.

Example: One controller with IGS-NT-Std FW 2.6.3 and one controller with IGS-NT-Std FW 2.6.1 are connected via CAN . Date is 27.10. 2013 and time is 2:59 am. SummerTime Mode is set to SUMMER (i.e. time change is active). Controllers are powered down and stay powered down for period longer than one hour (e.g. 8 hours). When powered back on time and SummerTime Mode changes rapidly causing bad time value and moreover causing desynchronization of the time between controllers (e.g. IGS-NT-Std 2.6.3 shows 2:05 am and IGS-NT-Std 2.6.1 shows 7:05 pm).

Solution:

- All controllers FW need to be updated to the latest version to prevent this behavior. When all controllers are updated, SummerTime Mode works properly.

Note: Note that this behavior occurs only when old and new versions are mixed. When only old versions are present and controllers are powered down, time change does not occur (due to previous error fixed in 2.6.3/2.9.1) but time is not desynchronized.

7.8.2 Wrn addr error occurs when updating to new FW

Problem:

- Wrn addr error is issued. Controller address cannot be changed. (This may occur after changing CANnegotiation setpoint to AUT and restarting the controller or after update to the new FW version (e.g. IM-NT 2.9 to IM-NT 2.9.1) – the update may activate CANnegotiation.)

Solution:

- This particular problem (Wrn addr) is caused by the function CANnegotiation and occurs only if there are controllers with the same CAN address and without CANnegotiation ability. This occurs only in specific case with specific hardware.
- It is essential to check setpoints and write correct value in them. In this particular case please locate the setpoint CANnegotiation (in Comms settings) and change its state (there may be AUT or a number after update) to OFF mode. Then **power down and power up** the controller. The warning should not be displayed anymore.

Note: Function CANnegotiation can be activated only when all controllers are able to perform this function. If there are controllers with and without CANnegotiation (e.g. IM-NT and IG-MINT), CANnegotiation must be switch OFF in all CANnegotiation capable controllers!

7.8.3 Statistic values window contains strange numbers upon start-up

Problem:

- All NT controllers produced till March, 2007 (serial numbers 0703xxxx and lower) have undefined values in statistics. Controllers produced later have all statistics values set to initial value 0.

Solution:

- Should you come across a controller with undefined statistic values, run IntelliMonitor, go to menu Monitor, select Set statistics, and click on button "Clear all". Wait until all numbers lose their bold form (writing in process) and close the window.

7.8.4 Alarms stays in Alarm list even though Fault reset was used to acknowledge them

Problem:

- Fault reset was used to acknowledge active alarms displayed by controller, but alarms stayed in alarm list after they became inactive, because controller does not allow an alarm to be acknowledged by pressing the fault reset button while the alarm is still active. It is caused by setpoint **Engine protect:ResetActAlarms** setting to DISABLED. This is a new option which was not available in IG/IS classic – you can now disable resetting of alarms that are currently active by setting the setpoint to DISABLED (Marine authorities requirement).

Solution:

- If you don't need this functionality, switch the setpoint to ENABLED, which is the mode compatible with IG/IS classic controllers.

7.8.5 No active call after some protection has been activated

Solution:

- Setpoint that enables active calls for a particular protection type is not set to ENABLED. Check it in **Act. calls/SMS** setpoints group.
- Setpoint **Act. calls/SMS:AcallCHx-Type** is set to a wrong option. E.g. it is set to SMS-GSM, while analog modem is actually connected. You have to change this setpoint to such option that matches used type of connection.
- Phone number or e-mail address is wrong. Check the setting (**Act. calls/SMS:AcallCHx-Addr** setpoints), including the prefix codes for local phone calls or intercity calls.

7.8.6 Forgotten controller password

Solution:

- For all users, except the user 0 = administrator, password can be reset by the administrator. If administrator is logged in, he can set password to any value for a particular user. Controller panel or PC can be used to do that:
 - **Controller panel:** log in as administrator (default user name of the administrator is U0), go to Users/Password in the menu and select user for which you intend to reset the password. You will see "Reset password" option on the screen, select it, press Enter to confirm your choice and press Esc to get back into the menu. Now that user has password set to "0" and it can be set to any value.

- **PC SW (InteliMonitor):** log in as administrator (default user name of the administrator is U0), go to menu Monitor / Admin users. A window opens where you can set up access rights etc. Select the user for which you intend to reset its password and press the crossed lock icon in the upper left corner. You can also reset passwords for all users at once. Password is set to "0" and it can be set to any value.
- If the highest (level 7) administrator password is lost, you need to provide your distributor this information: controller serial number and PasswordDecode number.
- Serial number and PasswordDecode number are available in InteliMonitor in Monitor / Controller / Archive info... Both serial number and PasswordDecode number are available on controller Info screen 2. Hold Enter and push the Esc button to enter the screen on IS-Display, push the right arrow then to display information on IG-NT / IM-NT screen.

7.8.7 PID regulator doesn't work in the same way as in IS-CU

Solution:

- If the PID regulator in internal PLC of the controller doesn't behave in the same as you were used to with the classic IS-CU controller, set the parameters 10 times higher than for the PID regulator in classic IS-CU.

7.8.8 MCB fail / GCB fail alarm is issued after switching controller on

Problem:

- Breaker fail alarm is issued if a breaker feedback signal is not connected directly to a controller and controller receives information about breaker state after initial reading of its Binary inputs. This happens if breaker feedback is evaluated in controller PLC or it is connected to controller via an extension module (standard or virtual).

Solution:

- Connect breaker feedback signals directly to a controller binary input. Feedback signal is delayed if it is connected to an extension unit, using a virtual periphery or it is output of controller PLC logic. States of binary inputs are evaluated immediately after switching controller on. It takes some additional time to run PLC or establish remote communication via CAN (virtual periphery) or with a standard extension module (e.g. IGS-PTM). Breaker feedback is very important signal for correct controller function and it is strongly recommended to connect it directly to binary input of a controller itself.
- Check if either breaker control signal logic (e.g. GCB close/open signal) or breaker feedback signal logic (e.g. GCB feedback signal) is set correctly (BI/BO option Inverted is set correctly).

7.9 How to...

7.9.1 Setup your controller to work as the SSB application

SSB application is known from IG/IS classic controllers, but it is no more present among NT applications. So you have to modify behavior of the SPtM application to achieve that. This type of application can be handled with IL-NT AMF controllers.

Start with the default SPtM archive and set the following setpoints in the **ProcessControl** group of setpoints:

- *Island enable* = YES (stand-by application needs to work in island when mains is gone)
- *ParallelEnable* = NO (no mains paralleling is allowed)

- *SynchroEnable* = NONE (no synchronizing is allowed)
- *MFStart enable* = YES (basic function of the SSB application – start upon mains failure)

7.9.2 Setup your controller to work as the SPM application

SPM application is known from IG/IS classic controllers, but it is no more present among NT applications. So you have to modify behavior of the MINT application to achieve that. This type of application can be handled with IL-NT MRS controllers.

Start with the default MINT archive and follow these instructions:

- The controller with MINT, COX or Combi in MINT archive can work without Dongle LSM+PMS if all following conditions are fulfilled
 - The power management must be disabled (Pwr management = DISABLED) **and**
 - (SysLdCtrl PtM must be switched to BASE LOAD and MCB feedback must be 1) **or** there is no CAN2 communication

The conditions above allow user to use the following combinations without Dongle:

Pwr management	SysLdCtrl PtM	MCB feedback	CAN2 communication
DISABLED	BASE LOAD	1	YES
DISABLED	ANY	ANY	NO

If the above conditions are fulfilled, there is no "Dongle incomp" message displayed in controller Alarm list. This message is normally displayed by controller with MINT application as the IGS-NT-LSM+PMS dongle is expected to be used for standard use of the MINT application. In this special case and providing the stated conditions, the message is suppressed to allow controller to work in the SPM mode.

7.10 List of Possible Events

Note: Be aware that it is possible to change alarm messages using Translator in GenConfig. Try to find an alarm text in the Translator card if you can not find it on this list. Use Ctrl+F function to find an alarm text. Check PLC functions Force protect setting and customized protections (see card Protections in GenConfig) to find alarm messages which are not listed below.

IGS-NT Alarm/History record	Alarm/History Appearance	Description
BIN 1-12 ¹⁾	A+H	<p>Indication of error in communication with binary inputs extension module.</p> <p>Check if the unit with corresponding CAN address is</p> <ul style="list-style-type: none"> > Powered up > Address of the module is set correctly > Correctly connected and check connection of terminating resistors on the CAN1 bus > The CAN bus Low and High wires are not swapped <p>To check module communication activity look at the Tx and Rx LEDs of the CAN bus port. Fast flashing means that communication is OK.</p>
ANA 1-10 ¹⁾	A+H	<p>Indication of error in communication with analog inputs extension module.</p> <p>Check if the unit with corresponding CAN address is</p> <ul style="list-style-type: none"> > Powered up > Address of the module is set correctly > Correctly connected and check connection of terminating resistors on the CAN1 bus > The CAN bus Low and High wires are not swapped <p>To check module communication activity look at the Tx and Rx LEDs of the CAN bus port. Fast flashing means that communication is OK.</p>
BOU 1-12 ¹⁾	A+H	<p>Indication of error in communication with binary outputs extension module.</p> <p>Check if the unit with corresponding CAN address is</p> <ul style="list-style-type: none"> > Powered up > Address of the module is set correctly > Correctly connected and check connection of terminating resistors on the CAN1 bus. The CAN bus Low and High wires are not swapped <p>To check module communication activity look at the Tx and Rx LEDs of the CAN bus port. Fast flashing means that communication is OK.</p>

IGS-NT Alarm/History record	Alarm/History Appearance	Description
AOUT 1-4 ¹⁾	A+H	<p>Indication of error in communication with analog outputs extension module.</p> <p>Check if the unit with corresponding CAN address is</p> <ul style="list-style-type: none"> ➤ Powered up ➤ Address of the module is set correctly ➤ Correctly connected and check connection of terminating resistors on the CAN1 bus ➤ The CAN bus Low and High wires are not swapped <p>To check module communication activity look at the Tx and Rx LEDs of the CAN bus port. Fast flashing means that communication is OK.</p>
ECU ¹⁾	A+H	<p>Indication of error in communication with ECU .</p> <p>Check if the ECU is:</p> <ul style="list-style-type: none"> ➤ Correctly connected to the CAN1port of the controller ➤ Powered up ➤ Terminating resistors are properly connected ➤ The CAN bus Low and High wires are not swapped
SHBIN 1-4 ¹⁾	A+H	<p>Indication of error in communication with SHBOUT 1–4 module.</p> <p>Check that</p> <ul style="list-style-type: none"> ➤ One of the controllers on site is configured as a SOURCE controller (has SHBOUT (x) module configured) ➤ The SOURCE controller is powered up ➤ TARGET and SOURCE controllers are connected to the CAN2 bus and Tx and Rx LEDs of the CAN2 bus ports are flashing ➤ The controllers can "see" each other – check CAN16/CAN32 values on the Power management screen (each controller is indicated by 1 on the position given by its address)
SHAIN 1-4 ¹⁾	A+H	<p>Indication of error in communication with SHAOUT 1–4 module.</p> <p>Check that</p> <ul style="list-style-type: none"> ➤ One of the controllers on site is configured as a SOURCE controller (has SHAOUT (x) module configured) ➤ The SOURCE controller is powered up ➤ TARGET and SOURCE controllers are connected to the CAN2 bus and Tx and Rx LEDs of the CAN2 bus ports are flashing ➤ The controllers can "see" each other – check CAN16/CAN32 values on the Power management screen (each controller is indicated by 1 on the position given by its address)

IGS-NT Alarm/History record	Alarm/History Appearance	Description
SHBinCfgErr ¹⁾	A	Shared Binary module configuration error – i.e. more than one source module (SHBOUT) were configured (on the CAN2 bus). Make sure that only one SHBOUT x module is configured in controllers.
SHAINCfgErr ¹⁾	A	Shared Analog module configuration error – i.e. more than one source module (SHAOUT) were configured (on the CAN2 bus). Make sure that only one SHAOUT x module is configured in controllers.
PLC State 1 ²⁾	A	PLC state 1 indication (for more information see description of Force protect PLC function).
PLC State 2 ²⁾	A	PLC state 2 indication (for more information see description of Force protect PLC function).
PLC State 3 ²⁾	A	PLC state 3 indication (for more information see description of Force protect PLC function).
PLC State 4 ²⁾	A	PLC state 4 indication (for more information see description of Force protect PLC function).
ActCall Fail	A	Indication of failed Active call. Refer to an InteliCommunication Guide to check modem/internet connection and active call setup.
ECUDiagBlocked	A	Alarm is active when Comms settings:ECU diag = DISABLED . This setting means that ECU alarms are not displayed and considered by controller and this alarm is the setting notification.
Wrong config	A+H	Wrong controller configuration indication. Indicates that controller hardware doesn't support PLC used in configuration. In case DISTBIN/DISTBOUT is configured and the correct dongle is not used, alarm message "Wrong config" is issued. DISTBIN and DISTBOUT function is conditioned by dongle. IS-AFC-LSM+PMS / IGS-NT-LSM+PMS / IGS-NT-AFR-LSM+PMS dongle can be used. To check it send the IDch and Dngl strings ³⁾ from controller Info screen 2 and archive to your technical support.
RTCbatteryFlat	A	This warning message "RTCbatteryFlat" appears in Alarmlist when battery is close to be completely flat. If power supply cut comes when the RTC battery is flat, the statistic values, history and setpoints settings are lost. Send a controller to your distributor for battery exchange if the RTCbatteryFlat message is displayed ⁴⁾ .
AI/Hist. msg 1-16 ⁵⁾	A+H	AI/Hist. msg 1-16 activity indication (AI/Hist. msg means Alarm/History message). AI/Hist. msg can be used as a customized message for additional protection configured to any controller internal value. See GenConfig manual – Protections.

IGS-NT Alarm/History record	Alarm/History Appearance	Description
Batt volt	A+H	Indication of battery voltage protection activity. This protection is based on Analog protect: <i>Batt >V, Batt <V, and Batt volt del</i> setpoints. Check if engine alternator or independent battery charger works properly.
EarthFaultCurr	A+H	Indication of Earth fault current protection activity. This protection is based on Gener protect: <i>EarthFaultCurr</i> and <i>EthFltCurr del</i> setpoints. Setpoint <i>EarthFltCurrCT</i> from Basic settings group of setpoints is related to this protection too.
Gen V unbal	A+H	Generator voltage unbalance alarm is based on Gener protect: <i>Gen V unbal</i> and <i>Gen V unb del</i> setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
Gen I unbal	A+H	Generator current asymmetry (unbalance) alarm is based on Gener protect: <i>Gen I unbal</i> and <i>Gen I unb del</i> Setpoints. The current unbalance is calculated as a maximum difference between phase currents.
BusL I unbal	A+H	Left bus current asymmetry (unbalance) alarm is based on Gener protect: <i>BusL I unbal</i> and <i>BusL I unb del</i> Setpoints. The current unbalance is calculated as a maximum difference between phase currents.
Mains V unbal	A+H	Mains voltage unbalance alarm is based on Mains protect: <i>Mains V unbal</i> and <i>MainsV unb del</i> Setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
Mains I unbal	A+H	Mains current asymmetry (unbalance) alarm is based on Mains protect: <i>Mains I unbal</i> and <i>Mains I unb del</i> Setpoints. The current unbalance is calculated as a maximum difference between phase currents.
Bus V unbal	A+H	Bus voltage unbalance alarm is based on Gener protect (Bus protect): <i>Bus V unbal</i> and <i>Bus V unb del</i> Setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
BusL V unbal		Left bus voltage unbalance alarm is based on BusL protect: <i>BusL V unbal</i> and <i>BusL V unb del</i> Setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
BusR V unbal		Right bus voltage unbalance alarm is based on BusR protect: <i>BusR V unbal</i> and <i>BusR V unb del</i> Setpoints. The voltage unbalance is calculated as a maximum difference between phase voltages.
Dongle incomp	A+H	Incompatible (usually missing) dongle indication. IS-AFC-LSM+PMS / IGS-NT-LSM+PMS / IGS-NT-AFR-LSM+PMS dongle is required if load sharing and power management functions are used in MINT, COX or Combi application.

IGS-NT Alarm/History record	Alarm/History Appearance	Description
Incom. periph.	A+H	If the incompatible modules are used and the communication to this module cannot be established, this alarm and history event are recorded.
Emergency stop	A+H	Emergency stop activity indication. Check Binary input with Emergency stop function.
CAN2 bus empty	A+H	This alarm is active if controller doesn't "see" any other controllers on the CAN2 bus. Alarm activation can be ENABLED / DISABLED using setpoint Comm settings: CAN2emptyDetect . This setpoint should be set to DISABLED for single Gen-set applications. Check Reg16/Reg32 strings to see which controllers are in the same group ¹⁸⁾ .
ChrgAlternFail	A+H	Charger fail detection. This alarm means that voltage on the D+ terminal is lower than 80 % of controller power supply voltage and it means that battery is no longer charged. Check function of engine alternator or independent battery charger.
Sd Stop fail	A+H	Engine stop fail indication. Stop fail means that engine does not reach "still engine" state within Engine params: Stop time . "Still engine" conditions: <ul style="list-style-type: none"> > Engine speed (RPM) = 0 and > AI: Oil press < Starting POil and > D+ terminal is not active and > BI: RunIndication 1 and 2 and 3 are not active and > Generator voltage < 15 V (in all phases) and > Generator frequency = 0 Hz > If all these conditions are fulfilled, additional 2 s delay is used to confirm "still engine" state.
Overspeed	A+H	Gen-set over speed alarm is based on Engine protect: Overspeed setpoint setting.
Underspeed	A+H	Gen-set under speed alarm indication. Under speed limit is based on Engine params: Starting RPM setting. This protection is activated after successful engine start if engine speed drops below value given by Starting RPM setpoint setting.
Pickup fail	A+H	Pickup fail indication. Pickup fail means loss of RPM signal in running state ("engine running" state is active). The maximal difference between RPM and Frequency is based on the following calculation: $\text{abs}\{[(\text{RPM_meas}/\text{f_meas}) - (\text{RPM_nominal}/\text{f_nominal})]/(\text{RPM_nominal}/\text{f_nominal})\} > 0,01$ for over 2 seconds. "Engine running" conditions: <ul style="list-style-type: none"> > Engine speed > Engine params: Starting RPM or

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		<ul style="list-style-type: none"> ➤ AI: Oil press > Starting POil or ➤ D+ terminal active (this condition is used only if Engine params:D+ function = ENABLED) or ➤ BI: RunIndication 1 or 2 or 3 is active or ➤ Generator voltage > 15 V (in any phase) <p>See <i>Speed pick-up</i> input section in the Technical data (page 315) for information about requested pick-up signal parameters.</p>
Sd BatteryFlat	A+H	Alarm is activated if controller "wakes up" after a start attempt which caused battery voltage drop (voltage drop below 6 V) and consequently controller switch-off. ComAp I-LBA module may help to solve this problem.
WrnServiceTime	A+H	This alarm is activated when at least one of controller count down service timers Engine protect:Service time X has reached zero. It is necessary to set again a non-zero value to a corresponding setpoint to reset this alarm.
Not lubricated	A	This Alarm list message is active until the first lubrication cycle has been finished. See <i>Engine states</i> chapter.
Start fail	A+H	This alarm is issued if Gen-set start-up fails. It means that several crank attempts has been done (number of attempts is given by Engine params:Crank attempts) and engine did not start. For more information see <i>Engine starting procedures</i> chapters.
Start blocking	A	This message means that a binary input with Startblocking function is active and engine start is blocked. If active, NotReady state is shown on the controller screen and the message appears in the Alarm list. As soon as input is deactivated, engine start is enabled again.
Wrn CylTemp1-32	A+H	Warning protection on AI Cylinder temperature 1-32 is active. Check corresponding setpoints in the Engine protect group.
Wrn MCB fail	A+H	MCB failure was detected. See <i>Circuit breakers operation sequence, GCB/MCB fail detection</i> chapters.
Stp GCB fail	A+H	GCBfailure was detected. See <i>Circuit breakers operation sequence, GCB/MCB fail detection</i> chapters.
Wrn BTB fail	A+H	BTB failure was detected. See <i>Circuit breakers operation sequence, GCB/MCBfail detection</i> chapters. It applies to BTB breaker too.
Wrn MGCB fail		MGCB failure was detected. See <i>Circuit breakers operation sequence, GCB/MCB fail detection</i>

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		chapter in Global Guide . It applies to MGCB breaker too.
Sd Oil press B	A+H	Engine shut-down was activated by binary input with "Oil press" function (see LBI card in GenConfig for information about source signal for this function).
Wrn RSync fail	A+H	<p>Reverse synchronization failure indication, Gen-set or group of Gen-sets was not synchronized to mains within Sync/Load ctrl: Sync timeout time.</p> <p>Check setting of setpoints in the Sync/Load ctrl and Volt/PF ctrl groups. Frequency regulation loop, Angle regulation loop and Voltage regulation loop are active during synchronization and you may need to adjust their setting.</p> <p>Actual state of synchronization is visible on the controller measurement screen with synchroscope where speed and voltage regulator's outputs, slip frequency and generator and mains voltages can be observed during the synchronization process.</p>
Stp Sync fail	A+H	<p>Synchronization failure indication (alarm Sync timeout is active), Gen-set or group of Gen-sets was not synchronized to mains/bus within Sync/Load ctrl: Sync timeout time.</p> <p>Check setting of setpoints in the Sync/Load ctrl and Volt/PF ctrl groups. Frequency regulation loop, Angle regulation loop and Voltage regulation loop are active during synchronization and you may need to adjust their setting.</p> <p>Actual state of synchronization is visible on the controller measurement screen with synchroscope where speed and voltage regulators' outputs, slip frequency and generator and mains/bus voltages can be observed during the synchronization process.</p>
Wrn Sync fail	A+H	<p>Synchronization failure indication (alarm Sync timeout is active), gen-set or group of Gen-sets was not synchronized to mains/bus within Sync/Load ctrl: Sync timeout time.</p> <p>Check setting of setpoints in the <i>Sync/Load ctrl</i> and <i>Volt/PF ctrl</i> groups. Frequency regulation loop, Angle regulation loop and Voltage regulation loop are active during synchronization and you may need to adjust their setting.</p> <p>Actual state of synchronization is visible on the controller measurement screen with synchroscope where speed and voltage regulators' outputs, slip frequency and generator and mains/bus voltages can be observed during the synchronization process.</p>
BOC L1, L2 or L3 under	A+H	Generator L1, L2 or L3 voltage was under the Gen <V BOC limit for Gen V del time. Undervoltage protections are based on Gener protect: Gen <V BOC and <i>Gen V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		NEUTRAL. ¹⁹⁾
BOC L1, L2 or L3 over	A+H	Generator L1, L2 or L3 voltage was over the Gen >V BOC limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V BOC and <i>Gen V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-NEUTRAL. ¹⁹⁾
Sd L1, L2 or L3 over	A+H	Generator L1, L2 or L3 voltage was over the Gen >V SD limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V SD and <i>Gen V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-NEUTRAL. ¹⁹⁾
BOC L12, L23 or L31 under	A+H	Generator L12, L23 or L31 voltage was under the Gen <V BOC limit for Gen V del time.. Undervoltage protections are based on Gener protect: Gen <V BOC and <i>Gen V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE. ¹⁹⁾
BOC L12, L23 or L31 over	A+H	Generator L12, L23 or L31 voltage was over the Gen >V BOC limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V BOC and <i>Gen V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE. ¹⁹⁾
Sd L12, L23 or L31 over	A+H	Generator L12, L23 or L31 voltage was over the Gen >V SD limit for Gen V del time. Overvoltage protections are based on Gener protect: Gen >V SD and <i>Gen V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: FixVoltProtSel is set to PHASE-PHASE. ¹⁹⁾
BOC fgen under	A+H	Generator frequency was under the <i>Gen <f</i> limit for <i>Gen f del</i> time. Under frequency protection is based on Gener protect: Gen <f and <i>Gen f del/Setpoints</i> . ²⁰⁾
BOC fgen over	A+H	Generator frequency was over the <i>Gen >f</i> limit for <i>Gen f del</i> time. Over frequency protection is based on Gener protect: Gen <f and <i>Gen f del/Setpoints</i> . ²⁰⁾
BOC ReversePwr	A+H	This alarm is issued by the reverse power protection. This protection is based on Gener protect: Reverse power and <i>ReversePwr del</i> setpoints. This alarm means that either engine speed/power control does not work properly or generator current transformers (CT's) are connected in a wrong way. ²⁰⁾
MP L1, L2 or L3	A+H	Mains L1, L2 or L3 voltage was under the <i>Mains <V MP</i> limit for

IGS-NT Alarm/History record	Alarm/History Appearance	Description
under		<i>Mains V del time</i> . Undervoltage protections are based on Mains protect: <i>Mains <V MP</i> and <i>Mains V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: <i>FixVoltProtSel</i> is set to PHASE-NEUTRAL.
MP L1, L2 or L3 over	A+H	Mains L1, L2 or L3 voltage was over the <i>Mains >V MP</i> limit for <i>Mains V del time</i> . Overvoltage protections are based on Mains protect: <i>Mains >V MP</i> and <i>Mains V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings: <i>FixVoltProtSel</i> is set to PHASE-NEUTRAL.
MP L12, L23 or L31 under	A+H	Mains L12, L23 or L31 voltage was under the <i>Mains <V MP</i> limit for <i>Mains V del time</i> . Undervoltage protections are based on Mains protect: <i>Mains <V MP</i> and <i>Mains V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: <i>FixVoltProtSel</i> is set to PHASE-PHASE.
MP L12, L23 or L31 over	A+H	Mains L12, L23 or L31 voltage was over the <i>Mains >V MP</i> limit for <i>Mains V del time</i> . Overvoltage protections are based on Mains protect: <i>Mains >V MP</i> and <i>Mains V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings: <i>FixVoltProtSel</i> is set to PHASE-PHASE.
Mains Avg x >V	A+H	If the value of 10 min. average mains voltage of any phase (<i>Mains Avg V1, Mains Avg V2, Mains Avg V3</i>) exceed value given by Setpoint <i>Mains Avg >V MP</i> (Mains protect group) the MCB is opened and message <i>Mains Avg x >V</i> appears in alarm list and history record. BO <i>Common MP</i> is activated (<i>x indicates number of phase</i>).
MP fmns under	A+H	Mains frequency was under the <i>Mains <f limit</i> for <i>Mains f del time</i> . Under frequency protection is based on Mains protect: <i>Mains <f</i> and <i>Mains f del</i> setpoints.
MP fmns over	A+H	Mains frequency was over the <i>Mains >f limit</i> for <i>Mains f del time</i> . Over frequency protection is based on Mains protect: <i>Mains >f</i> and <i>Mains f del</i> setpoints.
ROCOF	H	If measured value of <i>df/dt</i> (mains frequency) exceed <i>ROCOF df/dt</i> (setpoint in Mains protect group), ROCOF protection is activated. ROCOF protection trips mains circuit breaker (MCB). The message ROCOF is written in history of controller. Value of <i>df/dt</i> is evaluated from mains voltage.
BusL L1, L2 or L3 under	H	Left bus L1,L2 or L3 voltage was under the <i>BusLeft <V limit</i> for the <i>BusLeft V del time</i> . Information about that is recorded into controller history.

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		<p>Setpoint BusL protect:BusL Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested.</p> <p>Voltage has to be over the <i>BusLeft <V limit</i> if BTB synchronization should be started, because the <i>BusLeft <V</i> Setpoint is used for healthy bus detection (this condition applies only if <i>BusL Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-NEUTRAL.</p>
BusL L1, L2 or L3 over	H	<p>Left bus L1, L2 or L3 voltage was over the <i>BusLeft >V limit</i> for the <i>BusLeft V del</i> time. Information about that is recorded into controller history.</p> <p>Setpoint BusL protect:BusL Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested.</p> <p>Voltage has to be below the <i>BusLeft >V limit</i> if BTB synchronization should be started, because the <i>BusLeft >V</i> Setpoint is used for healthy bus detection (this condition applies only if <i>BusL Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-NEUTRAL.</p>
BusL L12, L23 or L31 under	H	<p>Left bus L12, L23 or L31 voltage was under the <i>BusLeft <V limit</i> for the <i>BusLeft V del</i> time. Information about that is recorded into controller history.</p> <p>Setpoint BusL protect:BusL Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested.</p> <p>Voltage has to be over the <i>BusLeft <V limit</i> if BTB synchronization should be started, because the <i>BusLeft <V</i> Setpoint is used for healthy bus detection (this condition applies only if <i>BusL Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-PHASE.</p>
BusL L12, L23 or L31 over	H	<p>Left bus L12, L23 or L31 voltage was over the <i>BusLeft >V limit</i> for the <i>BusLeft V del</i> time. Information about that is recorded into controller history.</p> <p>Setpoint BusL protect:BusL Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested.</p> <p>Voltage has to be below the <i>BusLeft >V limit</i> if BTB synchronization should be started, because the <i>BusLeft >V</i> setpoint is used for healthy bus detection (this condition applies only if <i>BusL Volt prot</i> is set to ENABLED).</p>

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-PHASE.
BusR L1, L2 or L3 under	H	<p>Right bus L1,L2 or L3 voltage was under the <i>BusRight <V limit</i> for the <i>BusRight V del time</i>. Information about that is recorded into controller history.</p> <p>Setpoint BusR protect:BusR Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested. Voltage has to be over the <i>BusRight <V limit</i> if BTB synchronization should be started, because the <i>BusRight <V Setpoint</i> is used for healthy bus detection (this condition applies only if <i>BusR Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-NEUTRAL.</p>
BusR L1, L2 or L3 over	H	<p>Right bus L1, L2 or L3 voltage was over the <i>BusRight >V limit</i> for the <i>BusRight V del time</i>. Information about that is recorded into controller history.</p> <p>Setpoint BusR protect:BusR Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested. Voltage has to be below the <i>BusRight >V limit</i> if BTB synchronization should be started, because the <i>BusRight >V Setpoint</i> is used for healthy bus detection (this condition applies only if <i>BusR Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-NEUTRAL.</p>
BusR L12, L23 or L31 under	H	<p>Right bus L12, L23 or L31 voltage was under the <i>BusRight <V limit</i> for the <i>BusRight V del time</i>. Information about that is recorded into controller history.</p> <p>Setpoint BusR protect:BusR Volt prot has to be set to ENABLEDnif healthy bus voltage detection and history record are requested. Voltage has to be over the <i>BusRight <V limit</i> if BTB synchronization should be started, because the <i>BusRight <V setpoint</i> is used for healthy bus detection (this condition applies only if <i>BusR Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-PHASE.</p>
BusR L12, L23 or L31 over	H	<p>Right bus L12, L23 or L31 voltage was over the <i>BusRight >V limit</i> for the <i>BusRight V del time</i>. Information about that is recorded into controller history.</p>

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		<p>Setpoint BusR protect:BusR Volt prot has to be set to ENABLED if healthy bus voltage detection and history record are requested. Voltage has to be below the <i>BusRight >V limit</i> if BTB synchronization should be started, because the <i>BusRight >V</i> Setpoint is used for healthy bus detection (this condition applies only if <i>BusR Volt prot</i> is set to ENABLED).</p> <p>This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-PHASE.</p>
BusL f under	H	Left bus frequency was under the <i>BusLeft <f limit</i> for <i>BusLeft f del</i> time. Under frequency protection is based on BusL protect:BusLeft <f and <i>BusLeft f del</i> setpoints.
BusL f over	H	Left bus frequency was over the <i>BusLeft >f limit</i> for <i>BusLeft f del</i> time. Over frequency protection is based on BusL protect:BusLeft >f and <i>BusLeft f del</i> Setpoints.
BusR f under	H	Right bus frequency was under the <i>BusRight <f limit</i> for <i>BusRight f del</i> time. Under frequency protection is based on BusR protect:BusRight <f and <i>BusRight f del</i> setpoints.
BusR f over	H	Right bus frequency was over the <i>BusRight >f limit</i> for <i>BusRight f del</i> time. Over frequency protection is based on BusR protect:BusRight >f and <i>BusRight f del</i> setpoints.
Vb L1, L2 or L3 under	H	Bus L1, L2 or L3 voltage was under the <i>Bus <Hst</i> limit for <i>Bus V del</i> time. Undervoltage protections are based on Bus protect:Bus <Hst and <i>Bus V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-NEUTRAL.
Vb L1, L2 or L3 over	H	Bus L1, L2 or L3 voltage was over the <i>Bus >Hst</i> limit for <i>Bus V del</i> time. Overvoltage protections are based on Bus protect:Bus >Hst and <i>Bus V del</i> setpoints. This alarm is issued if voltage protections are based on phase to neutral voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-NEUTRAL.
Vb L12, L23 or L31 under	H	Bus L12, L23 or L31 voltage was under the <i>Bus <Hst</i> limit for <i>Bus V del</i> time. Undervoltage protections are based on Bus protect:Bus <Hst and <i>Bus V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-PHASE.
Vb L12, L23 or L31 over	H	Bus L12, L23 or L31 voltage was over the <i>Bus >Hst</i> limit for <i>Bus V del</i> time. Overvoltage protections are based on Bus protect:Bus >Hst and <i>Bus V del</i> setpoints. This alarm is issued if voltage protections are based on phase to phase voltages. It means that Basic settings:FixVoltProtSel is set to PHASE-PHASE.
f bus under	H	Bus frequency was under the <i>Bus <f limit</i> for <i>Bus f del</i> time. Under

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		frequency protection is based on Bus protect:Bus <f and <i>Bus f del</i> setpoints.
f bus over	H	Bus frequency was over the <i>Bus >f</i> limit for <i>Bus f del</i> time. Over frequency protection is based on Bus protect:Bus >f and <i>Bus f del</i> setpoints.
Bus meas error	A+H	Bus measurement error is issued if bus voltage is out of limits. For details see description of the Gener protect:BusMeasError setpoint.
OfL StartBck	A+H	<p>This alarm indicates wrong setpoints setting that disables engine start or load takeover. Incorrect combination of ProcessControl:Island enable; ParallelEnable; Synchro enable; MF start enable Setpoints setting is the reason why this alarm is issued.</p> <p>See AUT mode section of the OFF-MAN-AUT mode chapter in Global Guide for SPtM, SPI or Combi application.</p>
OperConflict	A	<p>Alarm alerts to conflict of settings required behavior.</p> <p>It can occur in these cases:</p> <ul style="list-style-type: none"> ➤ Function MF (MainsFail) want to start gen-set(s), but Island mode is Disabled (in AUT or TEST mode) ➤ Parallel and Island mode are Disabled (in other mode than OFF) ➤ Parallel is Enabled, but Synchronization is Disabled (NONE) - in AUT mode <p>This alarm indication is implemented in IGS/M-NT 3.1 and higher. (it replaces alarm "OfL StartBck")</p>
StartBck	A+H	<p>This alarm indicates wrong setpoints setting that disables start of Gen-sets. Incorrect combination of ProcessControl:Island enable; ParallelEnable; Synchro enable; MF start enable setpoints setting is the reason why this alarm is issued.</p> <p>See OFF-MAN-AUT mode chapter in IM-NT-MCB-MGCB Global Guide.</p>
BOC IDMT	A+H	Indicates current IDMT protection activation. Current IDMT protection is inverse definite minimum time protection which is based on the generator current. Protection reaction time depends on overcurrent value. High overcurrent means short reaction time whereas low overcurrent means longer reaction time. Protection is based on setpoints Generator protect:2Inom del and Basic settings:Nomin current .
MPR Imains IDMT	A+H	Indicates current IDMT protection activation. Current IDMT protection is inverse definite minimum time protection which is based on the mains current. Protection reaction time depends on

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		<p>overcurrent value. High overcurrent means short reaction time whereas low overcurrent means longer reaction time.</p> <p>This protection is active if the <i>Mns2Inom</i> prot setpoint is set to ENABLED. Protection is based on setpoints Mains protect:<i>Mains2Inom del</i> and Basic settings:<i>Nomin current</i>.</p>
BOR lbusL IDMT	A+H	<p>Indicates current IDMT protection activation. Current IDMT protection is inverse definite minimum time protection which is based on the left bus current. Protection reaction time depends on overcurrent value. High overcurrent means short reaction time whereas low overcurrent means longer reaction time.</p> <p>This protection is active if the <i>BusL2Inom</i> prot setpoint is set to ENABLED. Protection is based on setpoints BusL protect:<i>BusL2Inom del</i> and Basic settings:<i>Nomin current</i>.</p>
BOC ShortCurr	A+H	<p>Generator short current protection was activated. Generator current was over Generator protect:<i>Ishort level</i> for <i>Ishort del.</i> time.</p>
BOC Overload	A+H	<p>Indicates overload IDMT protection activation. Overload IDMT protection is inverse definite minimum time protection which is based on the generator power. Protection reaction time depends on generator power value. High generator overload means short reaction time whereas low generator overload means longer reaction time. Protection is based on setpoints Generator protect:<i>OverldStrtEval</i> and <i>2POverldStEvDel</i>.</p>
MPR Pmains IDMT	A+H	<p>Indicates overload IDMT protection activation. Overload IDMT protection is inverse definite minimum time protection which is based on the mains power. Protection reaction time depends on mains power value. High mains overload means short reaction time whereas low mains overload means longer reaction time.</p> <p>This protection is active if the <i>Mns2POvrldProt</i> Setpoint is set to ENABLED . Protection is based on Setpoints Mains protect:<i>OverldStrtEval</i> and <i>2POverldStEvDel</i>.</p>
BOR PbusL IDMT	A+H	<p>Indicates overload IDMT protection activation. Overload IDMT protection is inverse definite minimum time protection which is based on the left bus power. Protection reaction time depends on the left bus power value. High left bus overload means short reaction time whereas low left bus overload means longer reaction time.</p> <p>This protection is active if the <i>BusL2POvrldProt</i> Setpoint is set to ENABLED. Protection is based on Setpoints BusL protect:<i>OverldStrtEval</i> and <i>2POverldStEvDel</i>.</p>
BOC NCB fail	A+H	<p>NCB fail is detected if the <i>Neutral/CB fdb</i> input doesn't follow <i>Neutral CB C/O</i> output within 400 ms.</p>
Wrn BadPwrCfg	A+H	<p>Power format is set differently in controllers which are part of the</p>

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		same control group. Check Power formats setting in GenConfig on the Miscellaneous card (available in the Advanced mode only). ²¹⁾
WrnTstOnLdFail	A+H	This alarm is issued if the Test on load function is activated (by closing corresponding BI) and Gen-set is not able to take over mains load completely (mains import = 0) within the Sync/Load ctrl:Load ramp time. Message "WrnTstOnLdFail" is recorded into controller history in case of this failure. It is either necessary to extend the <i>Load ramp</i> time or check engine speed regulation. ²⁰⁾
Wrn SpdRegLim	A+H	<p>This alarm indicates that controller Speed governor output has reached its limit. Warning is issued if Speed governor output stays close to one of the limit values for more than 2 seconds. Close to one of the limits means that <i>Speed governor</i> output value is within <i>SpeedGovLowLim</i>+0.2 V range or <i>SpeedGovHiLim</i>-0.2 V range.</p> <p>This alarm gives you information that engine speed governor is either connected in a wrong way or one of the speed control related regulation loops⁶⁾ is set in a wrong way.</p> <p>Warning is blocked if binary output functions SPEED up and SPEED down are configured.</p>
Wrn VoltRegLim	A+H	<p>This alarm indicates that controller AVRi output has reached its limit. Warning is issued if the AVRi output stays close to 0% or 100% limit for more than 2 seconds. Close to limit means that AVRi output value is either <2 % or >98 %.</p> <p>This alarm gives you information that generator voltage regulator is either connected in a wrong way or one of the voltage control related regulation loops⁷⁾ is set in a wrong way.</p> <p>Warning is blocked if binary output functions AVR up or AVR down are configured.</p>
G L neg ⁸⁾	A	Generator phase is inverted. Check generator phases connection, one of generator phases is connected the other way round (swap generator coil leads connection).
G ph+L neg ⁸⁾	A	Wrong generator phases sequence ¹⁴⁾ , additionally one phase is inverted.
G ph opposed ⁸⁾	A	Wrong generator phases sequence. ¹⁴⁾
M L neg ⁹⁾	A	Mains phase is inverted. Check mains transformer phases connection, one of transformer phases is connected the other way round (swap transformer coil leads connection).
M ph+L neg ⁹⁾	A	Wrong mains phases sequence ¹⁴⁾ , additionally one phase is inverted.
M ph opposed ⁹⁾	A	Wrong mains phases sequence. ¹⁴⁾
B L neg ¹³⁾	A	Bus phase is inverted. ²²⁾
B ph+L neg ¹³⁾	A	Wrong bus phases sequence ¹⁴⁾ , additionally one phase is inverted.

IGS-NT Alarm/History record	Alarm/History Appearance	Description
B ph opposed ¹³⁾	A	Wrong bus phases sequence. ¹⁴⁾
BL L neg ¹²⁾	A	Left bus phase is inverted. ²²⁾
BL ph+L neg ¹²⁾	A	Wrong left bus phases sequence ¹⁴⁾ , additionally one phase is inverted.
BL ph opposed ¹²⁾	A	Wrong left bus phases sequence. ¹⁴⁾
BR L neg ¹³⁾	A	Right bus phase is inverted. ²²⁾
BR ph+L neg ¹³⁾	A	Wrong right bus phases sequence ¹⁴⁾ , additionally one phase is inverted.
BR ph opposed ¹³⁾	A	Wrong right bus phases sequence. ¹⁴⁾
hist PLC 1-4	H	Default message which indicates activity of PLC functions Force Hist. 1-4. ²⁾
Fault reset	H	Indication of the Fault reset function activation. Fault reset function can be activated using the Fault reset button, Binary input with <i>FaultResButton</i> function, Modbus or via remote communication (InteliMonitor).
ActCallCH1-OK, CH2-OK, CH3-OK	H	Indication of successful active call 1-3.
ActCallCH1Fail, CH2Fail, CH3Fail	A+H	Indication of unsuccessful active call 1-3. See Inteli Communication Guide for information about active calls.
Switched On	H	Controller was switched on.
Watchdog	H	Indication of internal watchdog. Send controller archive with history records to ComAp for investigation.
System	H	<p>These messages may be recorded as System reasons:</p> <p><i>Firmware prog.error</i> (controller programming error)</p> <p><i>Disp.error</i> (problem in communication with controller display)</p> <p><i>RTC battery flat</i> (see information about alarm RTCbatteryFlat in this list)</p> <p><i>SetpointCS err</i> (setpoint setting error)¹⁵⁾</p> <p><i>StatisticCS err</i> (statistics value error)¹⁶⁾</p> <p>Wrong config (wrong configuration was uploaded into a controller)</p> <p><i>Power Fail</i> (controller power supply voltage dropped below 8 V)¹⁷⁾</p>
System Log	H	This history record gives you information that controller history was deleted using the Clear History function in GenConfig. This function is part of the Options toolbar.
SetpointChange	H	Setpoint change indication in controller history. History record contains communication object number of a setpoint which was

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		changed. ¹⁰⁾
Password set	H	Controller password was set.
Password chng	H	Controller password was changed.
PassInsertBck	A	<p>Break through password function can be ENABLED / DISABLED from the password management window in IntelliMonitor (initial status is DISABLED).</p> <p>Warning "PassInsertBck" appears in alarm list when controller is blocked. It is not allowed to insert the password in case that controller is blocked. There is information that controller is blocked for next password attempt and time remaining till the end of blockation instead of password input window at the terminal screen. The controller is locked for 5 minutes when the password is 6 times wrong entered (in case of next 6 wrong attempts (correct password was not inserted at all) for 30, 60, 120, 240 minutes). Incorrect password message appears in the history of the controller when the invalid password is used ("System Log Incorrect password").</p>
Incorrect password	H	Read information about alarm <i>PassInsertBck</i> .
AccessCodeSet	H	Controller access code was set.
AccessCodeChng	H	Controller access code was changed.
Admin action	H	<p>This history record means that user administration changes were done¹¹⁾. Only User 0 (Administrator) is allowed to do such changes. These events can be recorded as Admin action record:</p> <ul style="list-style-type: none"> ➤ Password reset ➤ Access rights changed ➤ Alias changed
Terminal	H	External terminal was either connected or disconnected.
BinaryUnstable	H	Unstable Binary input, this problem is usually caused by floating Binary input ground. Check controller grounding to fix the problem.
ForceValue	H	Indication of any configured ForceValue state. Force value ON and OFF records are done.
TimeModeChange	H	Indication of TimeModeChange (summer/winter). Setpoint Date/Time:#SummerTimeMod is used to do time mode changes.
GroupsLinked	H	This history record means that two groups of Gen-sets were connected together, Binary input function <i>GroupLink</i> is used for the state indication. Setpoints Pwr management:GroupLinkLeft and GroupLinkRight gives you information which groups of Gen-sets are in parallel if Binary input function <i>GroupLink</i> is active.
GroupsUnlinked	H	Binary input function <i>GroupLink</i> was deactivated. It means that two groups of Gen-sets, which were working in parallel, were disconnected from each other.
Time stamp	H	Regular Time stamp record. See Setpoints Date/Time:Time stamp

IGS-NT Alarm/History record	Alarm/History Appearance	Description
		<i>act and Time stamp per.</i>
Gen Peak start	H	Indication of Gen-set start by automatic Peak start/stop function. See setpoints ProcessControl:PeakLevelStart , PeakLevelStop and PeakAutS/S del for information about this function.
Gen Peak stop	H	Indication of Gen-set stop by automatic <i>Peak start/stop</i> function. See setpoints ProcessControl:PeakLevelStart , PeakLevelStop and PeakAutS/S del for information about this function.
Gen PMS start	H	Gen-set was started by Power Management.
Gen PMS stop	H	Gen-set was stopped by Power Management.
Overload	H	Gen-set overload protection was activated. See Setpoints Gener protect:OverldStrtEval and 2POverldStEvDel . Be aware that this protection is based on Basic settings:Nominal power setpoint setting.
Gen start	H	Indication of Gen-set start using the Start button.
Gen stop	H	Indication of Gen-set stop using the Stop button.
Gen MF start	H	Indication of Gen-set start by the AMF function.
Gen MF stop	H	Indication of Gen-set stop by the AMF function.
Gen Rem start	H	Indication of Gen-set start using the <i>Rem start/stop</i> Binary input.
Gen Rem stop	H	Indication of Gen-set stop using the <i>Rem start/stop</i> Binary input
Load Shed	H	Load Shedding function was activated and corresponding LdShed stage x output was closed. See description of setpoints in the Load shedding group of setpoints.
Load Reconnect	H	Load Shedding function was deactivated and corresponding LdShed stage x output was opened. See description of setpoints in the Load shedding group of setpoints.
VectorShift	H	Indication of VectorShift protection activation. See setpoints Mains protect:VectorS prot and VectorS limit .
Other CB trip	H	Other CB on bus was tripped. This information is available for breakers which are controlled by a ComAp controller (IG/IS-NT or IM-NT).
GCB opened	H	GCB was opened.
GCB closed	H	GCB was closed.
MCBopened	H	MCB was opened.
MCB opened ext	H	MCB was opened externally.
MCB closed	H	MCB was closed.
MGCB opened	H	MGCB was opened.
MGCB closed	H	MGCB was closed.
BTB opened	H	BTB was opened.
BTB opened ext	H	BTB was opened externally.

IGS-NT Alarm/History record	Alarm/History Appearance	Description
BTB closed	H	BTB was closed.
SyncStarted	H	Forward synchronization was started.
RevSyncStarted	H	Reverse synchronization was started.
Ready	H	Gen-set is ready to be started.
Idle run	H	Engine was started ("engine started" conditions were fulfilled) and engine speed and generator voltage goes up to nominal values during the Idle run state.
Running	H	Gen-set is running and GCB can be closed or synchronization started.
Warming	H	Indication of Warming function activation. In case of operation in parallel with mains is Gen-set load reduced to <i>Warming load</i> level. For more information about this function see Setpoints Engine params:Warming load, Warming temp, Max warm time .
Soft load	H	Gen-set load is increased according to Sync/Load ctrl:Load ramp, Load gain, Load int, RampStartLevel Setpoints setting.
Loaded	H	Gen-set is loaded.
Soft unload	H	Gen-set load is decreased according to Sync/Load ctrl:Load ramp, Load gain and Load int Setpoints setting. Setpoints Sync/Load ctrl:GCB open level and GCB open del are related to Gen-set unloading too.
Cooling	H	Engine is cooling down.
Emerg man	H	Emerg. manual Binary input function is active.
Not ready	H	Gen-set is not ready to start. Controller is either in OFF mode or any 2nd level alarm is in controller alarm list.
ExcitationON/ ExcitationOFF	H	It indicates activation/deactivation of excitation in case of configuration the <i>SUS sequence</i> function.
Wrn SUSminPwr	A+H	It indicates that require power from the Gen-sets with activated LBO: <i>ReadyToExcite</i> was not achieved (require power is set by Setpoint <i>#SUS min power</i>).
SUS seq blk	A	Alarm indicates that <i>SUS sequence</i> is required, but Setpoint <i>Gear teeth</i> is equal 0. (SUS sequence require pick-up sensor for correct function).
SUSseq break-1	H	MCB is closed (in SPtM application).
SUSseq break-2	H	MCB is open (MCB feedback is not active) OR Mains voltage is higher than 1/3 of setpoint Basic settings:MainsNomV (in SPI application).
SUSseq break-3	H	Bus voltage is higher than 1/3 of setpoint Basic settings:BusNomV (in MINT application).

IGS-NT Alarm/History record	Alarm/History Appearance	Description
SUSseq break-4	H	GCB was not closed during the Prestart Time count down.
SUSseq break-5	H	Setpoint SUS control:ExcitationCtrl =EXTERNAL. The LBI: SUSexcitBlck was not activated before engine start OR it was deactivated before the LBO: ReadyToExcite activation.
Sd DefCredentials	A+H	This Sd alarm appears when the default password is not changed before operating the controller.

Note: 1)

This alarm may be displayed as Wrn or Sd alarm type. Alarm type depends on Protection upon module failure setting in Modules card in GenConfig. Available settings are: No Protection, Warning and Shutdown.

Note: 2)

See setting of Force Protect functions on the PLC card in GenConfig to find out what PLC State x texts were changed to.

Note: 3)

Hold Enter and push Esc to enter the Info screen 1. Push the right arrow → to enter Info screen 2 to read IDch and Dngl strings or controller serial number and Password Decode number (Pwd.Dec.).

Note: 4)

For IG-NT-BB, IG-NTC-BB, IS-NT-BB, IS-NTC-BB, IM-NT-BB and IM-NTC-BB controllers send a controller to your distributor for battery exchange. For IG/IS-NT, IG/IS-CU, ID-DCU, IL-NT, IC-NT, ID-Lite and ID-Mobile controllers send a controller to your distributor for battery exchange, or you can exchange battery by yourself, but ComAp would not be responsible for controller damage caused by battery exchange then.

Note: 5)

See Al./Hist. msg column on Protections card in GenConfig to see customized alarm messages which are related to configurable protections.

Note: 6)

*Speed control related regulation loops are part of the **Sync/Load ctrl** group of Setpoints:*

- Frequency regulation loop: Freq gain, Freq int Setpoints
- Angle regulation loop: Angle gain Setpoint
- Load regulation loop: Load ramp, Load gain, Load int Setpoints
- Load sharing loop: LS gain, LS int Setpoints

Note: 7)

*Voltage control related regulation loops are part of the **Volt/PF ctrl** group of Setpoints:*

- Voltage regulation loop: Voltage gain, Voltage int Setpoints
- Power Factor regulation loop: PF gain, PF int Setpoints
- VAr sharing regulation loop: VS gain, VS int Setpoints

Note: 8)

Alarm is related to Generator voltage terminals connection.

Note: 9)

Alarm is related to Mains (Bus) voltage terminals connection.

Note: 10)

In GenConfig go to File – Generate Cfg Image – Generate Cfg Image (Comm.objects) to obtain the communication objects list.

Note: 11)

In IntelliMonitor go to Monitor – Admin Users to do any user administration changes.

Note: 12)

Alarm is related to Mains (Bus-L) voltage terminals connection.

Note: 13)

Alarm is related to Bus (Bus-R) voltage terminals connection.

Note: 14)

Wrong phases sequence means that e.g. generator/Mains voltages rotation is counter clockwise. Typical reason is that two phases are swapped, e.g. phase L2 is connected to L3 controller voltage terminal and phase L3 is connected to L2 controller voltage terminal.

Note: 15)

Adjust setting of incorrectly set setpoints to get rid of the alarm. Use IntelliMonitor to do that, setpoints with out of range/incorrect setting are marked with yellow background.

Note: 16)

Use IntelliMonitor to adjust incorrectly set statistics value. Go to Monitor and Set statistics... to do that.

Note: 17)

It happens if 12V battery is used as power supply and voltage drops during engine starting (due to high starter current). Use the I-LBA module to avoid this problem.

Note: 18)

See the How to check that communication between controllers works chapter for more information.

Note: 19)

*Check if generator voltage regulation works properly if this alarm is issued, see **Volt/PF control adjustment on page 207**.*

Note: 20)

*Check if engine speed regulation works properly if this alarm is issued, see **Sync/Load control adjustment on page 205** for information about correct engine speed regulation setting.*

Note: 21)

In GenConfig go to Options/Settings/Display and select Advanced.

Note: 22)

Check either mains transformer or generator phases connection, one of transformer or generator phases is connected the other way round (swap transformer or generator coil leads connection).

 **back to Troubleshooting**

8 Technical data

Power supply

Power supply range	8-36 VDC
Power supply drop-out immunity	20 ms (from 8 V)
Power consumption	0.4 A / 8 VDC 0.15 A / 24 VDC 0.1 A / 36 VDC
RTC battery	10 years (replaceable by official service)
Fusing	2 A (without BOUT consumption)

Operating conditions

Operating temperature	-40 °C to +70 °C
Storage temperature	-40 °C to +80 °C
Max. operating altitude	2000 m above sea level 4000 m above sea level for max Ph- Ph voltage 400 VAC
Operating humidity	95 % non-condensing (EN 60068-2-30)
Vibration	5-25 Hz, ± 1.6 mm 25-100 Hz, $a = 4$ g
Shocks	$a = 200$ m/s ²

Voltage measurement

Measurement inputs	3 ph-n Gen voltage 3 ph-n Mains voltage/Bus voltage
Measurement range	110 V / 277 V
Max allowed voltage	125 % ph-n
Accuracy	1 % of 110 V / 277 V
Frequency range	40-70 Hz (accuracy 0.05 %, <0.03 Hz)
Input impedance	0.6 M Ω ph-ph , 0.3 M Ω ph-n

Current measurement

Measurement inputs	3 ph Gen current, 1 ph Mains current galvanically isolated
Measurement range	1 A / 5 A
Max allowed continuous current	10x Inom / 2x Inom
Accuracy	2 % of 1 A / 5 A
Input impedance	<0.1 Ω

Binary inputs

Number	16, non-isolated
Input resistance	4.7 k Ω
Close/Open indication	0-2 VDC close contact >4 VDC open contact

Binary outputs

Number	16, non-isolated
Max current	5 A (2 A per group) group1: BO1-8; group2: BO9-16
Switching to	negative/positive supply terminal

Analog inputs

Number	4, non-isolated
Type	Switchable (Voltage, Resistance, Current)
Resolution	10 bits, max 4 decimal
Range	0-5 VDC / 0-2500 Ω / 0-20 mA
Input impedance	>100 k Ω / >100 k Ω / 180 Ω
Accuracy	± 1 % of meas. value ± 5 mV ± 2 % of meas value ± 2 Ω ± 1 % of meas value ± 0.5 mA

Analog outputs

Number	1
Type	Switchable (Voltage, Current)
Range	0-10 VDC / 0-20 mA
Max current/load	5 mA / 500 Ω
Accuracy	± 0.5 % of output value ± 20 mV ± 0.5 % of output value ± 100 μ A

Magnetic pick-up

Voltage input range	2 Vpk-pk to 50 Veff
Frequency input range	4 Hz to 15 kHz
Frequency measurement tolerance	0.2 % from range above

Voltage regulator output

Type	5 V TTL PWM / ± 10 VDC with IG-AVRi interface
------	---

Speed governor output

Voltage output	± 10 VDC / max 10 mA
Voltage output via resistor	± 10 VDC via 10 k Ω resistor / max 1 mA
PWM	500-3000 Hz / 5 V / max 10 mA

Communications

RS232	Direct / Modbus, non-isolated
RS485(1)	Direct / Modbus, non-isolated
RS485(2)	Direct / Modbus, isolated
Display port	Non-isolated RS485, only terminal connection
USB port	Direct, Isolated
Ethernet port	galvanically isolated LAN/Internet, Modbus TCP, AirGate
CAN1	External modules, 250 kbps, max 200 m, Isolated
CAN2	Intercontroller and comm extensions, 250 / 50 kbps, max 200 / 1000 m, Isolated

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9 Appendix

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9.1 Controller objects

9.1.1 List of controller objects types

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9.1.2 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.

Each setpoint can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure. For instructions on how to enter and modify a password please refer to [InteliVision 5](#) or [InteliVision 8](#) Global Guide.

For full list of setpoints go to the chapter **List of setpoints (page 317)**.

List of setpoints

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Group: ProcCtrlMulti

#SysBaseLoad

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	0 .. 65000 [kW] (this depends on selected Power formats (page 165))		
Default value	1000	Force value	NO
Step	1		
Comm object	8775	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust the requested load for the whole Gen-set group in <i>system baseload</i> mode (i.e. #SysLdCtrl PtM (page 324) = BASELOAD). Each gen-set takes proportionally equal part of this total required value. The number of running Gen-sets is resolved by the Power Management (page 168) according to the requested total load, Gen-sets nominal power and adjusted reserves.			

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LocalBaseload

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	OFF, 1 .. Nomin power (page 345) [kW] (this depends on selected Power formats (page 165))		
Default value	OFF	Force value	NO
Step	1		
Comm object	10118	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust local baseload level. The Gen-set maintains this load instead of performing proportional load sharing whenever the total load is high enough. Load variations are then equalized by the Gen-sets with lower priority (higher number) or by Gen-sets with local baseload switched off. If the setpoint is adjusted to 0 (OFF) the function is off. Description of the function is available in the chapter Load shedding (page 145) .			

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LocalBasePF

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	OFF, 0.001 .. 1.999		
Default value	OFF	Force value	NO
Step	0.001		
Comm object	16479	Related applications	MINT
Description			
This function has to set the required PF of the gen-set independently on the #SysBasePF requirement. In case the setpoint is on OFF, the Gen-set power factor is fully controlled by #SysBasePF setting.			
IMPORTANT: Function LocalBasePF is available only in multiple parallel operation, that means LocalBasePF is evaluated only in case the LBI: MCB FEEDBACK (PAGE 725) is active.			

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LocalBaseQ

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	OFF, -32000 .. 32000		
Default value	OFF	Force value	NO
Step	1		
Comm object	16480	Related applications	MINT, COX, Combi
Description			
<p>This function has to set the required Q of the Gen-set independently on the #SysBaseQ requirement. In case the setpoint is on OFF, the Gen-set reactive power is fully controlled by #SysBaseQ setting. Format of the setpoint could be changed with change of power format (0.1kVA, 1kVA, 0.01MVA)</p>			
IMPORTANT: Function LocalBaseQ is available only in multiple parallel operation, that means LocalBaseQ is evaluated only in case the LBI: MCB FEEDBACK (PAGE 725) is active.			
IMPORTANT: If the LocalBasePF and LocalBaseQ are set on number >0 in that case has the LocalBasePF priority.			

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#SysPwrFactor

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	0.60 .. 1.20 [kW]		
Default value	1	Force value	NO
Step	0.01		
Comm object	8776	Related applications	MINT, COX, Combi
Description			
<p>The setpoint is used for adjusting the requested Gen-set power factor during the parallel-to-mains operation if #SysPFCtrl PtM (page 324) = BASEPF and also during the LocalBaseload (page 322) operation. Values 0.60 - 0.99 correspond to inductive PF (0.60L - 0.99L), 1.01 - 1.20 correspond to capacitive PF (0.99C - 0.80C).</p>			
Note: # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.			

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#SysBaseQ

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	-32000 .. 32000 [kVAr]		
Default value	1	Force value	NO
Step	1		
Comm object	16407	Related applications	MINT
Description			
<p>#SysBaseQ is used in case the #SysPFCtrlPTM is switched either to BASEQ or VSHARING and the setpoint PF/Qctrl PTM is switched to Q control</p>			

Note: # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.

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#SysLdCtrl PtM

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	BASELOAD, LDSHARING [-]		
Default value	BASELOAD	Force value	NO
Step	[-]		
Comm object	8774	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust the power control mode in parallel-to-mains operation.			
<ul style="list-style-type: none"> ➤ BASELOAD: The Gen-set is controlled by the load control loop (i.e. as in SPtM) to provide constant proportional part of the requested system baseload (see SysBaseLdMode (page 324)). The proportional parts of all running Gen-sets are equal relative to their nominal power. ➤ LDSHARING: The Gen-set load controlled by the load sharing loop as in island operation. This option is intended only for systems with IntelliMains, where the IntelliMains controls the power of the group via the load sharing line (e.g. in Import/Export mode). 			

⬅ back to List of setpoints

#SysPFCtrl PtM

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	BASEPF, VSHARING, BASEQ [-]		
Default value	BASEPF	Force value	NO
Step	[-]		
Comm object	8779	Related applications	MINT
Description			
This setpoint is used to adjust the power factor control mode in parallel-to-mains operation.			
<ul style="list-style-type: none"> ➤ BASEPF: The Gen-set power factor is controlled to a preadjusted level #SysPwrFactor (page 323). ➤ VSHARING: The power factor is equalized with other Gen-sets according to the actual reactive load. ➤ BASEQ: The Gen-set reactive power is controlled to the level set by #SysBaseQ (page 323). 			
Note: If the power factor control mode is switched to VSHARING the #SysLdCtrl PtM (page 324) must be switched to LDSHARING.			

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SysBaseLdMode

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	INTERNAL, EXTERNAL [-]		
Default value	INTERNAL	Force value	NO

Step	[-]		
Comm object	10339	Related applications	MINT, COX, Combi
Description			
This setpoint selects from where the System Base load value is taken if the load control mode in parallel-to-mains operation is switched to baseload (i.e. #SysLdCtrl PtM (page 324) = BASELOAD).			
INTERNAL	The baseload is adjusted by the setpoint #SysBaseLoad (page 322) .		
EXTERNAL	The baseload is adjusted by the logical (functional) analog input MLC:ANExSYSBLD (PAGE 887) .		

Note: If the external source is selected the logical analog input must be configured at each Gen-set to the identical source. The shared peripheral modules can be used to distribute the value over the controllers via the CAN2 bus.

- One controller measures the value physically on it's analog input and the function **MLC:ANExSYSBLD (PAGE 887)** is configured onto this physical input. But the value is also being transmitted from this controller to the CAN bus via one shared analog output (e.g. SHAOUT #1.1).
- The other controllers reads the value from their shared analog inputs (e.g. SHAIN #1.1) and the function **MLC:ANExSYSBLD (PAGE 887)** is configured onto these shared inputs.
- The transmitting controller must be always switched on!

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SysBasePFQMode

Setpoint group	ProcCtrlMulti	Related FW	2.2.0
Range [units]	INTERNAL, EXTERNAL [-]		
Default value	INTERNAL	Force value	NO
Step	[-]		
Comm object	11003	Related applications	MINT, COX, Combi
Description			
This setpoint selects from where the System Power Factor or System Reactive power value is taken if the PF/Q control mode in parallel-to-mains operation is switched to BasePF (i.e. #SysPFCtrl PtM (page 324) = BASEPF) or BaseQ.			
INTERNAL	The required power factor is adjusted by the setpoint #SysPwrFactor (page 323) or LocalBaseQ (page 323) .		
EXTERNAL	The baseload is adjusted by the logical (functional) analog input MPF:ANExSysBPF (PAGE 887) or MQ:ANExSysBQ (PAGE 888) .		

Note: If the external source is selected the logical analog input must be configured at each Gen-set to the identical source. See the note at the setpoint **SysBaseLdMode (page 324)**.

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Group: ProcCtrlSingle

Base load

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0 .. Nomin power (page 345)		
Default value	(this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8639	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting of the requested Gen-set power in <i>Baseload</i> mode, i.e. if the setpoint Load ctrl PtM (page 328) is set to BASELOAD.			
<i>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</i>			
<i>Note: If the this setpoint is adjusted to lower value than Min Power PtM (page 401) the Gen-set power is limited the Min Power PtM (page 401) setpoint.</i>			

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Base PF

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0.001 .. 1.999 [-]		
Default value	1	Force value	NO
Step	0.001		
Comm object	8640	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting of the requested Gen-set power factor value if the power factor control mode is set to BASEPF (setpoint PF/Qctrl PtM (page 328)).			
Values over 1.00 mean capacitive load character, i.e. setting 0.95 means 0.95L and setting 1.05 means 0.95C.			

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Base Q

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. 32000 (this depends on selected Power formats (page 165))		
Default value	(this depends on selected Power formats (page 165))	Force value	NO
Step	(this depends on selected Power formats (page 165))		
Comm object	13026	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting of the requested Gen-set reactive power if the power factor control mode is set to BASEQ (setpoint PF/Qctrl PtM (page 328)).			

Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.

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Import load

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. 32000 (this depends on selected Power formats (page 165))		
Default value	0	Force value	NO
Step	1		
Comm object	8641	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting of the requested mains import if the Gen-set load control mode is set to IMP/EXP (PF/Qctrl PtM (page 328) = IMP/EXP)			
This setpoint is also used for adjusting of the maximum allowed export if <i>export limit</i> function is active (Export limit (page 333) = ENABLED).			
Note: Negative value of import is export , i.e. the power flows into the mains.			
Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.			

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Import PF

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0.001 .. 1.999 [-]		
Default value	1	Force value	NO
Step	0.001		
Comm object	8642	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to adjust the requested power factor at the mains when PF/Qctrl PtM (page 328) = PF-IM/EX . Values over 1.00 mean capacitive load character.			
Example: Setting 0.95 means 0.95L and setting 1.05 means 0.95C.			

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Import Q

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. 32000 [kVAr]		
Default value	(this depends on selected Power formats (page 165))	Force value	NO
Step	(this depends on selected Power formats (page 165))		
Comm object	14143	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to adjust the requested reactive power at the mains when PF/Qctrl PtM (page 328) = Q-IM/EX .			

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Load ctrl PtM

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	BASELOAD, IM/EX, ANEXT BASELOAD, ANEXT IM/EX, T BY PWR [-]		
Default value	BASELOAD	Force value	YES
Step	[-]		
Comm object	8638	Related applications	SPtM, SPI, Combi
Description			
<p>The setpoint is used for selection of the load control mode in parallel to mains operation.</p> <ul style="list-style-type: none"> ➤ BASELOAD: Gen-set load is maintained at constant level adjusted by the setpoint Base load (page 326). ➤ IM/EX: Gen-set load is controlled so, that the mains import is maintained constant at the level adjusted by setpoint Import load (page 327). ➤ ANEXT BASELOAD: Gen-set load is maintained at constant level given by the analog input LDCTRL:ANExBLD (PAGE 884). ➤ ANEXT IM/EX: Gen-set load is controlled so, that the mains import is maintained constant at the level given by the analog input LDCTRL:ANExI/E (PAGE 884). This option is available in IS-NT only. ➤ T BY PWR: Gen-set load is controlled so, that the analog input LDCTRL:TBYPWR (PAGE 884) is maintained at constant level given by setpoint TempByPwr Treq (page 335). The regulation loop is adjusted by setpoints TempByPwr gain (page 336) and TempByPwr int (page 336). This option is available in IS-NT only. <p>Note: If the baseload value needs to be changed remotely via a communication interface select the ANEXT BASELOAD mode and then configure one of the objects ExValue1 (page 637) .. ExValue4 (page 638) as the source for the analog input LDCTRL:ANExBLD (PAGE 884). These objects can be written remotely via communication (e.g. via Modbus).</p>			

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PF/Qctrl PtM

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	PF control, PF(Pm), Q control, Q(Um), Q(P), Qref/Ulim [-]		
Default value	PF control	Force value	YES
Step	[-]		
Comm object	10120	Related applications	SPtM, SPI, Combi
Description			
<p>Setpoint switch the modes of power factor or reactive power in parallel to mains operation.</p> <ul style="list-style-type: none"> ➤ PF control (original BASEPF) - regulation on fixed PF value ➤ PF(Pm) – regulation of PF in depending on the actual active power based on the configured user curve PF(Pm) ➤ Q control (original BASEQ) – regulation on fixed Q value ➤ Q(Um) – regulation of Q in depending on the actual mains voltage based on the configured user curve Q(Um) ➤ Q(P) – regulation of Q in depending on the actual active power based on the configured user curve 			

Q(P)

- Qref/Ulim – specific type of Q(Um) mode where is the Q part in constant level in case the U mains changes

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PF/Qctrl ANEXT

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	16130	Related applications	SPtM, SPI, Combi
Description			
Setpoint switch the functionality of PF/Qctrl PTM to the mode when the required value is given by analog external value presented in the configuration by particular LAI.			
IMPORTANT: Analog extern does not work for mode PF(Pm) and Q(P).			
IMPORTANT: In case one of these two modes are chosen and setpoint PF/Qctrl ANEXT is chosen, mode is evaluated the same way as the this setpoint would be DISABLED and the WRN alarm message is activated.			

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PF/Qctrl IM/EX

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	16131	Related applications	SPtM, SPI, Combi
Description			
Setpoint switch the functionality of PF/Qctrl PTM in to the import/export mode.			
IMPORTANT: In case one the IM/EX mode is ENABLED and the conditions for mains import measurement are not fulfilled the WRN PFQ I/EFail is activated.			

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I/E-Pm meas

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	NONE, IM3 CT INPUT, ANALOG INPUT [-]		
Default value	IM3 CT INPUT	Force value	NO
Step	[-]		
Comm object	10599	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used to select, which method is used for measurement of the active power (P) imported from the mains.			

- NONE: Active power from the mains is not measured.
- IM3 CT INPUT: Active power from the mains is calculated from the mains L3-N voltage and the current measured at the controller Im3 terminal and then multiplied by 3.
- ANALOG INPUT: Active power from the mains is measured by an external device and passed the controller via analog input **LDCTRL:I/E-PM (PAGE 884)**.

Note: If the mains import is not measured or measured externally, the Im3 terminal can be used for Earth fault current protection. This protection is present in default archive and **should be removed** in GenConfig (Protections tab) if the Im3 input is used for mains import measurement.

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I/E-Qm meas

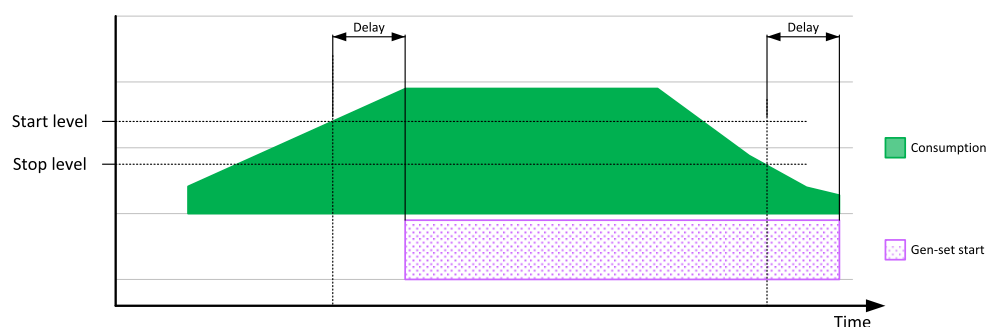
Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	NONE, IM3 CT INPUT, ANALOG INPUT[-]		
Default value	IM3 CT INPUT	Force value	NO
Step	[-]		
Comm object	10598	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used to select, which method is used for measurement of the reactive power (Q) imported from the mains.			
➤ NONE: Reactive power from the mains is not measured.			
<p>Note: It is possible to perform import/export load control without reactive power measurement, i.e. based on active power measurement only. The Gen-set power factor will be maintained at constant level given by Base PF (page 326) setpoint. However, this kind of operation may lead in certain conditions to bad power factor values at the mains.</p>			
➤ IM3 CT INPUT: Reactive power from the mains is calculated from the mains L3-N voltage and the current measured at the controller Im3 terminal and then multiplied by 3.			
➤ ANALOG INPUT: Reactive power from the mains is measured by an external device and passed the controller via analog input PFCTRL:I/E-QM (PAGE 890) .			
<p>Note: If the reactive power is measured, then the measurement method should match the method used for active power measurement, i.e. if the setpoint I/E-Pm meas (page 329) is set to IM3 CT INPUT, this setpoint should not be set to ANALOG INPUT and vice versa.</p>			

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PeakLevelStart

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	PeakLevelStop (page 331) .. 32000 [kW] (this depends on selected Power formats (page 165))		
Default value	0	Force value	YES
Step	1		
Comm object	8643	Related applications	SPtM, SPI, Combi
Description			
If the object consumption (Object P (page 607)) exceeds this setpoint for time longer than PeakAutS/S			

del (page 331), the Gen-set starts automatically. Adjusting the **PeakAutS/S del (page 331)** to 0 (OFF) disables the autostart. See also the setpoint **PeakLevelStop (page 331)**.



Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.

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PeakLevelStop

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0 .. PeakLevelStart (page 330)		
Default value	0	Force value	NO
Step	1		
Comm object	8644	Related applications	SPtM, SPI, Combi
Description			
If the object consumption (Object P (page 607)) drops below this setpoint for time longer than PeakAutS/S del (page 331) , the Gen-set stops automatically. See also the setpoint PeakLevelStart (page 330) .			
Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.			

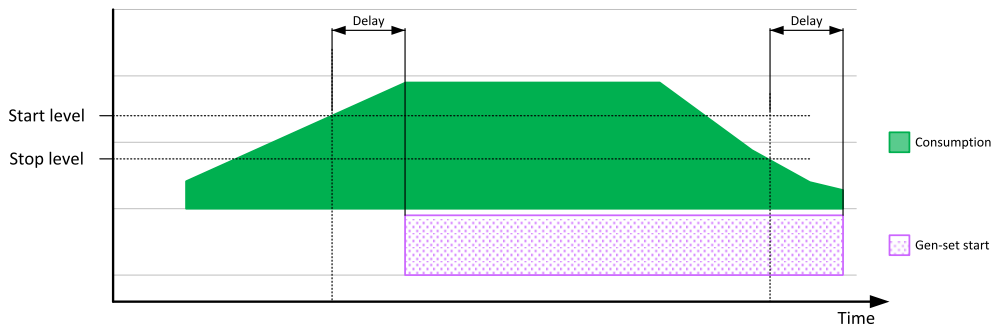
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PeakAutS/S del

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	OFF, 1 .. 3200 [s]		
Default value	OFF	Force value	NO
Step	1		
Comm object	9989	Related applications	SPtM, SPI, Combi
Description			
The setpoints adjusts the delay for automatic Peak start/stop function. Set 0 (OFF) to disable Peak automatic start function. See also the setpoints PeakLevelStart (page 330) and PeakLevelStop (page 331) .			
Note: The delay for this function is counted down in any mode if the conditions are fulfilled (i.e. in OFF when the Mains Import in kW is higher than PeakLevelStart (page 330)).			

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Peak kVA Start

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	PeakLevelStop (page 331) .. 32000 [kVA] (this depends on selected Power formats (page 165))		
Default value	0	Force value	YES
Step	1 (this depends on selected Power formats (page 165))		
Comm object	13223	Related applications	SPtM, SPI, Combi
Description <p>If the object apparent consumption (Object P (page 607) to the power of 2 + Object Q (page 607) to the power of 2) exceeds this setpoint for time longer than PeakKVAS/S del (page 332), the Gen-set starts automatically (in SPtM application) or group of Gen-sets is started by IntelliMains. Adjusting the PeakKVAS/S del (page 332) to 0 (OFF) disables the autostart. See also the setpoint Peak kVA Stop (page 332).</p>			
 <p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p>			

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Peak kVA Stop

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0 .. Peak kVA Start (page 332) [kW] (this depends on selected Power formats (page 165))		
Default value	0	Force value	YES
Step	1		
Comm object	13224	Related applications	SPtM, SPI, Combi
Description <p>If the object apparent consumption (Object P (page 607) to the power of 2 + Object Q (page 607) to the power of 2) drops below this setpoint for time longer than PeakKVAS/S del (page 332), the Gen-set stops automatically (in SPtM application) or Gen-set group is stopped by IntelliMains. See also the setpoint Peak kVA Start (page 332).</p>			
<p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p>			

🔍 back to List of setpoints

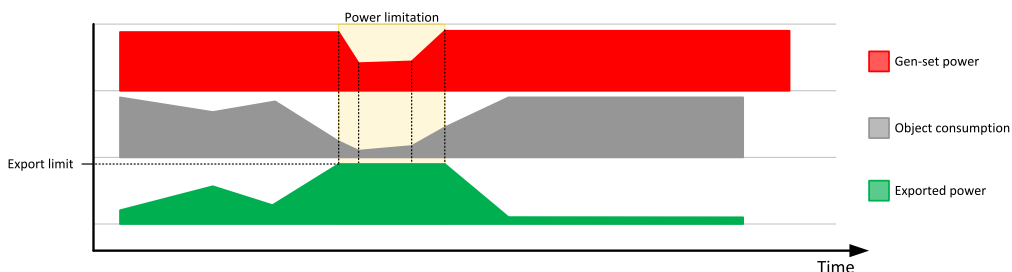
PeakKVAS/S del

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
----------------	----------------	------------	-------

Range [units]	OFF, 1 .. 3200 [s]		
Default value	OFF	Force value	YES
Step	1		
Comm object	13225	Related applications	SPtM, SPI, Combi
Description			
The setpoints adjusts the delay for automatic Peak kVA start/stop function. Set 0 (OFF) to disable Peak kVA automatic start function. See also the setpoints Peak kVA Start (page 332) and Peak kVA Stop (page 332).			
Note: The delay for this function is counted down in any mode if the conditions are fulfilled (i.e. in OFF when the Mains Import in kVA is higher than Peak kVA Start (page 332)).			

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Export limit

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	9592	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to enable and disable the <i>Export limit</i> function. If the function is enabled, the gen-set power is limited so that mains import is always higher or equal to the setpoint Import load (page 327).			
			
This function can be used if the setpoint Load ctrl PtM (page 328) is set to BASELOAD, ANEXT BASELOAD or T BY PWR.			
Note: If the import value/setpoint is negative, it actually means export. This function can be used to protect the system from unwanted export. You may set maximum export value or you can set it possitive to keep some import even in cases that there are abrupt load changes.			
Note: See the setpoint I/E-Pm meas (page 329) for details about mains import measurement methods.			

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Derating1 strt

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. +32000 [x]		

Default value	0	Force value	YES
Step	1		
Comm object	9046	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting the starting point of the <i>Power derating 1</i> function, where the gen-set nominal power is still 100% of the setpoint Nomin power (page 345) .			
See the chapter Power derating (page 127) for details.			
Note: The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input POWERDERATING1 (PAGE 891) is assigned.			

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Derating2 strt

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. +32000 [x]		
Default value	0	Force value	YES
Step	1		
Comm object	10189	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting the starting point of the <i>Power derating 2</i> function, where the gen-set nominal power is still 100% of the setpoint Nomin power (page 345) .			
See the chapter Power derating (page 127) for details.			
Note: The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input POWERDERATING2 (PAGE 891) is assigned.			

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Derating1 end

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. +32000 [x]		
Default value	0	Force value	YES
Step	1		
Comm object	9047	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting the end point of the <i>Power derating 1</i> function, where the gen-set nominal power is reduced to the value adjusted by the setpoint Derated1 pwr (page 335) .			
See the chapter Power derating (page 127) Power derating for details.			
Note: The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input POWERDERATING1 (PAGE 891) is assigned.			

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Derating2 end

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. +32000 [x]		
Default value	0	Force value	YES
Step	1		
Comm object	10190	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting the end point of the <i>Power derating 2</i> function, where the gen-set nominal power is reduced to the value adjusted by the setpoint Derated2 pwr (page 335) . See the chapter Power derating (page 127) Power derating for details.			
Note: The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input POWERDERATING2 (PAGE 891) is assigned.			

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Derated1 pwr

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	50.0	Force value	YES
Step	0.1		
Comm object	9048	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting the final power level for the <i>Power derating 1</i> function. The nominal power is not reduced below this setpoint even if the respective analog input increases further. See the chapter Power derating (page 127) Power derating for details.			

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Derated2 pwr

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	50.0	Force value	YES
Step	0.1		
Comm object	10191	Related applications	SPtM, SPI, Combi
Description			
This setpoint is used for adjusting the final power level for the <i>Power derating 2</i> function. The nominal power is not reduced below this setpoint even if the respective analog input increases further. See the chapter Power derating (page 127) Power derating for details.			

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TempByPwr Treq

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	-32000 .. +32000 [°C]		

Default value	0	Force value	YES
Step	1		
Comm object	9607	Related applications	SPtM, SPI, Combi
Description			
<p>The setpoint is used for adjusting the requested temperature for the <i>Temperature-By-Power</i> control loop.</p> <p>The <i>Temperature-By-Power</i> is active if the setpoint Load ctrl PtM (page 328) is set to T BY PWR position and the logical analog input <i>LdCtrl:TByPwr</i> is attached to the physical analog input where the temperature is measured.</p> <p>See also the setpoints TempByPwr int (page 336) and TempByPwr gain (page 336).</p> <p>Note: As the "regulating action" of the <i>Temperature-By-Power</i> control loop is changing of the gen-set power the regulated value (i.e. some temperature) must depend on the gen-set power. Typical usage of this function is regulation of the output temperature of the heating water at a CHP unit.</p>			

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TempByPwr gain

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	10.00	Force value	NO
Step	0.01		
Comm object	9608	Related applications	SPtM, SPI, Combi
Description			
<p>This setpoint is used to adjust the gain factor for the <i>Temperature-By-Power</i> control loop. See also the setpoints TempByPwr Treq (page 335) and TempByPwr int (page 336).</p>			

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TempByPwr int

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10.0	Force value	NO
Step	0.1		
Comm object	9609	Related applications	SPtM, SPI, Combi
Description			
<p>This setpoint is used to adjust the integration factor for the <i>Temperature-By-Power</i> control loop. See also the setpoints TempByPwr Treq (page 335) and TempByPwr gain (page 336).</p>			

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Overheat prot

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	DISABLED, ENABLED		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	9619	Related applications	SPtM, SPI, Combi

Description

The setpoint is used to enable/disable the *Overheat protection*, which is used for limitation of the gen-set power when there is not enough heat outlet from the gen-set to avoid shutdown due to overheating.

If the *Overheat protection* is enabled and the temperature at the logical analog input *LdCtrl:TByPwr*:

- increases over the setpoint **TempByPwr Treq (page 335)**, the *Temperature-By-Power* load control loop is temporarily activated to reduce the power and consequently the temperature.
- returns back under the setpoint **TempByPwr Treq (page 335)**, the *Temperature-By-Power* regulation loop is deactivated and previous load control mode (e.g. Baseload) takes place.

Note: When the temperature increases rapidly, the *Temperature-By-Power* load control loop can be activated even before the temperature gets over the setpoint **TempByPwr Treq (page 335)** to avoid overheating.

Note: See more information about the *Temperature-By-Power* load control mode in the description of the setpoint **TempByPwr Treq (page 335)**.

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Island enable

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	NO, YES [-]		
Default value	YES	Force value	YES
Step	-		
Comm object	9236	Related applications	SPtM, SPI, Combi

Description

The setpoint is used to enable/disable the island operation, i.e. supplying the load while the mains is disconnected.

- **Island mode** is recognized if the mains breaker is **open**, e.g. the feedback input **MCB FEEDBACK (PAGE 725)** is not active.
- **Parallel mode** is recognized if the mains breaker is **closed**, e.g. the feedback input **MCB FEEDBACK (PAGE 725)** is active.

If the island mode is recognized and island operation is disabled the controller will open the generator breaker, cool-down the gen-set and stop it. While this situation persists the controller behavior is following:

- The gen-set start in AUT mode is blocked, it can be started in MAN mode only.
- The GCB can't be closed.
- The message *OfL StartBlck* is present in the alarm list (see the alarm output *OfL StartBlck*).

Note: See table with examples in the description of the setpoint **MFStart enable (page 338)**.

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ParallelEnable

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	NO, YES [-]		
Default value	YES	Force value	YES

Step	-		
Comm object	9237	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to enable/disable the parallel operation, i.e. supplying the load in parallel with the mains.			
<ul style="list-style-type: none"> ➤ Island mode is recognized if the mains breaker is open, e.g. the feedback input MCB FEEDBACK (PAGE 725) is not active. ➤ Parallel mode is recognized if the mains breaker is closed, e.g. the feedback input MCB FEEDBACK (PAGE 725) is active. 			
If the parallel mode is recognized and parallel operation is disabled the controller will open the generator breaker, cool-down the gen-set and stop it. While this situation persists the controller behavior is following:			
<ul style="list-style-type: none"> ➤ The gen-set start in AUT mode is blocked, it can be started in MAN mode only. ➤ The GCB can't be closed. ➤ The message <i>OfL StartBick</i> is present in the alarm list (see the alarm output <i>OfL StartBick</i>). 			
Note: See table with examples in the description of the setpoint <i>MFStart enable</i> (page 338).			

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Synchro enable

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	NONE, FORWARD, REVERSE, BOTH [-]		
Default value	BOTH	Force value	YES
Step	-		
Comm object	9235	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used for enable/disable forward and reverse synchronization.			
<ul style="list-style-type: none"> ➤ NONE: No synchronizing is enabled. ➤ FORWARD: GCB synchronizing is enabled. ➤ REVERSE: MCB synchronizing is enabled. ➤ BOTH: GCB and MCB synchronizing are enabled. 			
Note: Although synchronizing of the particular breaker is disabled the breaker can be closed to a "dead" (voltage-free) bus.			
Note: See table with examples in the description of the setpoint <i>MFStart enable</i> (page 338).			

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MFStart enable

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	NO, YES [-]		
Default value	YES	Force value	YES
Step	-		

Comm object	9238	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to enable/disable automatic start of the gen-set when a mains failure occurs.			

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#Neutral cont

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	EACH, COMMON [-]		
Default value	EACH	Force value	NO
Step	-		
Comm object	9890	Related applications	SPtM, SPI, Combi

Description

The setpoint is used for adjusting the behavior of the **NEUTRAL CB C/O (PAGE 826)** output according to actual site wiring.

The neutral contactor is used to connect the neutral wire (N) with the protective wire (PE) in a TN-S system. This connection **must exist in one moment at one point** of the circuit only.

The **EACH** option should be used if each gen-set has it's own neutral contactor. Four-pole GCB must be used for this case.

- The output is always opened while the gen-set is not running.
- The output is always opened while the MCB is closed.
- While the gen-set is running and GCB is open, the output closes when generator voltage in at least one phase exceeds 85% of the nominal voltage. It opens when the generator voltage in all phases drops below 50% of the nominal voltage.
- While the gen-set is running, MCB is open and GCB is closed, then the position of the output is given by an internal algorithm, which ensures, that always exactly one gen-set connected to the bus has the neutral contactor closed.

Note: Functional CAN2 communication between the controllers is required for this function.

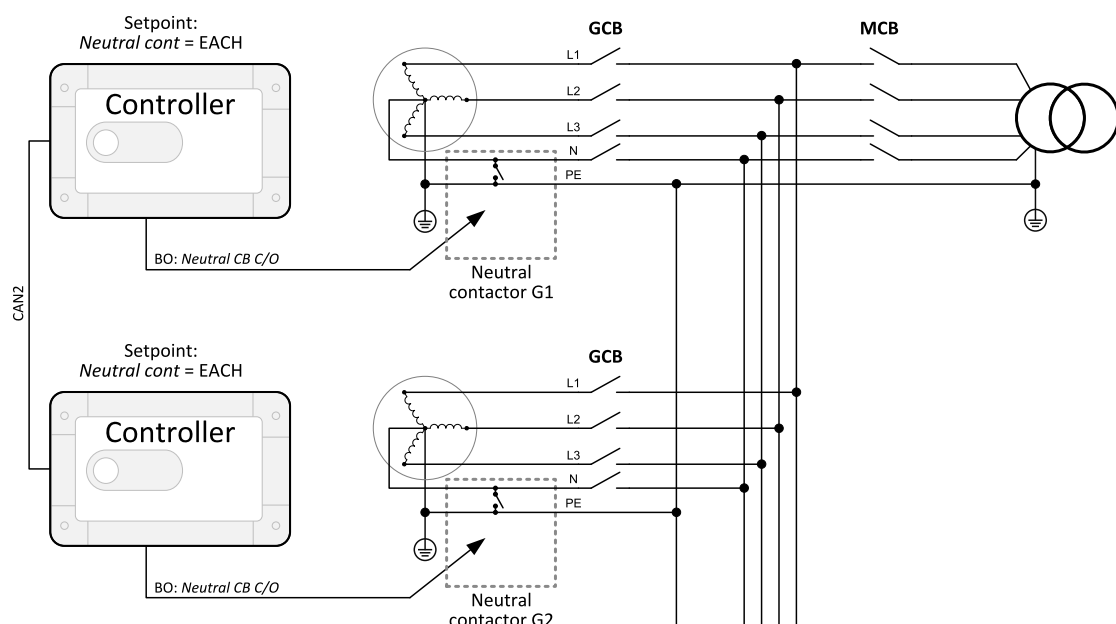


Image 9.1 Principal scheme of a site if Neutral cont = EACH

The **COMMON** option should be used if there is one common neutral contactor for the whole site. The outputs **NEUTRAL CB C/O (PAGE 826)** from all controllers are combined together and the combined signal is used to control the breaker. Three-pole GCB must be used for this case.

- The output is always opened while the gen-set is not running.
- The output is always opened while the MCB is closed.
- While the gen-set is running the output closes when generator voltage in at least one phase exceeds 85% of the nominal voltage. It opens when the generator voltage in all phases drops below 50% of the nominal voltage. That means if at least one gen-set in the site is running and having proper voltage, the neutral breaker is closed.

Note: If there are more logical groups the "common" option is related to the group. That means one common neutral contactor is expected for each group.

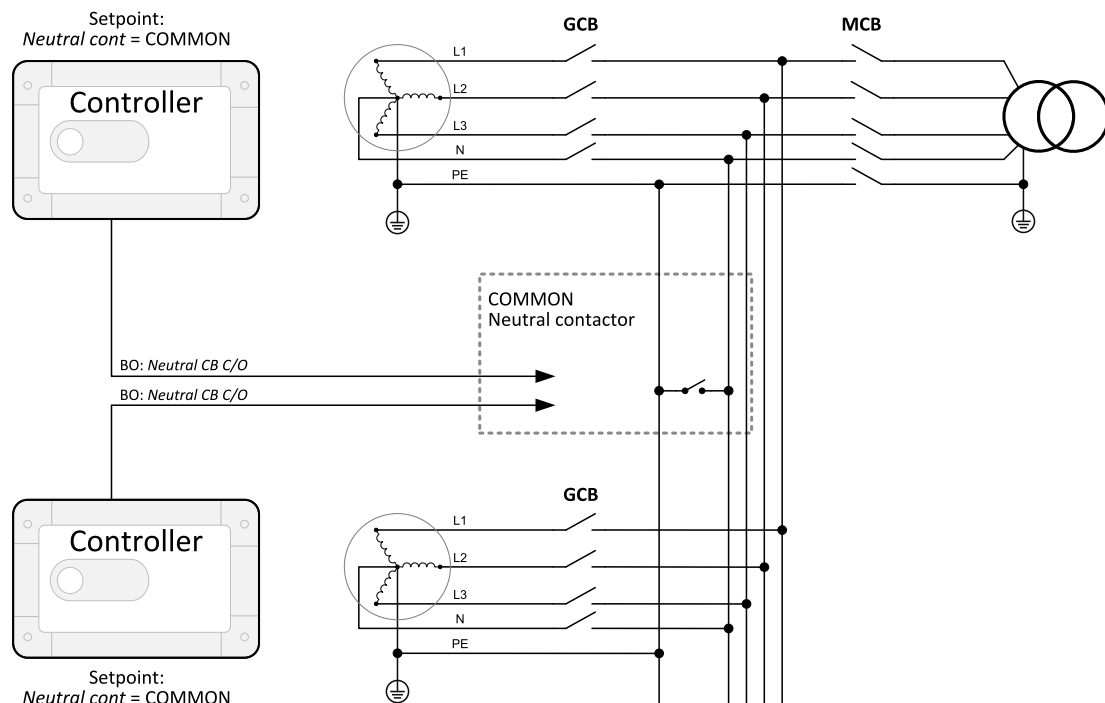


Image 9.2 Principal scheme of a site if Neutral cont = COMMON

Note: As there is always a connection between the N and PE wires at the mains side the generator neutral contactors are always open when the mains breaker is closed.

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WatchedContr

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	OFF, 1 .. 16 [-]		
Default value	OFF	Force value	NO
Step	1		
Comm object	11719	Related applications	SPtM, SPI, Combi

Description

This setpoint is used at redundant controller to specify the address of the related main controller in **Redundant systems using CAN bus (page 147)**. Adjust this setpoint to 0 if the controller is not used as redundant or if it is used in **Redundant systems using binary signals (page 147)**.

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CB ctrl mode

Setpoint group	ProcCtrlSingle	Related FW	2.2.0
Range [units]	INTERNAL / FOLLOW / EXTERNAL		
Default value	INTERNAL	Force value	YES
Step	-		
Comm object	11771	Related applications	SPtM, SPI, Combi
Description			
This setpoint switches the control modes for circuit breakers.			
INTERNAL – breakers are controlled only from controller side. Unexpected opening or closing of GCB or MCB leads to alarm message.			
FOLLOW – in this mode is expected, that the GCB or MCB can be opened from external unit. No alarm is issued. Controller reacts on actual state and mode and depend on this activates the corresponding actions.			
Note: In case any CB is externally opened the history record "GCB open ext" or "MCB open ext" is written.			
EXTERNAL – breakers are fully controlled from external unit. Controller reacts only on the breaker feedback. Red protection alarms are only visualized.			

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Group: SUS Control

SUS sequence

Setpoint group	SUS Control	Related FW	2.2.0				
Range [units]	ENABLED, DISABLED [-]						
Default value	DISABLED	Force value	YES				
Step	[-]						
Comm object	10110	Related applications	SPtM, SPI, MINT, Combi				
Description							
This setpoint is used for selection of the start sequence (standard start sequence, or Start Up Synchro sequence with closed GCB and not excited alternator)							
<table><tr><td>DISABLED</td><td>Standard start sequence (opened GCB)</td></tr><tr><td>ENABLED</td><td>SUS start sequence (closed GCB)</td></tr></table>				DISABLED	Standard start sequence (opened GCB)	ENABLED	SUS start sequence (closed GCB)
DISABLED	Standard start sequence (opened GCB)						
ENABLED	SUS start sequence (closed GCB)						
Conditions for performance of SUS sequence							
➤ Setpoint "SUS sequence" (SUS control group) – ENABLED							
➤ RPM pick-up is connected							

- No voltage on the bus (actually voltage on the bus must be lower than 1/3 of GenNomV. MINT, Combi application only)
- MCB is opened (SPtM, SPI application only)
- LBI: **GCB DISABLE (PAGE 706)** is not activated
- LBI: **SUS EXCIT BLCK (PAGE 746)** – is activated before Start command (in case of configuration: setpoint ExcitationCtrl=EXTERNAL only (SUS control group))
- In case of enabled power management – the Gen-sets are started based on actual Load reserves.
- GCB feedback must come during Prestart time (Engine params groups). If it doesn't come during Prestart time, then it is switched to STANDARD start sequence

Reason of SUS sequence interruption available as a history record.

- SUSseq break-1: MCB is closed (in SPTM application).
- SUSseq break-2: MCB is open, Mains voltage is higher then 1/3 of setpoint Basic settings: **MainsNomV (page 352)** (in SPTM application).
- SUSseq break-3: Bus voltage is higher than 1/3 of setpoint Basic settings: **BusNomV** (in MINT application).
- SUSseq break-4: The GCB feedback is not closed within the Prestart Time elapsed (after GCB closing).
- SUSseq break-5: Setpoint SUS control: ExcitationCtrl=EXTERNAL. The LBI **SUS EXCIT BLCK (PAGE 746)** is not closed in advance of the start command OR if it is inactivated sooner than the LBO **READYToEXCITE (PAGE 837)** gets active.

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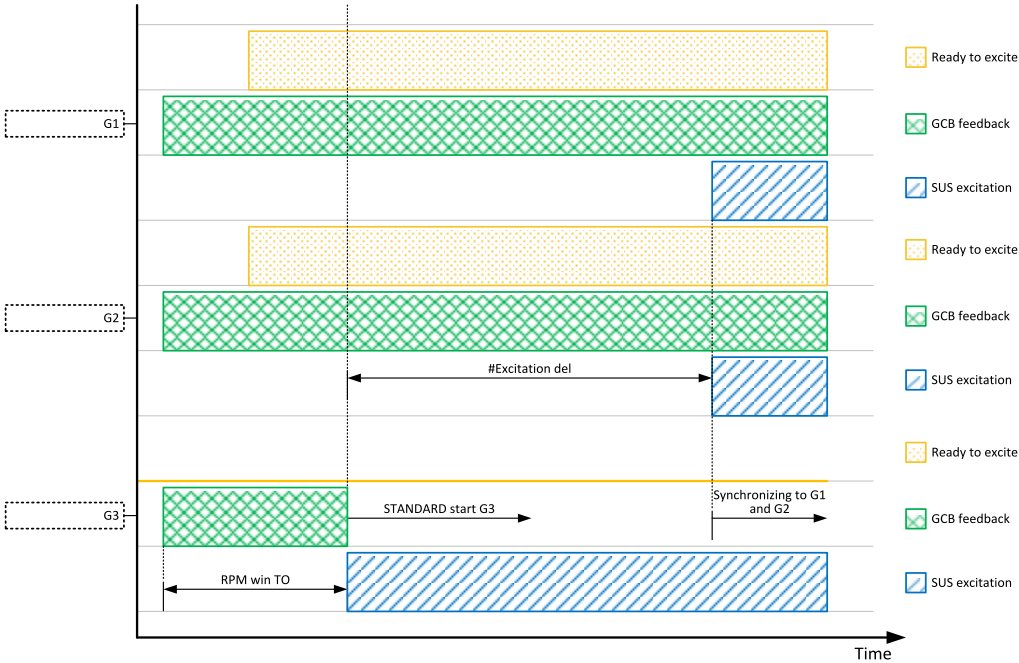
RPM window

Setpoint group	SUS Control	Related FW	2.2.0
Range [units]	0.0..100.0 [%]		
Default value	30	Force value	NO
Step	0.1		
Comm object	10193	Related applications	SPtM, SPI, MINT, Combi
Description			
RPM window is area around nominal RPM , where percentage value specifies area above and below Nominal RPM (page 579) .			
If the Gen-set's RPM achieve this RPM window and stay into this window for 1 second, then READYToEXCITE (PAGE 837) is activated.			
Example: RPM window = 10 %, Nominal RPM = 1500, 10 % of nominal RPM = 150 RPM, RPM window is (1500-150 to 1500+150) so RPM window is from 1350 to 1650 RPM.			

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#ExcitationDel

Setpoint group	SUS Control	Related FW	2.2.0
Range [units]	0 .. 600, 601=NO TIMEOUT [s]		
Default value	10	Force value	NO

Step	1		
Comm object	14104	Related applications	MINT, Combi
Description			
<p>Timer is designed for cases, when some Gen-set performs unsuccessful SUS sequence and it is switched over to standard start sequence and also condition #SUS min power (page 344) is not met. During ExcitationDel this Gen-set is started in standard start sequence and it should be started and be ready for synchronisation immediately after the moment when the voltage is on the bus.</p> <p>Timer is activated in case that condition #SUS min power (page 344) is not met only. In this case the Gen-sets with active LBO READYToEXCITE (PAGE 837) wait for delay ExcitationDel and than they are excited. In this moment the Gen-sets started standard sequence should be in running state and be ready to synchronized to bus.</p> <p>Counting of ExcitationDel starts when on the bus the Gen-sets with closed GCBs and LBO READYToEXCITE (PAGE 837) = 1 are only and the #SUS min power (page 344) condition is not met.</p>			
			
<p>On the picture is shown diagram, where condition #SUS min power (page 344) = 3x Gnom power. G1 and G2 achieve RPM window and activate LBO READYToEXCITE (PAGE 837), G3 doesn't activated LBO READYToEXCITE (PAGE 837) in delay RPM win TO (page 344) and it is switched to STANDARD start sequence.</p> <p>Condition #SUS min power is not met, G3 opens its GCB and from this moment timer #ExcitationDel starts counts down. During this delay G3 starts STANDARD way , it goes to Running state and waits for voltage on the bus then it is synchronized to the bus standard way.</p> <p>In case of option #ExcitationDel = OFF the timer is deactivated and the Gen-sets will be excited in case of fulfil condition #SUS min power (page 344) is met only. (Gen-sets started SUS sequence, then they stay in rotation without excitation and Gen-sets which was switched over to STANDARD start sequence and they stay in running state and will wait for voltage on the bus).</p> <p>In case of start counting the ExcitationDel the history record Wrn SUSminPwr is written in history of controller and warning Wrn SUSminPwr is evaluated in alarmlist.</p>			
<p>Note: This setpoint is in MINT application only.</p>			

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RPM win TO

Setpoint group	SUS Control	Related FW	2.2.0
Range [units]	2.0..6000.0 [s]		
Default value	30	Force value	YES
Step	0.1		
Comm object	10194	Related applications	SPtM, SPI, MINT, Combi
Description <p>RPM window TimeOut is time for reaching required RPM window. This timer starts when RPM achieves starting RPM (Starting RPM (page 580)) and Idle time is counted (Idle time (page 381)). In case of LBO: READYTOExcITE (PAGE 837) activation RPM win TO is finished.</p> <p>If RPM of Gen-set don't achieve RPM window (or LBO: READYTOExcITE (PAGE 837) is not activated in timer RPM win TO), then the GCB is opened and standard start sequence is performed.</p>			

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#SUS min power

Setpoint group	SUS Control	Related FW	2.2.0
Range [units]	1 .. 65000 [kW] (this depends on selected Power formats (page 165))		
Default value	100 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	14013	Related applications	SPtM, SPI, MINT, Combi
Description <p>Setpoint #SUS min power defines nominal power from Gen-sets (started in SUS sequence and with</p>			

active LBO **READYToEXCITE (PAGE 837)** for activation of excitation.

When the group of Gen-sets is started by SUS sequence, nominal power of each Gen-set which activates LBO **READYToEXCITE (PAGE 837)** is counted. When sum of nominal power of these Gen-sets (started v SUS sequence, with activated LBO **READYToEXCITE (PAGE 837)**) achieves the condition #SUS min power, then the rest of Gen-sets (with not active LBO **READYToEXCITE (PAGE 837)**) is switched over to STANDARD start sequence (and GCBs are opened) and Gen-sets with active LBO **READYToEXCITE (PAGE 837)** are excited.

If the condition #SUS min power is not met, and on the bus the Gen-sets with active LBO **READYToEXCITE (PAGE 837)** are connected only, the timer **#ExcitationDel (page 342)** starts count down (if **#ExcitationDel (page 342)** is 1 ... 600 s). When **#ExcitationDel (page 342)** expires, the excitation of Gen-sets with active **READYToEXCITE (PAGE 837)** is activated.

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ExcitationCtrl

Setpoint group	SUS Control	Related FW	2.2.0
Range [units]	INTERNAL,EXTERNAL [-]		
Default value	INTERNAL	Force value	NO
Step	[-]		
Comm object	10056	Related applications	SPtM, SPI, MINT, Combi

Description

This setpoint defines source of decision logic for activation of excitation output LBO **SUS EXCITATION (PAGE 846)**.

INTERNAL	Controller activates/deactivates excitation based on setpoint #SUS min power.
EXTERNAL	It's determined for cases, where request for excitation comes from external device (eq external PLC). External device gives request for excitation via LBI SUS EXCIT BLCK (PAGE 746) and controller activates/deactivates excitation – based of LBI SUS EXCIT BLCK (PAGE 746) (its valid for SUS sequence only). (Condition #SUS Min power is ignored, excitation is controlled via LBI SUS EXCIT BLCK (PAGE 746)). LBI SUS EXCIT BLCK (PAGE 746) must be activated before Start command comes, if not – STANDARD start sequence is performed.

In case, when the system has active LBO **READYToEXCITE (PAGE 837)** and it waits for deactivation LBI **SUS EXCIT BLCK (PAGE 746)** – and the RPM drop out from RPM window – Gen-set is switched over to STANDARD start sequence.

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Group: Basic settings

Nomin power

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 32000 [kW] (this depends on selected Power formats (page 165))		
Default value	200 (this depends on	Force value	YES

	selected Power formats (page 165))		
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8276	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used for adjusting the gen-set nominal (rated) power, i.e. the maximum allowed Gen-set power level.</p> <p>IS-NT controllers provide two independent <i>power derating</i> functions, which can be used for derating of the Gen-set according to an analog value (e.g. temperature). See the setpoints Derating1 strt (page 333) and Derating2 strt (page 334).</p> <p>The nominal power or derated nominal power is used as the basis (100 %) for Gen-set power protections, as the upper limit of the requested power in the parallel-to-mains operation, for power management and other functions.</p> <p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p>			

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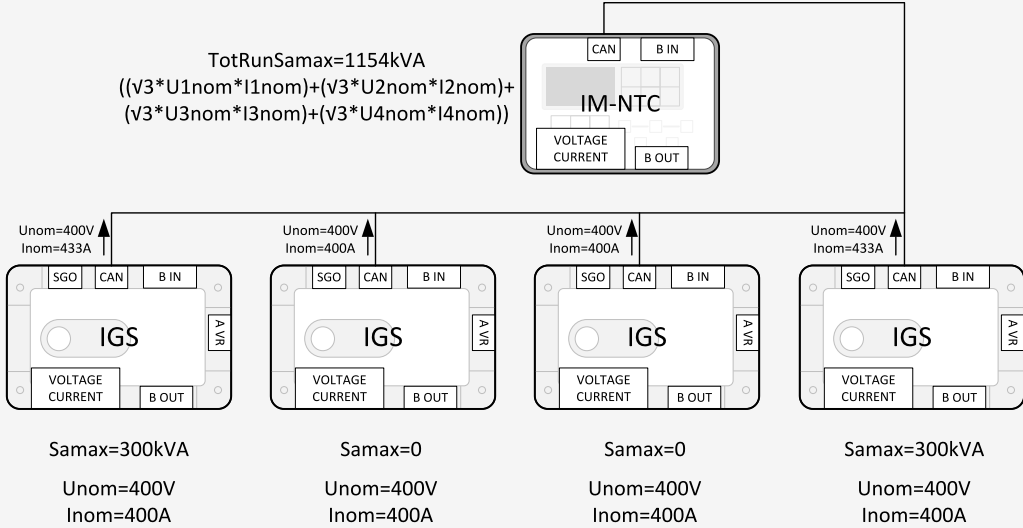
InstalledPower

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. Nomin power (page 345) (this depends on selected Power formats (page 165))		
Default value	200 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	16183	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>Setpoint defines the maximum power agreed for parallel to mains mode.</p> <p>This mode is used for counting the PowerOver- and PowerUnderFrequency derating/increasing and for mode PF(Pm) and Q(P).</p> <p>Setpoint is also used as default value for Load reduction mode defined by LBI's and LAI's.</p> <p>IMPORTANT: In MINT application is default value of this setpoint OFF which means, that in that case is taken Nominal power as the calculated value for Power management. In case the InstaPower is >0 this value is used as calculated value in to the Power management.</p> <p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p>			

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Samax

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 32000 (this depends on selected Power formats (page 165))		
Default value	(this depends on selected Power formats (page 165))	Force value	YES

Step	(this depends on selected Power formats (page 165))		
Comm object	13208	Related applications	SPtM, SPI, Combi
Description			
<p>This setpoint means maximal apparent power of generator. This setpoint is used for recalculation of required reactive power in case of Q(Um) function or PforQ. For adjusting the Q(Um) use curve named Q (Um) in card User Sensors in GenConfig.</p>			
<p>IMPORTANT: In MINT application can be set this setpoint to OFF, which means that the apparent power of the site is calculated from Nomin power (page 345) and GenNomV (page 351).</p>			
<p>IMPORTANT: In case the Samax has value >0, the nominal current which is shared with other controllers is recalculated from this value. This feature is used for functions related to grid code requirements on the InteliMains controller.</p>			
<p>IMPORTANT:</p> <div style="text-align: center;"> $\text{TotRunSamax} = 1154 \text{ kVA}$ $((\sqrt{3} * U_{1nom} * I_{1nom}) + (\sqrt{3} * U_{2nom} * I_{2nom}) + (\sqrt{3} * U_{3nom} * I_{3nom}) + (\sqrt{3} * U_{4nom} * I_{4nom}))$ </div>  <p>The diagram illustrates the calculation of the total apparent power (TotRunSamax) for four IGS units connected to a central IM-NTC unit. The formula for TotRunSamax is given as the sum of the apparent power of each unit, calculated as $\sqrt{3} * U_{nom} * I_{nom}$ for each phase. The units are labeled with their respective Samax values: 300kVA, 0, 0, and 300kVA. The nominal voltage (Unom) and nominal current (Inom) are specified for each unit.</p>			
<p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p>			

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Nomin current

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 10000 [A]		
Default value	300	Force value	YES
Step	1		
Comm object	8275	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used for adjusting the generator nominal current.</p> <p>The nominal current is used as the basis (100%) for generator thermal-overcurrent protection (2Inom del), and for short current protection (Gener protect: Ishort).</p>			
<p>Note: The setpoints CT ratio prim (page 348) and CT ratio sec (page 348) must be adjusted properly to obtain correct generator current readings.</p>			

IMPORTANT: The maximum measurable input current to the controller current terminals is 11 A.

IMPORTANT: Do not disconnect the CT terminals from the controller while there is nonzero current in the CT primary circuit!

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CT ratio prim

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 15000 [A]		
Default value	300	Force value	NO
Step	1		
Comm object	8274	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Nominal current of the primary side of the generator current transformers. The secondary side is adjusted by setpoint CT ratio sec (page 348).			

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CT ratio sec

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	/5, /1 [A]		
Default value	/5A	Force value	NO
Step	[-]		
Comm object	10556	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Nominal current of the secondary side of the generator current transformers. The primary side is adjusted by the setpoint CT ratio prim (page 348).			

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Im3/ErFICurCTp

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 15000 [A]		
Default value	300	Force value	NO
Step	1		
Comm object	8566	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Nominal current of the primary side of the current transformer connected to the controller terminals labeled <i>IN</i> . The secondary side is adjusted by setpoint Im3/ErFICurCTs (page 349).			
Note: The <i>IN</i> terminals can be used either for measurement of earth current or mains current (mains import). See also the setpoint I/E-Pm meas (page 329).			

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Im3/ErFICurCTs

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	/5, /1 [A]		
Default value	/5A	Force value	NO
Step	[-]		
Comm object	10557	Related applications	SPtM, SPI, MINT, COX, Combi
Description Nominal current of the secondary side of the current transformer connected to the controller terminals labeled <i>IN</i> . The primary side is adjusted by the setpoint Im3/ErFICurCTp (page 348). <i>Note: The IN terminals can be used either for measurement of earth current or mains current (mains import). See also the setpoint I/E-Pm meas (page 329).</i>			

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VT ratio

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1	Force value	NO
Step	0.01		
Comm object	9579	Related applications	SPtM, SPI, MINT, COX, Combi
Description The setpoint is used to adjust the generator voltage transformers ratio. <i>Note: Adjust the setpoint to the value of 1.0 if the generator voltage is connected directly to the controller terminals, i.e. without transformers.</i> <i>Note: Example: if you have transformers with ratio 6000/100 V adjust the setpoint to the value of 60.0.</i> <i>Note: The range of the generator voltage inputs must be adjusted properly. See the setpoint Vg InpRangeSel (page 349).</i>			

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Vg InpRangeSel

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	277, 120 [V]		
Default value	277	Force value	NO
Step	[-]		
Comm object	10662	Related applications	SPtM, SPI, MINT, COX, Combi
Description This setpoint selects the range of the generator voltage terminals. <i>Note: The 277 V range is suitable for both European (230 V) and American (277 V) measurement. The range 120 V is intended for high-voltage applications where voltage transformers with 100 V secondary range are used or for alternative American (120 V) measurement.</i>			

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Vm VT ratio

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1	Force value	YES
Step	0.01		
Comm object	9580	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to adjust the mains voltage transformers ratio.			
Note: Adjust the setpoint to the value of 1.0 if the mains voltage is connected directly to the controller terminals, i.e. without transformers.			
Note: Example: if you have transformers with ratio 6000/100 V adjust the setpoint to the value of 60.0 .			
Note: The range of the mains voltage inputs must be adjusted properly. See the setpoint Vm InpRangeSel (page 350).			

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VmMid VT ratio

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0.10 .. 500.00 [V/V]		
Default value	1.00	Force value	YES
Step	0.01		
Comm object	13118	Related applications	SPtM, SPI, Combi
Description			
The setpoint is used to adjust the mains medium voltage transformers ratio.			
Note: Adjust the setpoint to the value of 1.0 if the mains medium voltage is connected directly to the controller terminals, i.e. without transformers.			
Note: Example: if you have transformers with ratio 6000/100 V adjust the setpoint to the value of 60.0 .			

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Vm InpRangeSel

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	277, 120 [V]		
Default value	277	Force value	NO
Step	[-]		
Comm object	10663	Related applications	SPtM, SPI, Combi
Description			
This setpoint selects the range of the mains voltage terminals.			
Note: The 277 V range is suitable for both European (230 V) and American (277 V) measurement. The range 120 V is intended for high-voltage applications where voltage transformers with 100 V secondary range are used or for alternative American (120 V) measurement.			

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Vb InpRangeSel

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	277 V, 120 [V]		
Default value	277	Force value	NO
Step	[-]		
Comm object	10663	Related applications	MINT, COX
Description			
This setpoint selects the range of the bus voltage terminals.			
Note: See all notes mentioned above.			

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GenNomV

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	10 .. 34641 [V] (this depends on selected Power formats (page 165))		
Default value	231 (this depends on selected Power formats (page 165))	Force value	YES
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8277	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the nominal (rated) generator voltage (phase to neutral). If you do not know the phase-neutral nominal voltage, you can adjust the phase-phase nominal voltage GenNomVph-ph (page 351) . The controller will then recalculate the phase-neutral nominal voltage automatically.			
Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.			
Note: If different voltage on Gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (MainsNomV (page 352) and GenNomV) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. Gen-set nominal is 231 V but Bus/Mains nominal is 240 V. In this case both setpoints need to be adjusted to 231 V and setpoints of corresponding protections for Bus/Mains need to be set asymmetrically. For 240 V on Bus/Mains it is typical to open MCB when voltage reaches 254 V or 225 V. Since the setpoint is adjusted to 231 V corresponding protection setpoints need to be adjusted to Mains >V MP (page 409) = 106 % and Mains <V MP (page 412) = 97 % (hence the desired values are reached).			

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GenNomVph-ph

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	17 .. 60000 [V] (this depends on selected Power formats (page 165))		
Default value	400 (this depends on selected Power formats (page 165))	Force value	NO

Step	1 (this depends on selected Power formats (page 165))		
Comm object	9673	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the nominal (rated) generator voltage (phase to phase). This setpoint is also recalculated automatically when the phase-neutral nominal voltage GenNomV (page 351) is changed.</p> <p>This setpoint can be used if you know the phase-phase nominal voltage only. The controller will recalculate the phase-neutral nominal voltage automatically when this setpoint is changed.</p> <p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p> <p>Note: If different voltage on Gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (GenNomVph-ph and MainsNomVph-ph (page 353)) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. Gen-set nominal is 400 V but Bus/Mains nominal is 415 V.</p> <p>In this case both setpoints need to be adjusted to 400 V and setpoints of corresponding protections for Bus/Mains need to be set asymmetrically.</p> <p>For 415 V on Bus/Mains it is typical to open MCB when voltage reaches 440 V or 390 V. Since the setpoint is adjusted to 400 V corresponding protection setpoints need to be adjusted to Mains >V MP (page 409) = 106% and Mains <V MP (page 412) = 97 % (hence the desired values are reached).</p>			

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MainsNomV

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	10 .. 34641 [V] (this depends on selected Power formats (page 165))		
Default value	231 (this depends on selected Power formats (page 165))	Force value	YES
Step	1 (this depends on selected Power formats (page 165))		
Comm object	9888	Related applications	SPtM, SPI, Combi
Description			
<p>This setpoint is used to adjust the nominal mains voltage (phase to neutral). If you do not know the phase-neutral nominal voltage, you can adjust the phase-phase nominal voltage MainsNomVph-ph (page 353). The controller will then recalculate the phase-neutral nominal voltage automatically.</p> <p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p> <p>Note: If different voltage on Gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (MainsNomV and GenNomV (page 351)) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. Gen-set nominal is 231 V but Bus/Mains nominal is 240 V.</p> <p>In this case both setpoints need to be adjusted to 231 V and setpoints of corresponding protections for Bus/Mains need to be set asymmetrically.</p> <p>For 240 V on Bus/Mains it is typical to open MCB when voltage reaches 254 V or 225 V. Since the setpoint is adjusted to 231 V corresponding protection setpoints need to be adjusted to Mains >V MP (page 409) = 106 % and Mains <V MP (page 412) = 97 % (hence the desired values are reached).</p>			

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MainsNomVph-ph

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	17 .. 60000 [V] (this depends on selected Power formats (page 165))		
Default value	400 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	9907	Related applications	SPtM, SPI, Combi
Description			
In application SPtM and SPI.			
<p>This setpoint is used to adjust the nominal mains voltage (phase to phase). This setpoint is also recalculated automatically when the phase-neutral nominal voltage MainsNomV (page 352) is changed.</p> <p>This setpoint can be used if you know the phase-phase nominal voltage only. The controller will recalculate the phase-neutral nominal voltage automatically when this setpoint is changed.</p>			
<p>Note: The actual setpoint units and range depend on setting of the Power format in GenConfig.</p>			
<p>Note: If different voltage on Gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (GenNomVph-ph (page 351) and MainsNomVph-ph) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. Gen-set nominal is 400 V but Bus/Mains nominal is 415 V.</p> <p>In this case both setpoints need to be adjusted to 400 V and setpoints of corresponding protections for Bus/Mains need to be set asymmetrically.</p> <p>For 415 V on Bus/Mains it is typical to open MCB when voltage reaches 440 V or 390 V. Since the setpoint is adjusted to 400 V corresponding protection setpoints need to be adjusted to Mains >V MP (page 409) = 106 % and Mains <V MP (page 412) = 97 % (hence the desired values are reached).</p>			

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FixVoltProtSel

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	PHASE-NEUTRAL, PHASE-PHASE, BOTH + PH-N, BOTH + PH-PH [-]		
Default value	PHASE-NEUTRAL	Force value	NO
Step	[-]		
Comm object	10647	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<ul style="list-style-type: none"> ➤ PHASE-NEUTRAL: The generator and mains/bus voltage protections are based on phase-neutral voltages and the phase-neutral nominal voltages are taken as 100%. ➤ PHASE-PHASE: The generator and mains/bus voltage protections are based on phase-phase voltages and the phase-phase nominal voltages are taken as 100%. ➤ BOTH + PH-N: The Mains voltage protections are based both on phase-neutral and phase-phase voltages. Generator voltage protections are based on phase to neutral voltage. Also MainsAv10>V MP (page 411) is evaluated from the phase-neutral voltage. ➤ BOTH + PH-PH: The Mains voltage protections are based both on phase-neutral and phase-phase voltages. Generator voltage protections are based on phase to phase voltage. Also MainsAv10>V MP (page 411) is evaluated from the phase-phase voltage. 			

Note: All options require different settings of protection levels to achieve identical results.

	FixVoltProtSel	Voltages used for evaluation
Mains voltage	<i>PHASE-NEUTRAL</i>	<i>Any of 3 ph-N voltages</i>
	<i>PHASE-PHASE</i>	<i>Any of 3 ph-ph voltages</i>
	<i>BOTH + PH-N</i>	<i>Any of 3 ph-ph voltages or 3 ph-N voltages</i>
	<i>BOTH + PH-PH</i>	<i>Any of 3 ph-ph voltages or 3 ph-N voltages</i>

Phase-nominal voltage is 231 V, actual voltages are L1N = 231 V, L2N = 231 V, L3N = 219.5 V => the L3N voltage is at 95 % of the nominal. The same situation evaluated from phase-phase voltages gives following results: nominal phase-phase voltage is 400 V, measured voltages are L12 = 400 V, L23 = 390 V, L31 = 390 V => the L23 and L31 are at 97.5 % of the nominal. It is obvious that if the situation is evaluated from phase-neutral voltages the tripping level must be adjusted to 95 %, whereas the same situation evaluated from phase-phase voltages require tripping level adjusted to 97.5 %.

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Nominal Freq

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	50, 60 [Hz]		
Default value	50	Force value	YES
Step	[-]		
Comm object	13220	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts nominal system frequency (choose 50 Hz or 60 Hz).			
Setpoint Nom frq offset (page 354) is used for setting offset to the chosen nominal frequency (-2 to +2 Hz with step 0.01 Hz). Controller regulates to the Nominal Freq + Nom frq offset (page 354) frequency.			
The value Nominal Freq + Nom frq offset (page 354) is used as 100% for generator and mains/bus frequency protections and as requested value for frequency regulation (except synchronizing) if the setpoint Sync/Load: Freq reg loop / RPM reg loop (page 448) is set to ALL THE TIME.			

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Nom frq offset

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	-2.00 .. 2.00 [Hz]		
Default value	0	Force value	YES
Step	0.01		
Comm object	13221	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts offset of nominal system frequency (Nominal Freq (page 354)) with step 0.01 Hz. Controller regulates to the Nominal Freq (page 354) + Nom frq offset frequency.			
The value Nominal Freq (page 354) + Nom frq offset is used as 100% for generator and mains/bus frequency protections and as requested value for frequency regulation (except synchronizing) if the			

setpoint **Freq reg loop / RPM reg loop (page 448)** is set to ALL THE TIME.

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Gear Teeth

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	FGen->RPM, 1..500 [-]		
Default value	120	Force value	NO
Step	1		
Comm object	8252	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Number of teeth on the engine's flywheel for the pick-up sensor. Adjust the setpoint to Fgen->RPM (0), if the pick-up sensor is not used. Then the engine speed will be calculated from the generator frequency.			
Note: Generator voltage must be higher than 10 V effective to measure the speed from the frequency correctly. If this condition is not fulfilled at low speeds (cranking) it is recommended to use additional running indication as e.g. D+ signal to prevent overcranking of the engine. See the binary output STARTER (PAGE 844) for additional information.			
Note: The option Fgen->RPM (0) is not available in Async applications because RPM cannot be calculated from the asynchronous generator frequency. The pickup must be always used.			
IMPORTANT: The starting procedure of gas engine may not work without the pickup. The pickup must be always used for gas engines.			

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Nominal RPM

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	100 .. 4000 [RPM]		
Default value	1500	Force value	YES
Step	1		
Comm object	8253	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the nominal Gen-set speed.			
The nominal speed is used:			
➤ As 100% for the overspeed protection (setpoint Overspeed (page 393))			
➤ For current speed calculation if it is calculated from generator frequency. See the setpoint Gear Teeth (page 355) .			
Note: The setpoints Nominal RPM and system frequency (Nominal Freq (page 354) + Nom frq offset (page 354)) must correspond to each other, i.e. if the engine speed is at nominal value then the generator frequency must be at nominal value as well.			

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ControllerMode

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	OFF, RUN [-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	8315	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint can be used to select the controller mode. It is equivalent to selecting the mode by the buttons on the front panel. Currently active mode is displayed on the controller main screen.</p> <p>Note: If any of the mode forcing inputs REMOTE MAN (PAGE 738), REMOTE AUT/REMOTE SEM (PAGE 738) or REMOTE TEST (PAGE 739) is active, then the currently active mode can be different than the mode selected by the setpoint (resp. panel buttons).</p>			
OFF	<p>The GCB is opened and the engine is immediately stopped in this mode without unloading and cooling. After that the controller is in <i>Not ready</i> state and can not be started any way. The MCB is closed permanently (MCB Opens on (page 425) = GENRUN) or is open or closed according to the mains is present or not (MCB Opens on (page 425) = MAINSFAIL).</p>		
RUN	<p>The engine can be started and stopped manually using START and STOP buttons (or external buttons wired to appropriate binary inputs) in RUN mode. When the engine is running, Load can be closed by the Clutch I/O button.</p>		
SEM	<p>(IS-NT only) – The Gen-set is started and stopped only manually using START and STOP buttons (or external buttons wired to appropriate binary inputs), however the the full start sequence up to the moment when the engine is loaded is automatic as well as unloading and stop sequence. The only case when the Gen-set starts automatically in SEMI is the start/stop initiated by the AMF function.</p>		
AUT	<p>This is fully automatic operation. The engine is started and stopped by:</p> <ul style="list-style-type: none"> ➤ Binary input Rem Start/Stop (page 738) (SPtM, SPI, COMBI) ➤ Mains import dependent autostart function (peak start/stop) (SPtM, SPI, Combi) ➤ AMF function (SPtM, Combi) ➤ Power management (MINT, Combi) <p>Buttons MCB, GCB, START, STOP including the appropriate binary inputs for external buttons are not active. The full start sequence up to the moment when the engine is loaded is automatic as well as unloading and stop sequence.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>IMPORTANT: If an red alarm is present and the Gen-set is in AUT mode, it can start by self after all red alarms becomes inactive and are acknowledged!!! If you want to avoid this situation, adjust the setpoint FitRes GoToMAN (page 357) to the ENABLED position.</p> </div>		
TEST	<p>(SPtM, Combi) – the Gen-set is started when the controller is switched to TEST mode and remains running unloaded until the mode is changed. If a mains failure occurs, the Gen-set takes over the load.</p>		

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FltRes GoToMAN

Setpoint group	Basic settings	Related FW	2.2.0				
Range [units]	DISABLED, ENABLED [-]						
Default value	DISABLED	Force value	YES				
Step	[-]						
Comm object	9983	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
This setpoint can be used to avoid possible unexpected automatic start of the Gen-set in AUT mode after the Gen-set was stopped by a protection and then fault reset was pressed.							
<table><tr><td>ENABLED</td><td>The controller mode is automatically changed from any mode except OFF to MAN if any red-level protection is acknowledged by pressing of the fault reset.</td></tr><tr><td>DISABLED</td><td>The automatic change of the controller mode is disabled.</td></tr></table>				ENABLED	The controller mode is automatically changed from any mode except OFF to MAN if any red-level protection is acknowledged by pressing of the fault reset.	DISABLED	The automatic change of the controller mode is disabled.
ENABLED	The controller mode is automatically changed from any mode except OFF to MAN if any red-level protection is acknowledged by pressing of the fault reset.						
DISABLED	The automatic change of the controller mode is disabled.						
Note: The function will not work if the current controller mode is forced by one of the inputs <i>REMOTE AUT/REMOTE SEM (PAGE 738)</i> or <i>REMOTE TEST (PAGE 739)</i> .							

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Local buttons

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	PANEL, EXTBUTTONS, BOTH [-]		
Default value	PANEL	Force value	NO
Step	[-]		
Comm object	10588	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint selects which set of control buttons is currently active. Its function depends on which type of controller is used. Please refer to the section which suits your controller/display version.			
<ul style="list-style-type: none"> ➤ First section deals with the case of IntelliSys Gas with IntelliVision 5. ➤ Second section deals with the case of IntelliSys Gas with IntelliVision 8. 			
IntelliSys Gas with IntelliVision 5 display			
Situation is depicted in the following figure.			
<ul style="list-style-type: none"> ➤ Buttons in red box are inactive when EXTBUTTONS option is selected and active when PANEL or BOTH option is selected. ➤ Buttons in green box are active when any option is selected. ➤ Behavior of buttons in orange box depends on functions assigned to each button individually. If any function in the list in the note below is assigned to these buttons then it behaves as buttons in the red box, if any other function is assigned to these buttons it behaves as buttons in the green box. 			



Note: The binary inputs for external buttons may be the following (depending on used application): *GCBButton*, *MCBButton*, *MGCButton*, *FDRButton*, *BTBButton*, *FaultResButton*, *HornResButton*, *StartButton*, *StopButton* etc.

IntelliSys Gas with IntelliVision 8 display

Situation is depicted in the following figure.

- Buttons in red box are inactive when EXTBUTTONS option is selected and active when PANEL or BOTH option is selected.
- Buttons in green box are active when any option is selected.
- Behavior of buttons in orange box depends on functions assigned to each button individually. If any function in the list in the note below is assigned to these buttons then it behaves as buttons in the red box, if any other function is assigned to these buttons it behaves as buttons in the green box.



Note: In the case that more IV displays are connected they all behave the same (they are all clones of each other).

Note: The binary inputs for external buttons may be the following (depending on used application): GCBButton, MCBButton, MGCBBButton, FDRButton, BTBButton, FaultResButton, HornResButton, StartButton, StopButton etc.

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DispBaklightTO

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	OFF, 1-240 min, NO TIMEOUT [min]		
Default value	NO TIMEOUT	Force value	YES
Step	1		
Comm object	10121	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts timeout after which the display (internal display or IS display #1) backlight is switched off.			
Note: When IntelliVision 5 or IntelliVision 8 is used this setpoint does not adjust its behavior. Its backlight is adjusted by internal IntelliVision 5 or IntelliVision 8 "setpoint".			
OFF		The backlight is off all the time	
NO TIMEOUT		The backlight is on all the time	

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DispBklStrtOff

Setpoint group	Basic settings	Related FW	2.2.0
----------------	----------------	------------	-------

Range [units]	DISABLED, ENABLED [-]		
Default value	ENABLED	Force value	YES
Step	[-]		
Comm object	11002	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
If this setpoint is in ENABLED position the display backlight is temporarily switched off during Gen-set start.			

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UserBtn pulse

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0.2 .. 10.0 [s]		
Default value	0.2	Force value	YES
Step	[-]		
Comm object	14020	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the duration of User Button 1..16 pulse. For more information read the description of LBO USER BUTTON 1 (PAGE 849).			

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MainsNomMidV

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	80 .. 34641 [V]		
Default value	231	Force value	YES
Step	1		
Comm object	13117	Related applications	SPtM, SPI, Combi
Description			
This setpoint defines the nominal Mains Medium Voltage.			
There is supposed, that the medium voltage will be measured via LAI: MAINSMIDVOLT (PAGE 886).			
In case the LAI: MAINSMIDVOLT (PAGE 886) is configured, this value is used as reference value Mains Voltage in Q(Um) or Qref/Ulim regulation.			

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SW Key

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	[-]		
Default value	(Empty)	Force value	NO
Step	[-]		
Comm object	24258	Related applications	SPtM, SPI, Combi
Description			
This setpoint allows to enter a software key that unlocks additional and paid functions, which can be purchased from ComAp technical support.			

Note: There are currently no functions which can be unlocked by SW Key. This setpoint is intended for future use.

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ConvCoefPulse1

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	10994	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #1 module. The module counts pulses at the input PULSECOUNTER 1 (PAGE 732) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 1</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse2

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	10995	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #2 module. The module counts pulses at the input PULSECOUNTER 2 (PAGE 733) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 2</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse3

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	10996	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #3 module. The module counts pulses at the input PULSECOUNTER 3 (PAGE 733) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 3</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse4

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	10997	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #4 module. The module counts pulses at the input PULSECOUNTER 4 (PAGE 734) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 4</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse5

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	15346	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #5 module. The module counts pulses at the input PULSECOUNTER 5 (PAGE 734) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 5</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse6

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	15347	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #6 module. The module counts pulses at the input PULSECOUNTER 6 (PAGE 735) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 6</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse7

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		

Default value	1	Force value	NO
Step	1		
Comm object	15348	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #7 module. The module counts pulses at the input PULSECOUNTER 7 (PAGE 735) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 7</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ConvCoefPulse8

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	1 .. 6500 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	15349	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate of increasing of the PulseCounter #8 module. The module counts pulses at the input PULSECOUNTER 8 (PAGE 736) and if the input pulses counter reaches value given by this setpoint, the counter value <i>PulseCounter 8</i> (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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ImpCountDef1

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	14277	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
By activation LBI: IMPCountSET1 (PAGE 708) will be set the actual value PulseCounter 1 (page 663) to value presented by this setpoint.			

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ImpCountDef2

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	14278	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
By activation LBI: IMPCountSET2 (PAGE 708) will be set the actual value PulseCounter 2 (page 663) to			

value presented by this setpoint.

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ImpCountDef3

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	14279	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
By activation LBI: IMPCOUNTSET3 (PAGE 709) will be set the actual value PulseCounter 3 (page 663) to value presented by this setpoint.			

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ImpCountDef4

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	14280	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
By activation LBI: IMPCOUNTSET4 (PAGE 709) will be set the actual value PulseCounter 4 (page 663) to value presented by this setpoint.			

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ImpCountDef5

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	15719	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
By activation LBI: IMPCOUNTSET5 (PAGE 709) will be set the actual value PulseCounter 5 (page 664) to value presented by this setpoint.			

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ImpCountDef6

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	15720	Related applications	SPtM, SPI, MINT, COX, Combi

Description
By activation LBI: IMPCOUNTSET6 (PAGE 709) will be set the actual value PulseCounter 6 (page 664) to value presented by this setpoint.

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ImpCountDef7

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	15721	Related applications	SPtM, SPI, MINT, COX, Combi
Description	By activation LBI: IMPCOUNTSET7 (PAGE 709) will be set the actual value PulseCounter 7 (page 664) to value presented by this setpoint.		

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ImpCountDef8

Setpoint group	Basic settings	Related FW	2.2.0
Range [units]	0 .. 65535 [-]		
Default value	0	Force value	YES
Step	1		
Comm object	15722	Related applications	SPtM, SPI, MINT, COX, Combi
Description	By activation LBI: IMPCOUNTSET8 (PAGE 710) will be set the actual value PulseCounter 8 (page 664) to value presented by this setpoint.		

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Group: Communication Settings

Gen-set name

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value	(Controller type)	Force value	NO
Step	[-]		
Comm object	8637	Related applications	SPtM, SPI, MINT, COX, Combi
Description	This setpoint is intended for a custom name of the Gen-set, which is used for identification of the Gen-set in saved archives or remote connections. Maximal length of the name is 15 characters.		

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Contr. address

Setpoint group	Communication	Related FW	2.2.0
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	Settings		
Range [units]	1 .. 32 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	24537	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the address of the particular controller at the CAN2, Modbus and/or RS485 bus. Each Gen-set connected to the same bus must have unique address.</p> <p>If the setpoint (Combi application only) is in AUT position, the address is assigned automatically. The setpoint Contr. address is preferred then, however if it is in conflict with other controller present on the CAN2 bus other address will be assigned to avoid address collision.</p> <p>Note: Address 1 is recommended for standalone Gen-sets.</p> <p>Note: If you are connecting to the gen-set remotely you have to adjust the proper controller address in connection settings of the remote client (InteliMonitor, GenConfig, Modbus client etc.)</p> <p>Note: Address of the controller is also used for Modbus communication via RS485 etc. Address adjusted by this setpoint is therefore universal address of the controller.</p>			

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RS232(1) mode

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DIRECT, MODEM (HW), MODEM (SW), MODBUS-DIRECT, MODBUS-MDM(HW), ECU LINK [-]		
Default value	DIRECT	Force value	NO
Step	[-]		
Comm object	24522	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint selects the connection type for the serial port COM1.			
See the diagram of all related terminals in the chapter Communication (page 269) .			
DIRECT	Connection to a local PC via RS232 or RS485 (with internal or external converter) interface. Use this option also for IG-IB connected via RS232 cable. The internal RS485 converter is enabled/disabled by the setpoint RS485(1) conv. (page 369) .		
MODEM (HW)	Modem point-to-point connection to a remote PC with hardware data flow control using signals RTS/CTS. Full modem cable is required for this option.		
MODEM (SW)	Modem point-to-point connection to a remote PC with software data flow control. 3-wire cable (RX, TX, GND) is sufficient for this option. Use this option only if your modem does not provide RTS/CTS signals.		
MODBUS	Modbus RTU connection in slave mode via RS232 or RS485 (with internal or external converter) interface. The internal RS485 converter is		

	enabled/disabled by the setpoint RS485(1) conv. (page 369), the communication speed is adjustable by the setpoint RS232(1)MBCSpd (page 368). See the latest communication guide for more information about the Modbus protocol.
MODBUS-MDM (HW)	Modbus RTU connection in slave mode via modem with hardware data flow control. The communication speed is adjustable by the setpoint RS232(1)MBCSpd (page 368). See the latest communication guide for more information about the Modbus protocol.
ECU-LINK	Connection to an electronic-controlled engine which uses non-J1939 ECU. The proper ECU type must be also configured with GenConfig.

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RS232(2) mode

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DIRECT, MODEM (HW), MODEM (SW), MODBUS-DIRECT, MODBUS-MDM(HW), ECU LINK [-]		
Default value	DIRECT	Force value	NO
Step	[-]		
Comm object	24451	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint selects the connection type for the serial port COM2.			
See the diagram of all related terminals in the chapter Communication (page 269).			
DIRECT	Connection to a local PC via RS232 or RS485 (with internal or external converter) interface. Use this option also for IG-IB connected via RS232 cable. The internal RS485 converter is enabled/disabled by the setpoint RS485(2) conv. (the setpoint is not available in hardware version 2.0 and above).		
MODEM (HW)	Modem point-to-point connection to a remote PC with hardware data flow control using signals RTS/CTS. Full modem cable is required for this option.		
MODEM (SW)	Modem point-to-point connection to a remote PC with software data flow control. 3-wire cable (RX, TX, GND) is sufficient for this option. Use this option only if your modem does not provide RTS/CTS signals.		

MODBUS	Modbus RTU connection in slave mode via RS232 or RS485 (with internal or external converter) interface. The internal RS485 converter is enabled/disabled by the setpoint RS485(2) conv. (the setpoint is not available in hardware version 2.0 and above), the communication speed is adjustable by the setpoint RS232(2)MBCSpd (page 368) . See the latest communication guide for more information about the Modbus protocol.
MODBUS-MDM (HW)	Modbus RTU connection in slave mode via modem with hardware data flow control. The communication speed is adjustable by the setpoint RS232(2)MBCSpd (page 368) . See the latest communication guide for more information about the Modbus protocol.
ECU-LINK	Connection to an electronic-controlled engine which uses non-J1939 ECU. The proper ECU type must be also configured with GenConfig.

Note: The RS232(2) connector is no more available in hardware version 2.0 and above. The COM2 port is redirected to the RS485(2) terminals all the time. That means modem is not supported at COM2 in these hardware versions. For modem use the COM1 port instead.

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RS232(1)MBCSpd

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	9600, 19200, 38400, 57600 [bps]		
Default value	9600	Force value	NO
Step	[-]		
Comm object	24477	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the communication speed on the COM1 connector when it is switched to Modbus or Modbus-MDM(HW) mode. See also the setpoint RS232(1) mode (page 366) .			

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RS232(2)MBCSpd

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	9600, 19200, 38400, 57600 [bps]		
Default value	9600	Force value	NO
Step	[-]		
Comm object	24420	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the communication speed on the COM2 connector when it is switched to Modbus or Modbus-MDM(HW) mode. See also the setpoint RS232(2) mode (page 367) .			

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RS232(1)MdmIni

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value		Force value	NO
Step	[-]		
Comm object	24436	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint can be used to add extra AT commands at the end of the initialization sequence of the modem connected to the COM1 port. The command can be entered with as well as without the "AT" prefix, are separated with semicolon and maximal length is 31 characters.			

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RS232(2)MdmIni

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value		Force value	NO
Step	[-]		
Comm object	24449	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint can be used to add extra AT commands at the end of the initialization sequence of the modem connected to the COM2 port. The command can be entered with as well as without the "AT" prefix, are separated with semicolon and maximal length is 31 characters.			
Using a modem at the COM2 port is not supported since the hardware version 2.0. For modem use the COM1 port instead.			

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RS485(1) conv.

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	24435	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint selects function of the built-in RS485(1) converter.			
ENABLED	The communication port COM1 is redirected to the integrated RS485(1) converter. The RS232(1) connector has no function and the external display interface is not available.		
DISABLED	The communication port COM1 is present at the RS232(1) connector and the RS485(1) connector is used for the external display interface.		

Note: The redirection is applied only for *DIRECT*, *MODBUS* and *ECU-LINK* modes. See the setpoint *RS232(1) mode* (page 366).

Note: This setpoint must be set to **DISABLED** at controllers that do not have internal display. i.e. *InteliVision 5* or *InteliVision 8* is connected to the *RS485(1)* terminals to allow *NT* terminal communication and connection of multiple controllers.

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CAN bus mode

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	32C,8C,16C [-]		
Default value	32C	Force value	NO
Step	[-]		
Comm object	24499	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
CAN bus speed selection.			
➤ 32C: Baud rate 250 kbps - applicable up to 32 controllers, CAN bus length limited up to 200 meters.			
➤ 8C: Baud rate 50 kbps - applicable up to 8 controllers, CAN bus length limited up to 900 meters.			
➤ 16C: Baud rate 125 kbps - applicable up to 16 controllers, CAN bus length limited up to 500 meters.			
Change of this setpoint is applied after the controller is switched off and on again .			
Note: Use low speed for long distance connection only. Set all connected controllers to the same speed.			

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CAN2emptDetect

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	9921	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Enables the detection of missing other controllers on the CAN2 bus. If the setpoint is in ENABLED position and there aren't any other controllers detected on the CAN2 bus (the complete bus, not only within the logical group) the alarm <i>CAN2Empty</i> is issued.			

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LB/UART Log

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		

Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	11327	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint enables/disables logging of remote communication activity. If logging is enabled connection and disconnection of each remote terminal as well as entering access code are recorded into the history.			
<p>Note: The terminal is disconnected automatically after 5 min of inactivity and next communication request from the same terminal is considered as a new connection. When logging is enabled in certain conditions the history may be filled up with large number of records related to the communication and important records may be overwritten quite fast.</p>			

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CANAddrSwitch1

Setpoint group	Communication Settings	Related FW	2.2.0				
Range [units]	[-]						
Default value	MODEM	Force value	NO				
Step	[-]						
Comm object	24399	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
The setpoint selects function of the terminal address 125 at the CAN2 line. See the latest communication guide for details about this topic.							
<table><tr><td>MODEM</td><td>The address is used for modem connection via I-LB</td></tr><tr><td>OTHER</td><td>The address is used for direct connection to any other device as e.g. IV8 or I-RD.</td></tr></table>				MODEM	The address is used for modem connection via I-LB	OTHER	The address is used for direct connection to any other device as e.g. IV8 or I-RD.
MODEM	The address is used for modem connection via I-LB						
OTHER	The address is used for direct connection to any other device as e.g. IV8 or I-RD.						

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CANAddrSwitch2

Setpoint group	Communication Settings	Related FW	2.2.0				
Range [units]	MODEM, OTHER [-]						
Default value	OTHER	Force value	NO				
Step	[-]						
Comm object	24398	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
The setpoint selects function of the terminal address 122 at the CAN2 line. See the latest communication guide for details about this topic.							
<table><tr><td>MODEM</td><td>The address is used for modem connection via I-LB</td></tr><tr><td>OTHER</td><td>The address is used for direct connection to any other device as e.g. IV8 or I-RD</td></tr></table>				MODEM	The address is used for modem connection via I-LB	OTHER	The address is used for direct connection to any other device as e.g. IV8 or I-RD
MODEM	The address is used for modem connection via I-LB						
OTHER	The address is used for direct connection to any other device as e.g. IV8 or I-RD						

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IP Addr mode

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	AUTOMATIC, FIXED [-]		
Default value	AUTOMATIC	Force value	NO
Step	[-]		
Comm object	24259	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to select the method how the Ethernet connection is adjusted.			
FIXED	The ethernet connection is adjusted fixedly according to the setpoints: IP address (page 372) , Net mask (page 373) , Gateway IP (page 373) , DNS IP (page 377) .		
	This method should be used for classic Ethernet or Internet connection. When this type of connection is opening the controller is specified by it's IP address. That means 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 then copied to the related setpoints (it is not possible to set those setpoints manually in this setting, for more information please see the following setpoints: IP address (page 372) , Net mask (page 373) , Gateway IP (page 373) , DNS IP (page 377)). If the process of obtaining the settings from DHCP server is not successful the value <i>000.000.000.000</i> is copied to the setpoint IP address (page 372) and the module continues trying to obtain the settings.		
	This method is beneficial for AirGate connection as it makes the connection very easy, in fact "plug and play". When this type of connection is opening the controller is specified by it's AirGate ID and the IP address does not play any role.		

IMPORTANT: If you need to use fixed Ethernet settings you should consult the proper setting with your IT specialist.

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IP address

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value	192.168.1.254	Force value	NO
Step	[-]		
Comm object	24376	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<ul style="list-style-type: none"> ➤ When IP Addr mode (page 372) = FIXED, this setpoint is used to adjust the IP address of the Ethernet interface of the controller. Ask your IT specialist for help with this setting. ➤ When IP Addr mode (page 372) = AUTOMATIC, this setpoint is used to display the IP address, 			

which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM).

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Net mask

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value	255.255.255.0	Force value	NO
Step	[-]		
Comm object	24375	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<ul style="list-style-type: none"> ➤ When IP Addr mode (page 372) = FIXED, this setpoint is used to adjust the network mask of the network segment where the controller is connected. ➤ When IP Addr mode (page 372) = AUTOMATIC, this setpoint is used to display the network mask which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM). 			

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Gateway IP

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value	192.168.1.1	Force value	NO
Step	[-]		
Comm object	24373	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<ul style="list-style-type: none"> ➤ When IP Addr mode (page 372) = FIXED, this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected. ➤ When IP Addr mode (page 372) = AUTOMATIC, this setpoint is used to display the gateway IP address which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM). <p>A gateway is a device which connects the respective segment with the other segments and/or Internet.</p>			

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ComApProtoPort

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	1..255 [-]		
Default value	23	Force value	NO

Step	1		
Comm object	24374	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the port, which is used for Ethernet connection to a PC with any of ComAp PC program (i.e. IntelliMonitor, GenConfig). This setpoint should be adjusted to 23 , which is the default port used by all ComAp PC programs. A different value should be used only in special situations as e.g. sharing one public IP address among many controllers or to overcome a firewall restrictions.			

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AirGate

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	ENABLED	Force value	NO
Step	[-]		
Comm object	24365	Related applications	SPTM, SPI, MINT, COX, Combi
Description			
This setpoint selects the Ethernet connection mode.			
DISABLED	This is a standard mode, in which the controller listens to the incoming traffic and answers the TCP/IP queries addressed to him. This mode requires the controller to be accessible from the remote device (PC), i.e. it must be accessible at a public and static IP address if you want to connect to it from the Internet.		
ENABLED	This mode uses the "AirGate" service, which hides all the issues with static/public address into a black box and you do not need to take care about it. You just need only a connection to the Internet. The AirGate server address is adjusted by the setpoint AirGate IP (page 374) .		

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AirGate IP

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	max. 32 characters [-]		
Default value	airgate.comap.cz	Force value	NO
Step	[-]		
Comm object	24364	Related applications	SPtM, SPI, MINT, COX, Combi
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 address <i>airgate.comap.cz</i> .			

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SMTP authent

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	24371	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Switch this setpoint to ENABLED position if your SMTP address (page 375) requires authenticated access. You also have to adjust SMTP user name (page 375) and SMTP password (page 375) . Ask your internet provider or IT manager for this information.			
<i>Note: Most of public free SMTP servers require authentication. You will get instructions when you register to the freemail service.</i>			

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SMTP user name

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	max. 32 characters [-]		
Default value		Force value	NO
Step	[-]		
Comm object	24370	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Use this setpoint to enter the user name for the SMTP server if SMTP authent (page 375) is enabled.			

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SMTP password

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	max. 32 characters [-]		
Default value		Force value	NO
Step	[-]		
Comm object	24369	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Use this setpoint to enter the password for the SMTP server if SMTP authent (page 375) is enabled.			

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SMTP address

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	max. 32 characters		

Default value		Force value	NO
Step	[-]		
Comm object	24368	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>IMPORTANT: Proper setting of SMTP-related setpoints as well as controller mailbox are essential for sending alerts via emails. For more information about protections please refer to the chapter Protections and Alarm management (page 194).</p>			
<p>This setpoint is used for entering the domain name (e.g. <i>smtp.yourprovider.com</i>) or IP address (e.g. 74.125.39.109) of the SMTP server. Please ask your internet provider or IT manager for this information.</p>			
<p>Note: You may also use one of free SMTP servers, e.g. <i>smtp.gmail.com</i>. However, please note that some free SMTP servers may cause delays (in hours..) when sending e-mails.</p>			
<p>Note: If you do not want to send active e-mails, you may leave this setpoint blank, as well as other setpoints related to SMTP server and e-mail settings.</p>			

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Contr mailbox

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	max. 32 characters [-]		
Default value		Force value	NO
Step	[-]		
Comm object	24367	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>Enter an existing e-mail address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. Do not enter your or other recipient's e-mail address. Recipient's addresses are to be entered into the setpoints AcallCH1-Addr (page 540), AcallCH2-Addr (page 540), AcallCH3-Addr (page 541), AcallCH4-Addr (page 541) and AcallCH5-Addr (page 542).</p>			
<p>Note: Most of SMTP server will reject sending e-mails that contain non-existing address in the sender address field.</p>			

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Time zone

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value	GMT+1:00	Force value	NO
Step	[-]		
Comm object	24366	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the windows task bar) if you are not</p>			

sure about your time zone.

Note: If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.

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DNS IP

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	[-]		
Default value	8.8.8.8	Force value	NO
Step	[-]		
Comm object	24362	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<ul style="list-style-type: none">➤ When IP Addr mode (page 372) = FIXED, this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in e-mail addresses and server names into correct IP addresses.➤ When IP Addr mode (page 372) = AUTOMATIC, this setpoint is used to display DNS server, which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM).			

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ECU Diag

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	ENABLED	Force value	YES
Step	[-]		
Comm object	10353	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to disable reading of diagnostic codes from the ECU if an external diagnostic tool is connected to the engine. A message <i>ECU Diag disabled</i> is displayed in the alarm list while ECU diagnostics is disabled.			

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SHxOcol detect

Setpoint group	Communication Settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	ENABLED	Force value	NO
Step	[-]		
Comm object	11024	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to enable/disable evaluation of collisions of virtual shared peripheral modules. A collision means that there is more than one source (shared outputs module) active on the CAN2 bus.

Note: In certain situations multiple sites with bus tie breakers may need to have more shared outputs sources as the CAN bus line is in some points interrupted according to bus tie breakers position. Normally a collision would be indicated if there were more sources on the bus and this setpoint can be used to disable the evaluation of collisions in this special case.

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Group: Engine parameters

Engine Start

Setpoint group	Engine parameters	Related FW	2.2.0				
Range [units]	Starter / Close GCB [-]						
Default value	Starter	Force value	YES				
Step	[-]						
Comm object	16891	Related applications	ASYNc SPI, ASYNc MINT				
Description							
This setpoint selects the type of engine start.							
<table><tr><td>Starter</td><td>Standard start sequence with activation of LBO: STARTER (PAGE 844) is performed. If the start is successful, GCB can be closed via RPM matching.</td></tr><tr><td>Close GCB</td><td>The engine is started via closing of the GCB. The LBO: STARTER (PAGE 844) is not activated during the start sequence.</td></tr></table>				Starter	Standard start sequence with activation of LBO: STARTER (PAGE 844) is performed. If the start is successful, GCB can be closed via RPM matching.	Close GCB	The engine is started via closing of the GCB. The LBO: STARTER (PAGE 844) is not activated during the start sequence.
Starter	Standard start sequence with activation of LBO: STARTER (PAGE 844) is performed. If the start is successful, GCB can be closed via RPM matching.						
Close GCB	The engine is started via closing of the GCB. The LBO: STARTER (PAGE 844) is not activated during the start sequence.						

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Starting RPM

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 1500 [RPM]		
Default value	350	Force value	YES
Step	1		
Comm object	9095	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts "firing" speed level. When this level is reached during cranking, the engine is considered as started and the starter motor is disengaged, i.e. the output STARTER (PAGE 844) is deactivated.			
Note: There are also other symptoms that cause disengagement of the starter. See the separate chapter Start sequence (page 131) .			
This setpoint is also used as the speed limit for the <i>Underspeed</i> protection, which is activated 5 seconds after the starter was disengaged and the controller continued from <i>Starting to Idle</i> or <i>Running</i> phase.			

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Underspeed

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	3 .. Starting RPM (page 378) [RPM]		
Default value	150	Force value	YES
Step	1		
Comm object	14685	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
On Gas engines it can happen, that after engine is started (starter is disengaged) that the RPM drops for a while and then RPM ramps up to Idle or Nominal value.			
This setpoint cover such a drop that the engine Underspeed protection is not activated in such a time.			
Undespeed protection will be activated if Underspeed is Enabled (5 s after RPM during cranking go above Starting RPM) and actual speed dropped under Underspeed value.			

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Y/D RPM

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	1 .. Nominal RPM (page 355) [RPM]		
Default value	1450	Force value	YES
Step	1		
Comm object	8564	Related applications	ASYNC SPI, ASYNC MINT
Description			
This setpoint adjusts the engine speed when the output Y/D (PAGE 866) is closed.			

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Starting POil

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0.0 .. 10.0 [bar]		
Default value	10	Force value	YES
Step	0.1		
Comm object	9681	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Oil pressure can be used as one of the symptoms that are used for detection that the engine is running. This setpoint adjusts oil pressure limit above which the engine is considered as started.			
Note: Learn more in the separate chapter <i>Start sequence (page 131)</i> .			
Note: The logical analog input Oil pressure must be configured onto the appropriate analog input where the oil pressure sensor is connected.			

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Prestart time

Setpoint group	Engine parameters	Related FW	2.2.0
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Range [units]	0 .. 3600 [s]		
Default value	2	Force value	YES
Step	1		
Comm object	8394	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjust length of the prestart period before starter is engaged. The output PRESTART (PAGE 833) is active during the prestart period. Adjust the setpoint to zero if you want to disable the prestart function.			

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Prelubr time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	0	Force value	YES
Step	1		
Comm object	8780	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used for adjusting duration of the prelubrication cycle. See the output Prelubr pump (page 832) for details about prelubrication.			

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Prelubr pause

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	1 .. 3000 [min]		
Default value	1	Force value	YES
Step	1		
Comm object	8781	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used for adjusting the pause between two consequent prelubrication cycles. See the output PRELUBR PUMP (PAGE 832) for details about prelubrication.			

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MaxCrank Time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	1 .. 240 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	8256	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the maximum duration the STARTER (PAGE 844) is energized within one cranking cycle. If there is none of <i>running engine symptoms</i> activated within this period the particular cranking attempt is finished and either a CrnkFail pause (page 381) follows or <i>start fail</i> alarm is issued.			

Note: At gas engines the last cranking cycle is extended about 25 % and the engine is cranked with closed gas valve during this additional time to ventilate the remaining gas.

Note: If magnetic pickup is used and the controller detects zero RPM within 2 s for gas engine or 5 s for diesel engine after energizing the starter motor then cranking pause follows immediately (as the pinion is probably not properly engaged).

Note: Learn more in the separate chapter **Start sequence (page 131)**.

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CrnkFail pause

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	5 .. 240 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	8257	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the pause between two subsequent cranking cycles.			
Note: Learn more in the separate chapter Start sequence (page 131) .			

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Crank attempts

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	1 .. 10 [-]		
Default value	3	Force value	YES
Step	1		
Comm object	8255	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the maximum number of cranking cycles. The alarm <i>Start fail</i> is issued when the engine does not start within this number of cranking cycles.			
Note: An gas engines the last cranking cycle is extended about 25 % and the engine is cranked with closed gas valve during this additional time to ventilate the remaining gas.			
Note: Learn more in the separate chapter Start sequence (page 131) .			

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Idle time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	1 .. 3600 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	9097	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts duration of the idle period, which begins in the moment when the engine is started (e.g. the **STARTER** (PAGE 844) is disengaged). The output **IDLE/NOMINAL** (PAGE 782) is not active to keep the engine at idle speed (if the governor supports idling) during idle period.

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Min stab time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	1 .. Max Stab Time (page 382) [s]		
Default value	5	Force value	YES
Step	1		
Comm object	8259	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the minimum time between the end of the idle period and closing of the GCB. Closing of the GCB is blocked during this period even if generator voltage and frequency are in limits.			

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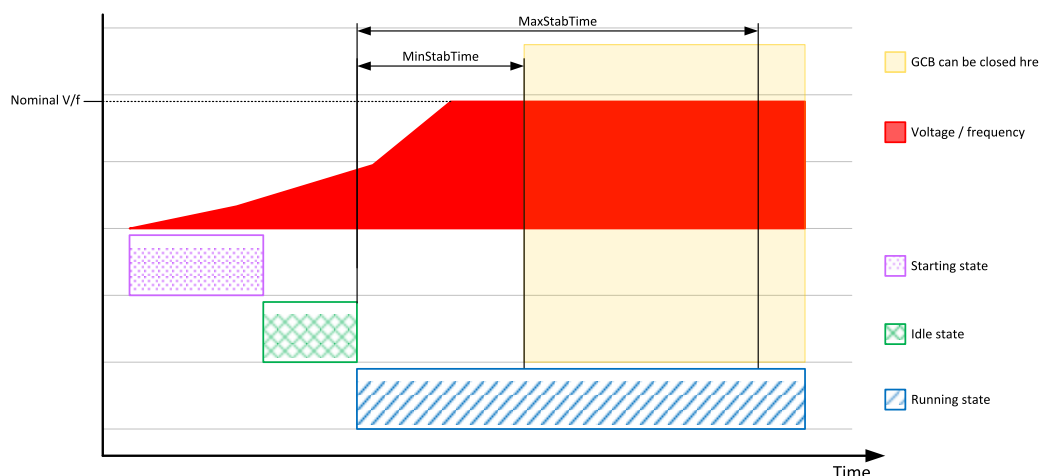
Max Stab Time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	Min stab time (page 382) .. 3600 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	8313	Related applications	SPtM, SPI, MINT, COX, Combi

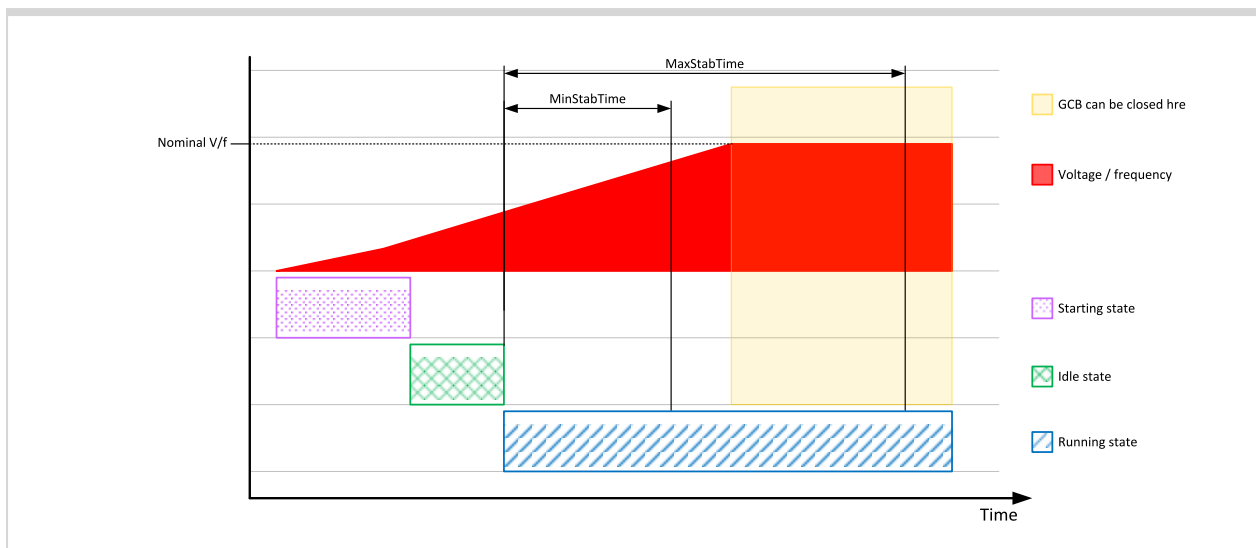
Description

This setpoint adjusts the **maximum** time between the end of the idle period and reaching proper generator voltage and frequency. If the proper generator voltage and frequency is not reached within this period generator voltage and/or frequency alarm is issued and the Gen-set is stopped.

Nominal voltage and frequency achieved before **Min stab time** (page 382) elapsed.



Nominal voltage and frequency achieved during **Max Stab Time**.



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Warming load

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	20	Force value	YES
Step	1		
Comm object	9243	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the requested load level during <i>warming</i> period in % of the Nomin power (page 345).</p> <p>The warming period takes place after the gen-set has been synchronized to the mains if the temperature measured at the logical analog input WARMING TEMP (PAGE 897) is below the value of Warming temp (page 383). The Gen-set load is maintained at Warming load, which should be adjusted to cca 20-30 % of the nominal load to allow the engine reaching of it's operational temperature smoothly. The warming period is finished either when the temperature reaches the warming level or if duration of the warming period reaches Max warm time (page 384).</p>			

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Warming temp

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	-32000 .. 32000 [°C]		
Default value	0	Force value	YES
Step	1		
Comm object	9258	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the warming temperature. The warming phase is finished when either the water temperature at the logical analog input WARMING TEMP (PAGE 897) reaches this level or the Max warm time (page 384) elapses.</p> <p>Note: See also the setpoint <i>Warming load</i> (page 383).</p>			

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Max warm time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	8562	Related applications	SPtM, SPI, MINT, COX, Combi
Description This setpoint adjusts the maximum duration of the warming phase after the Gen-set was synchronized to the mains. The warming phase is finished when either the water temperature at the LAI WARMING TEMP (PAGE 897) reaches this level or the Max warm time elapses.			

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Cooling speed

Setpoint group	Engine parameters	Related FW	2.2.0				
Range [units]	IDLE, NOMINAL [-]						
Default value	IDLE	Force value	YES				
Step	[-]						
Comm object	10046	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
This setpoint is used to select whether the cooling phase is performed at idle or nominal speed, i.e. whether the output IDLE/NOMINAL (PAGE 782) is open or closed during the idle phase.							
<table><tr><td>NOMINAL</td><td>Gen-set performs cooling at nominal speed, generator voltage and frequency protections remain active during cooling phase.</td></tr><tr><td>IDLE</td><td>Gen-set performs cooling at idle speed, generator protections are not active in the cooling phase (except of <i>Gen >V Sd</i>).</td></tr></table>				NOMINAL	Gen-set performs cooling at nominal speed, generator voltage and frequency protections remain active during cooling phase.	IDLE	Gen-set performs cooling at idle speed, generator protections are not active in the cooling phase (except of <i>Gen >V Sd</i>).
NOMINAL	Gen-set performs cooling at nominal speed, generator voltage and frequency protections remain active during cooling phase.						
IDLE	Gen-set performs cooling at idle speed, generator protections are not active in the cooling phase (except of <i>Gen >V Sd</i>).						

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Cooling time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	30	Force value	YES
Step	1		
Comm object	8258	Related applications	SPtM, SPI, MINT, COX, Combi
Description This setpoint is used to adjust the length of the <i>Cooling</i> phase, which takes place after the Gen-set has been unloaded (GCB opened) and before it is stopped. The cooling phase can be performed either at nominal or at idle speed. See the setpoint Cooling speed (page 384). If the cooling phase length optimization is enabled, the actual length depend on the actual Gen-set load in the moment when the stop sequence was started. See the setpoint Cooldown optim (page 385).			

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CoolDnAfterBOC

Setpoint group	Engine parameters	Related FW	2.2.0				
Range [units]	STOP, INFIN COOLING [-]						
Default value	STOP	Force value	YES				
Step	[-]						
Comm object	11000	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
The setpoint selects the controller behavior in cooling phase after a BOC alarm:							
<table><tr><td>STOP</td><td>The controller behaves as usually, e.g. the cooling phase lasts for period adjusted by the setpoint Cooling time (page 384) and then the Gen-set is stopped.</td></tr><tr><td>INFIN COOLING</td><td>The cooling phase is not finished automatically when the Cooling time (page 384) elapses. The Gen-set remains in cooling until another event changes the it's state, e.g. it is manually stopped. If the Gen-set is in AUT mode and the alarm is not active and has been reset the Gen-set returns to loaded state automatically.</td></tr></table>				STOP	The controller behaves as usually, e.g. the cooling phase lasts for period adjusted by the setpoint Cooling time (page 384) and then the Gen-set is stopped.	INFIN COOLING	The cooling phase is not finished automatically when the Cooling time (page 384) elapses. The Gen-set remains in cooling until another event changes the it's state, e.g. it is manually stopped. If the Gen-set is in AUT mode and the alarm is not active and has been reset the Gen-set returns to loaded state automatically.
STOP	The controller behaves as usually, e.g. the cooling phase lasts for period adjusted by the setpoint Cooling time (page 384) and then the Gen-set is stopped.						
INFIN COOLING	The cooling phase is not finished automatically when the Cooling time (page 384) elapses. The Gen-set remains in cooling until another event changes the it's state, e.g. it is manually stopped. If the Gen-set is in AUT mode and the alarm is not active and has been reset the Gen-set returns to loaded state automatically.						

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Cooldown optim

Setpoint group	Engine parameters	Related FW	2.2.0				
Range [units]	DISABLED, ENABLED [-]						
Default value	DISABLED	Force value	YES				
Step	[-]						
Comm object	10661	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
This setpoint enables optimization of the cooling phase length based on the previous Gen-set load.							
<table><tr><td>DISABLED</td><td>The length of the cooling phase is given by the setpoint Cooling time (page 384) regardless of the previous Gen-set load.</td></tr><tr><td>ENABLED</td><td>The length of the cooling phase is linearly reduced according to the Gen-set load in the moment the stop sequence started (i.e. prior to the Gen-set begun to ramp down or opened the GCB). If the load was 100 % of the Nomin power (page 345), the length will be 100 % of the setpoint Cooling time (page 384), if the load was 50 % the length will be reduced to 50 % etc...</td></tr></table>				DISABLED	The length of the cooling phase is given by the setpoint Cooling time (page 384) regardless of the previous Gen-set load.	ENABLED	The length of the cooling phase is linearly reduced according to the Gen-set load in the moment the stop sequence started (i.e. prior to the Gen-set begun to ramp down or opened the GCB). If the load was 100 % of the Nomin power (page 345) , the length will be 100 % of the setpoint Cooling time (page 384) , if the load was 50 % the length will be reduced to 50 % etc...
DISABLED	The length of the cooling phase is given by the setpoint Cooling time (page 384) regardless of the previous Gen-set load.						
ENABLED	The length of the cooling phase is linearly reduced according to the Gen-set load in the moment the stop sequence started (i.e. prior to the Gen-set begun to ramp down or opened the GCB). If the load was 100 % of the Nomin power (page 345) , the length will be 100 % of the setpoint Cooling time (page 384) , if the load was 50 % the length will be reduced to 50 % etc...						

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AfterCool time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	120	Force value	YES

Step	1		
Comm object	8662	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to adjust the length of the <i>aftercooling</i> period, i.e. how long the COOLING PUMP (PAGE 768) remains running after the Gen-set has been stopped.			

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Stop time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 240 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	9815	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the time period the Gen-set needs to stop completely. If the Gen-set does not stop within this period the LBO WRN STOP FAIL (PAGE 866) is activated. The setpoint also adjusts the minimal length of stop solenoid activation. See the output STOP SOLENOID (PAGE 845) for more information.			

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SDVentil time

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 60 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	9695	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the length of the preventilation phase at gas engines. The preventilation phase is a period of cranking without opened gas valve which takes place prior to the first start attempt after a shutdown or after switching on the controller.			
The purpose of the preventilation phase is to clean the engine and exhaust system from possible unburned gas.			

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FuelSol offset

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [s]		
Default value	0	Force value	NO
Step	0.1		
Comm object	10525	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used for fine adjustment of the moment when the FUEL SOLENOID (PAGE 774) output is			

activated. The time is related to the activation of the **STARTER (PAGE 844)** output, where negative values mean the fuel solenoid is activated in advance to the starter motor and positive values mean the fuel solenoid is delayed after the starter motor.

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GasVTest

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	10204	Related applications	SPtM, SPI, MINT, COX, Combi

Description

ENABLED – LBO**GASVTEST RUN (PAGE 775)** is activated before each engine start requirement.

DISABLED – Engine starts in standard way after engine start requirement.

Note: Gas Valve TEST procedure is skipped during Automatic Mains Fail Gen-set start to short black-out time.

Note: Active sprinkler function enables engine start even if the Gas valve test is negative.

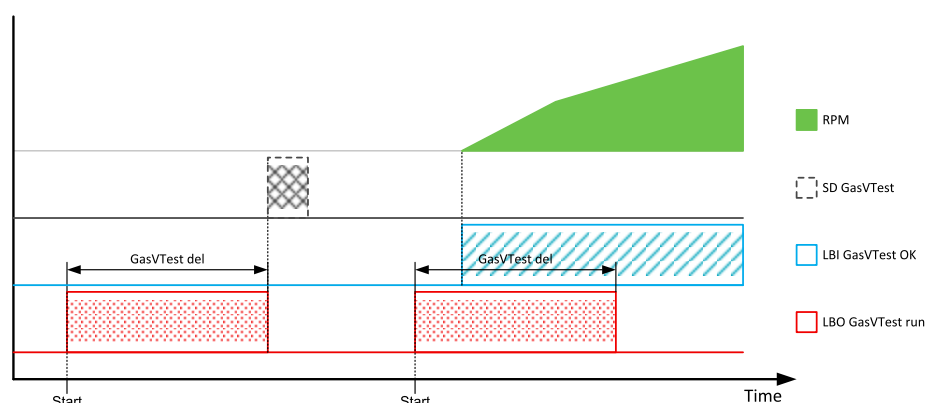


Image 9.3 Gas valve test

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GasVTest del

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	0 .. 300 [s]		
Default value	60	Force value	NO
Step	1		
Comm object	10205	Related applications	SPtM, SPI, MINT, COX, Combi

Description

When the **GasVTest (page 387)** is ENABLED then the LBO **GASVTEST RUN (PAGE 775)** is activated before each start for the time adjusted by this setpoint.

When during the time will not be activated LBI **GasVTESTOK** (PAGE 706), then is shutdown protection "Sd GasVTest" activated and start procedure stopped.

Note: Gas Valve TEST procedure is skipped during Automatic Mains Fail Gen-set start to short black-out time.

Note: Active sprinkler function enables engine start even if the Gas valve test is negative.

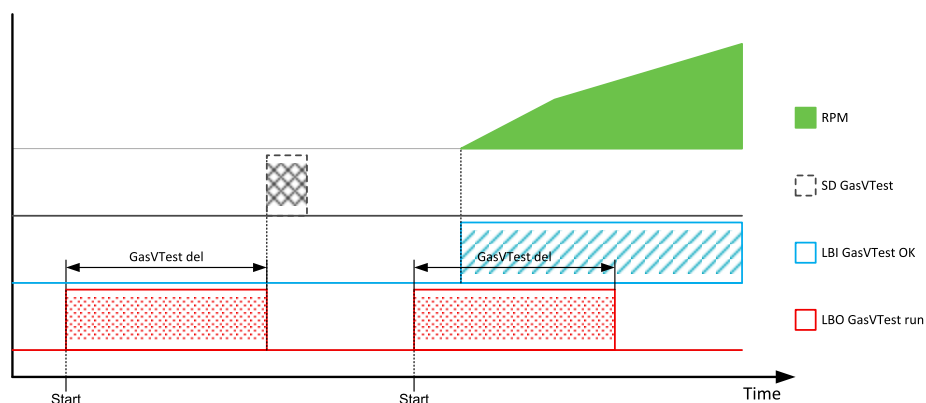


Image 9.4 Gas valve test

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D+ Function

Setpoint group	Engine parameters	Related FW	2.2.0						
Range [units]	ENABLED, CHRGFAIL, DISABLED [-]								
Default value	DISABLED	Force value	NO						
Step	[-]								
Comm object	9683	Related applications	SPtM, SPI, MINT, COX, Combi						
Description									
This setpoint adjusts the function of the D+ terminal.									
<table><tr><td>ENABLED</td><td>The D+ terminal is used for running engine detection as well as for charger failure alarm detection.</td></tr><tr><td>CHRGFAIL</td><td>The D+ terminal is used for charger failure alarm detection only.</td></tr><tr><td>DISABLED</td><td>The D+ terminal is not used.</td></tr></table>				ENABLED	The D+ terminal is used for running engine detection as well as for charger failure alarm detection.	CHRGFAIL	The D+ terminal is used for charger failure alarm detection only.	DISABLED	The D+ terminal is not used.
ENABLED	The D+ terminal is used for running engine detection as well as for charger failure alarm detection.								
CHRGFAIL	The D+ terminal is used for charger failure alarm detection only.								
DISABLED	The D+ terminal is not used.								
Note: Some alternators provide a terminal labeled as "L" instead of "D+". It is not possible to connect this "L" terminal to the "D+" terminal of the controller.									

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Bin selector 1

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	OFF, ON [-]		
Default value	OFF	Force value	YES

Step	[-]		
Comm object	10623	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to switch on and off the output BIN SELECTOR 1 (PAGE 764) .			

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Bin selector 2

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	OFF, ON[-]		
Default value	OFF	Force value	YES
Step	[-]		
Comm object	10624	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to switch on and off the output BIN SELECTOR 2 (PAGE 764) .			

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Bin selector 3

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	OFF, ON[-]		
Default value	OFF	Force value	YES
Step	[-]		
Comm object	10625	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to switch on and off the output BIN SELECTOR 3 (PAGE 764) .			

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Bin selector 4

Setpoint group	Engine parameters	Related FW	2.2.0
Range [units]	OFF, ON[-]		
Default value	OFF	Force value	YES
Step	[-]		
Comm object	10626	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to switch on and off the output BIN SELECTOR 4 (PAGE 764) .			

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Group: Engine protection

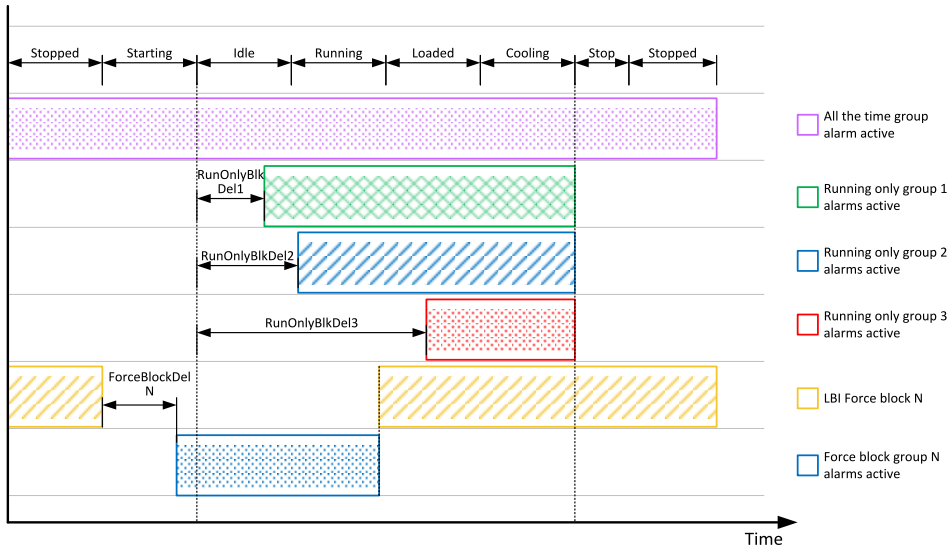
Horn Timeout

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	OFF, 1 .. 3600, NO TIMEOUT[s]		

Default value	10	Force value	YES
Step	1		
Comm object	8264	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts time after which the HORN (PAGE 780) output is automatically deactivated although the alarms still haven't been reset. If the setpoint is adjusted to OFF the horn output is not activated at all, the NO TIMEOUT position means the horn output is not deactivated until the alarms are reset.			

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RunOnlyBlkDel1

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 3000.0 [s]		
Default value	1	Force value	NO
Step	0.1		
Comm object	10023	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the delay after engine start when the alarms configured as <i>RunOnlyBlkDel1</i> (i.e. "running only", group #1) are started to be evaluated. The "running only" alarms are not being evaluated while the engine is not running or then, after start, while the adjusted delay is running.			
 <p>The diagram illustrates the engine's operational states over time: Stopped, Starting, Idle, Running, Loaded, Cooling, Stop, and Stopped. It shows the activation of various alarms and force blocks. A purple shaded area represents 'All the time group alarm active' from the start of the 'Starting' phase to the end of the 'Cooling' phase. Three green shaded areas represent 'Running only group 1 alarms active', starting at the end of the 'Starting' phase and lasting for a duration labeled 'RunOnlyBlkDel1'. Similarly, blue and red shaded areas represent 'Running only group 2' and 'Running only group 3' alarms active, with durations 'RunOnlyBlkDel2' and 'RunOnlyBlkDel3' respectively. Yellow hatched areas represent 'LBI Force block N' during the 'Starting' and 'Cooling' phases, with a duration 'ForceBlockDel N'. A blue dotted area represents 'Force block group N alarms active' during the 'Running' phase.</p>			
<p>Note: If you want to get more information on the alarm management in ComAp controller please refer to the chapter <i>Protections and Alarm management (page 194)</i>.</p>			

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RunOnlyBlkDel2

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 3000.0 [s]		
Default value	5	Force value	YES

Step	0.1		
Comm object	10024	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay after engine start when the alarms configured as <i>RunOnlyBlkDel2</i> (i.e. "running only", group #2) are started to be evaluated. The "running only" alarms are not being evaluated while the engine is not running or then, after start, while the adjusted delay is running.</p> <p>See the setpoint RunOnlyBlkDel1 (page 390) for diagram of alarm groups and their blocking periods.</p>			

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RunOnlyBlkDel3

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 3000.0 [s]		
Default value	10	Force value	YES
Step	0.1		
Comm object	10025	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay after engine start when the alarms configured as <i>RunOnlyBlkDel3</i> (i.e. "running only", group #3) are started to be evaluated. The "running only" alarms are not being evaluated while the engine is not running or then, after start, while the adjusted delay is running.</p> <p>See the setpoint RunOnlyBlkDel1 (page 390) for diagram of alarm groups and their blocking periods.</p>			

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BinInp delay 1

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1	Force value	NO
Step	0.1		
Comm object	10131	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay #1 which can be assigned to an input configured as alarm input (protection).</p> <p>Note: Protections configured at a binary inputs can have either fixed 0.5s evaluation delay or there are three independent delay setpoints and one of them can be assigned to each particular binary input protection.</p>			

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BinInp delay 2

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5	Force value	NO
Step	1		
Comm object	10132	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the delay #2 which can be assigned to an input configured as alarm input (protection).

Note: Protections configured at a binary inputs can have either fixed 0.5s evaluation delay or there are three independent delay setpoints and one of them can be assigned to each particular binary input protection.

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BinInp delay 3

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	10133	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the delay #3 which can be assigned to an input configured as alarm input (protection).			
Note: Protections configured at a binary inputs can have either fixed 0.5s evaluation delay or there are three independent delay setpoints and one of them can be assigned to each particular binary input protection.			

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ForceBlockDel1

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 60.0 [s]		
Default value	5	Force value	NO
Step	0.1		
Comm object	10569	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the delay after the binary input FORCE BLOCK 1 (PAGE 693) has been deactivated, when the alarms configured as <i>Force block #1</i> are started to be evaluated.			
If you want more information on this function please go to the setpoint RunOnlyBlkDel1 (page 390) where you can find a diagram for ForceBlockDel function as well.			

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ForceBlockDel2

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 60.0 [s]		
Default value	5	Force value	NO
Step	0.1		
Comm object	10570	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the delay after the binary input **FORCE BLOCK 2 (PAGE 693)** has been deactivated, when the alarms configured as *Force block #2* are started to be evaluated.

If you want more information on this function please go to the setpoint **RunOnlyBlkDel1 (page 390)** where you can find a diagram for ForceBlockDel function as well.

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ForceBlockDel3

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0.0 .. 60.0 [s]		
Default value	5	Force value	NO
Step	0.1		
Comm object	10571	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the delay after the binary input FORCE BLOCK 3 (PAGE 694) has been deactivated, when the alarms configured as <i>Force block #3</i> are started to be evaluated.			
If you want more information on this function please go to the setpoint RunOnlyBlkDel1 (page 390) where you can find a diagram for ForceBlockDel function as well.			

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ResetActAlarms

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	ENABLED, DISABLED [-]		
Default value	ENABLED	Force value	NO
Step	[-]		
Comm object	10665	Related applications	SPTM, SPI, MINT, COX, Combi
Description			
	DISABLED	Pressing of the fault reset button (at any terminal or external button) resets only inactive alarms. Active alarms remain in the alarmlist unchanged and must be reset again when they become inactive.	
	ENABLED	Pressing of the fault reset button (at any terminal or external button) resets all alarms that are currently present in the alarm list. Inactive alarms disappear from the alarm list immediately, active alarms are changed to "confirmed" state and disappear when the alarm condition disappear or the alarm starts to be blocked.	

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Overspeed

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 200 [%]		
Default value	110	Force value	NO
Step	1		
Comm object	8263	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the threshold level for overspeed protection.

Note: The overspeed protection is evaluated all the time and without any delay.

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StartBlockDel

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 6000 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	11034	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Time limit within the next (automatic or manual) engine start is blocked after engine was stopped. No block when set to zero.

Alarm message StartBlockDel is active during the start block time.

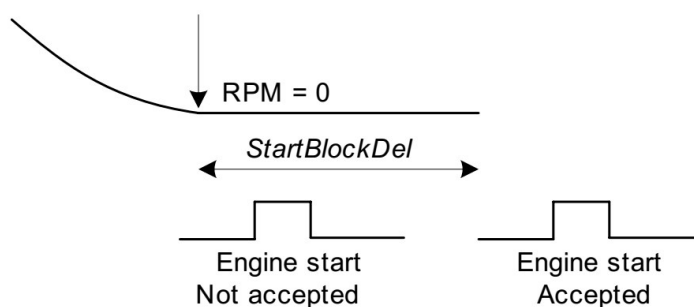


Image 9.5 Start block delay

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Max+CylDifPmin

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	-32000 .. 32000 [°C]		
Default value	10	Force value	NO
Step	1		
Comm object	9622	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the maximum allowed **positive** difference between a particular cylinder temperature and average cylinder temperature **at minimum power** level adjusted by setpoint **PminCylDifEval** (page 396). This setpoint is one of four setpoints that define the allowed area of cylinder temperature differences depending on Gen-set power. See the picture below.

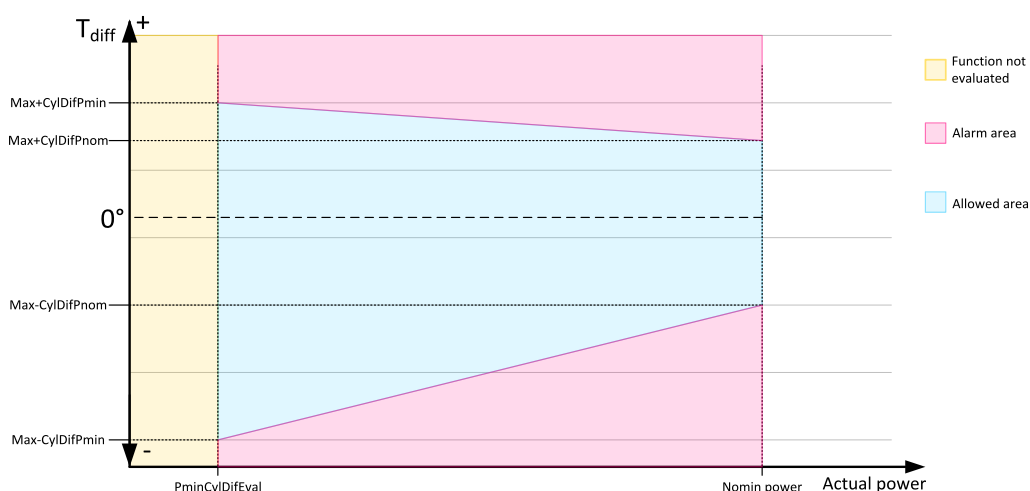


Image 9.6 Allowed area of cylinder temperature differences depending on Gen-set power

If the difference of actual cylinder temperature from the average temperature is out of the allowed range at one or more cylinders the alarm *Wrn CylTemp* is issued after the delay **CylDifEvalDel** (page 396) elapses. The alarm is intended for detection that there is a problem with combustion at the particular cylinders.

Note: Logical analog inputs Cyl temp "n" must be configured onto the appropriate physical analog inputs where the cylinder temperature sensors are connected. Use the "Cylinder temperature configuration wizard" in GenConfig – Analog inputs tab for easy configuration of cylinder temperature sensors.

Note: The cylinder temperature difference protection is available in IS-NT only.

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Max-CylDifPmin

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	-32000 .. 32000 [°C]		
Default value	10	Force value	NO
Step	1		
Comm object	9623	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the maximum allowed negative difference between a particular cylinder temperature and average cylinder temperature at minimum power level adjusted by setpoint PminCylDifEval (page 396). This setpoint is one of four setpoints that define the allowed area of cylinder temperature differences depending on Gen-set power. See the setpoint Max+CylDifPmin (page 394) for more details.			

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Max+CylDifPnom

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	-32000 .. 32000 [°C]		
Default value	10	Force value	NO

Step	1		
Comm object	9624	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the maximum allowed positive difference between a particular cylinder temperature and average cylinder temperature at nominal power. This setpoint is one of four setpoints that define the allowed area of cylinder temperature differences depending on Gen-set power. See the setpoint Max+CylDifPmin (page 394) for more details.</p>			

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Max-CylDifPnom

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	-32000 .. 32000 [°C]		
Default value	10	Force value	NO
Step	1		
Comm object	9625	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the maximum allowed negative difference between a particular cylinder temperature and average cylinder temperature at nominal power. This setpoint is one of four setpoints that define the allowed area of cylinder temperature differences depending on Gen-set power. See the setpoint Max+CylDifPmin (page 394) for more details.</p>			

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PminCylDifEval

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. Nomin power (page 345) [kW] (this depends on selected Power formats (page 165))		
Default value	10 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	9626	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the Gen-set power level below which the cylinder temperature difference protection is not evaluated. Learn more about this protection in the description of the setpoint Max+CylDifPmin (page 394).</p>			

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CylDifEvalDel

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	9627	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the evaluation delay of the cylinder temperature difference protection. Learn more about this protection in the description of the setpoint **Max+CylDifPmin** (page 394).

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Service time 1

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 32766 .. OFF(32767) [h]		
Default value	32766	Force value	NO
Step	1		
Comm object	15114	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Service timers could be reset with password protected command.			
There is special dialog window available, where could be every Service timer set on the value presented with this setpoint.			
Actual Value of this interval is presented with value Service time 1 (page 660).			
If the setpoint is set on the maximal Value (OFF), the counter is stopped and actual Value is visible as #####.			
If is the actual Value counted to 0, the related alarm message is issued (i.e. <i>WrnServiceT1+2</i> or <i>WrnServiceT3</i>) and the counter continuous counting until the maximal minus value.			
Alarm remains active until the Service time is reset.			
Note: Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc.			

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Service time 2

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 65534 .. OFF(65535) [h]		
Default value	65534	Force value	NO
Step	1		
Comm object	15115	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Service timers could be reset with password protected command.			
There is special dialog window available, where could be every Service timer set on the value presented with this setpoint.			
Actual Value of this interval is presented with value Service time 2 (page 661).			
If the setpoint is set on the maximal Value (OFF), the counter is stopped and actual Value is visible as #####.			
If is the actual Value counted to 0, the related alarm message is issued (i.e. <i>WrnServiceT1+2</i> or <i>WrnServiceT3</i>) and the counter continuous counting until the maximal minus value.			
Alarm remains active until the Service time is reset.			

Note: Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc.

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Service time 3

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 65534 .. OFF(65535) [h]		
Default value	65534	Force value	NO
Step	1		
Comm object	15117	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Service timers could be reset with password protected command.			
There is special dialog window available, where could be every Service timer set on the value presented with this setpoint.			
Actual Value of this interval is presented with value Service time 3 (page 661) .			
If the setpoint is set on the maximal Value (OFF), the counter is stopped and actual Value is visible as #####.			
If is the actual Value counted to 0, the related alarm message is issued (i.e. <i>WrnServiceT1+2</i> or <i>WrnServiceT3</i>) and the counter continuous counting until the maximal minus value.			
Alarm remains active until the Service time is reset.			
Note: Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc.			

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ServiceTimeStp

Setpoint group	Engine protection	Related FW	2.2.0
Range [units]	0 .. 200000 (OFF) [h]		
Default value	200000 (OFF)	Force value	NO
Step	1		
Comm object	15801	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Service timers could be reset with password protected command.			
There is special dialog window available, where could be every Service timer set on the value presented with this setpoint.			
Actual Value of this interval is presented with value ServiceTimeStp (page 662) .			
If the setpoint is set on the maximal Value (OFF), the counter is stopped and actual Value is visible as #####.			
If is the actual Value counted to 0, the related alarm message is issued (<i>StpServiceTime</i>).			
Alarm remains active until the Service time is reset.			
Note: Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc.			

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Group: Analog protect

Batt >V

Setpoint group	Analog protect	Related FW	2.2.0
Range [units]	8.0 .. 40.0 [V]		
Default value	30	Force value	NO
Step	0.1		
Comm object	9262	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the warning level for battery overvoltage alarm.			

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Batt volt del

Setpoint group	Analog protect	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	5	Force value	NO
Step	0.1		
Comm object	9264	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the delay for battery Batt >V (page 399) and Batt <V (page 399) alarms.			

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Batt <V

Setpoint group	Analog protect	Related FW	2.2.0
Range [units]	8.0 .. 40.0 [V]		
Default value	22	Force value	NO
Step	0.1		
Comm object	9265	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the warning level for battery undervoltage alarm.			

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Group: Gener protect

GenerProt del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.0 .. 10.0 [s]		
Default value	0.0	Force value	NO
Step	0.1		
Comm object	14435	Related applications	ASYNc SPI, ASYNc MINT

Description

In Async applications, the generator protections are enabled with delay adjusted by this setpoint. This delay starts to be counted when the GCB is closed.

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OverldStrtEval

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	100 .. 200 [%]		
Default value	150	Force value	YES
Step	1		
Comm object	8280	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint specifies the power level relative to the Nomin power (page 345) , where the thermal overload protection starts to be evaluated. See the setpoint 2POvrldStEvDel (page 400) for more information about the thermal overload protection.			

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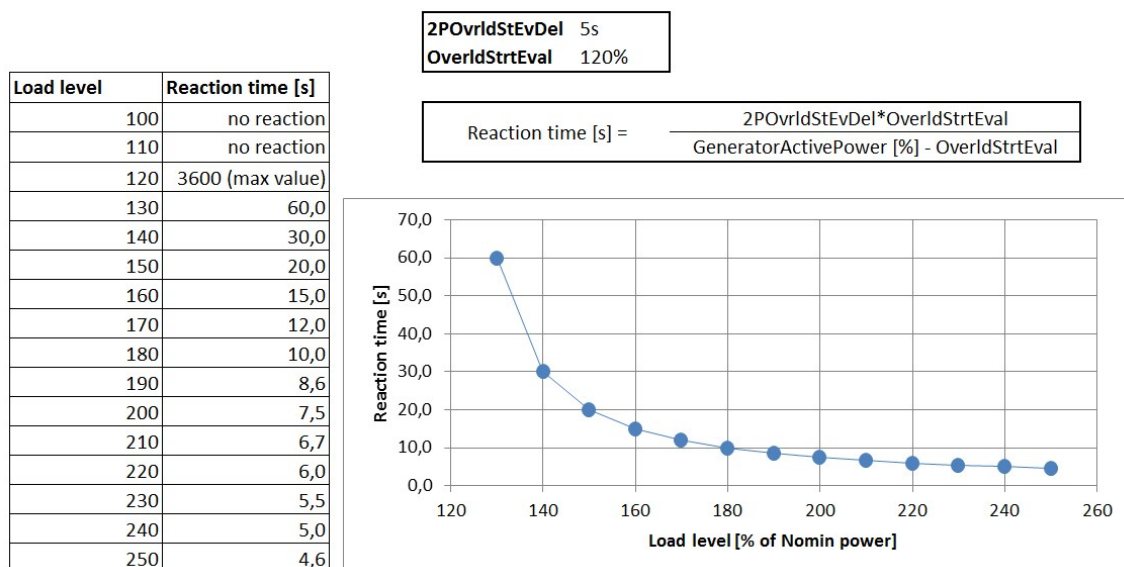
2POvrldStEvDel

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5	Force value	NO
Step	0.1		
Comm object	8281	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the reaction time of the thermal overload protection if the load level is twice **OverldStrtEval (page 400)**.

The reaction time of the thermal overload protection is not fixed; it depends on how much is the load above the limit (base level). The higher is the load the shorter the reaction time will be.



Note: The thermal overload protection is Breaker open and cool down (BOC) type.

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Min Power PtM

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	5.0	Force value	YES
Step	0.1		
Comm object	9241	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used for adjusting of the lower limit of the requested Gen-set power in parallel to the mains operation. If the requested load (given by the active load control mode, e.g. Baseload, Import/Export etc.) is below this limit the requested load is limited to the level adjusted by this setpoint.</p> <p>The only situation, where the <i>Min Power PtM</i> is ignored, is the warming procedure after the Gen-set is synchronized to the mains, i.e. the Warming load (page 383) can be adjusted also below the setpoint <i>Min Power PtM</i>.</p> <p>This setpoint is also used as the requested load level if a protection of <i>Low power</i> type is active.</p> <p>Note: Note that if <i>InteliMains</i> is used and it is in active control mode (i.e. the #SysLdCtrl PtM (page 324) is set to <i>LD SHARING</i>) this setpoint is not considered and minimal power in parallel to Mains operation is given by ProcessControlMinPwr PtM is used to determine minimal power of each Gen-set in the group in percentage of its nominal power.</p>			

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Ishort

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	100 .. 500 [%]		
Default value	150	Force value	NO
Step	1		
Comm object	8282	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the threshold level (in % of the) for the generator fast overcurrent protection. The protection is activated (alarm <i>Ishort</i> is issued) when the generator current in at least one phase exceeds the threshold limit for time longer than Ishort del (page 401).</p> <p>Note: The protection type is Breaker open and cool down (BOC).</p>			

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Ishort del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.00 .. 10.00 [s]		
Default value	0	Force value	NO
Step	0.01		

Comm object	9991	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjust the delay for generator fast overcurrent protection. The limit for the protection is adjusted by the setpoint Ishort (page 401).			
Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.			

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2Inom del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	1 .. 600.0 [s]		
Default value	10	Force value	NO
Step	0.1		
Comm object	8283	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the reaction time of the IDMT overcurrent protection if the overcurrent level is 200 % of the **Nomin current** (page 347).

The reaction time of the IDMT overcurrent protection is not fixed; it depends on how much is the actual current above the limit (nominal). The higher is the overcurrent the shorter the reaction time will be.

Current	Reaction time [s]
100	no reaction
110	50,0
120	25,0
130	16,7
140	12,5
150	10,0
160	8,3
170	7,1
180	6,3
190	5,6
200	5,0
210	4,5
220	4,2
230	3,8
240	3,6
250	3,3

2Inom del5s

Fixed evaluation start level100%

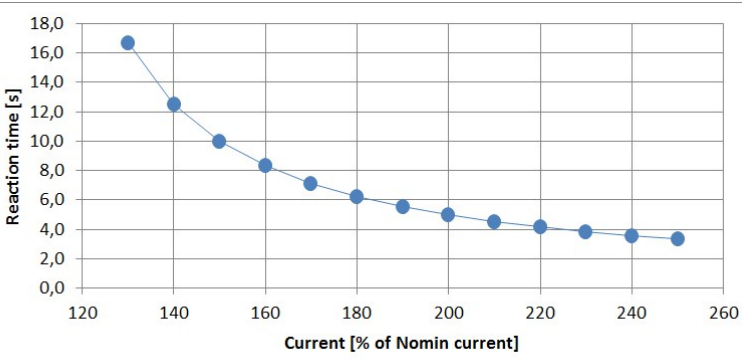
Reaction time [s] =

2Inom del*100

Current [%] - 100

Reaction time [s]

Current [% of Nomin current]



Note: The IDMT overcurrent protection is Breaker open and cool down (BOC) type.

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Gen >V BOC

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	Gen <V BOC (page 403) .. 150 [%]		
Default value	110	Force value	YES

Step	1		
Comm object	8291	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the threshold level for the generator overvoltage protection. The threshold is adjusted in % of the nominal generator voltage, which is either GenNomV (page 351) or GenNomVph-ph (page 351), depending on the position of the setpoint FixVoltProtSel (page 353).</p> <p>The protection activates if the voltage in at least one phase gets over the threshold for time longer than Gen V del (page 404).</p> <p>Note: The associated protection to this setpoint is Breaker open and cool down (BOC) type. There is also Shutdown overvoltage protection, which is adjusted by setpoint Gen >V Sd (page 403).</p> <p>Note: The BOC protections are active after the Max Stab Time (page 382) elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if Cooling speed (page 384) = NOMINAL).</p>			

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Gen <V BOC

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	20 .. Gen >V BOC (page 402) [%]		
Default value	90	Force value	YES
Step	1		
Comm object	8293	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the threshold level for the generator undervoltage protection. The threshold is adjusted in % of the nominal generator voltage, which is either GenNomV (page 351) or GenNomVph-ph (page 351), depending on the position of the setpoint FixVoltProtSel (page 353).</p> <p>The protection activates if the voltage in at least one phase drops below the threshold for time longer than Gen V del (page 404).</p> <p>Note: The generator undervoltage protection is Breaker open and cool down (BOC) type.</p> <p>Note: The BOC protections are active after the Max Stab Time (page 382) elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if Cooling speed (page 384) = NOMINAL).</p>			

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Gen >V Sd

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	50 .. 150 [%]		
Default value	150	Force value	YES
Step	1		
Comm object	10013	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the threshold level for the generator overvoltage shutdown protection. The</p>			

threshold is adjusted in % of the nominal generator voltage, which is either **GenNomV** (page 351) or **GenNomVph-ph** (page 351), depending on the position of the setpoint **FixVoltProtSel** (page 353).

The protection activates if the voltage in at least one phase gets over the threshold for time longer than **Gen V del** (page 404).

Note: The associated protection to this setpoint is Shutdown type. There is also Breaker open and cool down (BOC) overvoltage protection, which is adjusted by setpoint **Gen >V BOC** (page 402). The **BOC overvoltage protection is intended to be used as first level protection with lower threshold, whereas the shutdown one is intended as second level with higher threshold.**

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Gen V del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	5	Force value	NO
Step	0.01		
Comm object	9103	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the delay for generator under- and overvoltage protections. The thresholds for these protections are adjusted by setpoints Gen >V BOC (page 402), Gen <V BOC (page 403) and Gen >V Sd (page 403).			
Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.			

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Gen >f

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 10.00 [Hz]		
Default value	1.50	Force value	YES
Step	0.01		
Comm object	8296	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Over frequency protection.			

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Gen <f

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	-10.00 .. 0 [Hz]		
Default value	-2.50	Force value	YES
Step	0.01		
Comm object	14588	Related applications	SPtM, SPI, MINT, COX, Combi

Description
Under frequency protection.

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Gen f del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	5.00	Force value	NO
Step	0.01		
Comm object	8297	Related applications	SPtM, SPI, MINT, COX, Combi
Description	Over/Under frequency protection delay.		

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BusMeasError

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	10558	Related applications	MINT, COX, Combi
Description	<p>This setpoint is used to enable and disable the <i>Bus meas error</i> alarm. If enabled, it is issued when the controller detects a mismatch between the expected and current voltage on the busbar. The mismatch means the measured voltage is out of limits, although the controller receives information that there is a breaker closed, through which the bus should be supplied. The alarm is issued when the mismatch lasts more than 20s.</p> <p>The breaker mentioned above may be MCB, GCB of the respective controller or GCB of any other controller in the group.</p> <p>If there is a mismatch of bus voltage then closing of the GCB is blocked even if the 20s delay hasn't elapsed yet.</p>		

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Reverse power

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 50 [%]		
Default value	10	Force value	NO
Step	1		
Comm object	8486	Related applications	SPtM, SPI, MINT, COX, Combi
Description	<p>This setpoint adjusts the threshold level for the generator reverse (negative) power protection. The threshold is adjusted in % of the generator Nomin power (page 345).</p> <p>The protection activates if the generator power drops below the threshold for time longer than</p>		

ReversePwr del (page 406).

Note: The generator reverse power protection is Breaker open and cool down (BOC) type.

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ReversePwr del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 600.0 [s]		
Default value	5	Force value	NO
Step	0.1		
Comm object	8552	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the delay for generator reverse power protection. The threshold for the protection is adjusted by setpoint Reverse power (page 405) .			

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ExcitationLoss

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 150 [%]		
Default value	30	Force value	YES
Step	1		
Comm object	12486	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts excitation loss protection level. Corresponding level in kVA is calculated from Nomin power (page 345) of Gen-set as a negative percentage value given by this setpoint (e.g. this setpoint is adjusted to 50 % and nominal power of Gen-set is 200 kW, therefore excitation loss protection level is set to -100 kVA _r).			
Delay for this protection is given by the setpoint ExctLoss del (page 406) .			
This protection is breaker off and cooldown type. For more information on protection types please refer to the section Protections and Alarm management (page 194) .			

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ExctLoss del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	OFF, 0.1..600.0 [s]		
Default value	OFF	Force value	YES
Step	0.1		
Comm object	12487	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the delay for loss of excitation protection. Threshold of this protection is given by the setpoint ExcitationLoss (page 406) .			

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Nom EthFltCurr

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 10000 [A]		
Default value	10	Force value	YES
Step	1		
Comm object	13290	Related applications	SPtM, SPI, MINT, COX, Combi
Description <p>This setpoint adjust the level of EarthFault Current when IDMT protection starts to get evaluated. Time of evaluation of this protection is given by the setpoint 2EthFltCur del (page 407). When the EarthFault Current goes below the level given by Nom EthFltCurr (page 407), protection starts decreasing its thermal counter. For more information about this protection, refer to the setpoint 2EthFltCur del (page 407).</p>			

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2EthFltCur del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	OFF, 0.1 .. 600.0 [s]		
Default value	OFF	Force value	YES
Step	0.1		
Comm object	13291	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the reaction time of the IDMT EarthFault Current protection if the current is 200% of the base level given by the setpoint **Nom EthFltCurr** (page 407).

The reaction time of the IDMT EarthFault Current protection is not fixed; it depends on how much is the current above the limit (base level). The higher is the current the shorter the reaction time will be.

Current	Reaction time [s]
100	no reaction
110	50,0
120	25,0
130	16,7
140	12,5
150	10,0
160	8,3
170	7,1
180	6,3
190	5,6
200	5,0
210	4,5
220	4,2
230	3,8
240	3,6
250	3,3

2EthFltCurr del5s

Fixed evaluation start level100%

Reaction time [s] =

2EthFltCurr del*100

Earth Fault Current [%] - 100

Reaction time [s]

Current [% of NomEthFltCurr]

Current [% of NomEthFltCurr]	Reaction time [s]
130	16,7
140	12,5
150	10,0
160	8,3
170	7,1
180	6,3
190	5,6
200	5,0
210	4,5
220	4,2
230	3,8
240	3,6
250	3,3

Note: The IDMT EarthFault Current protection is Breaker open and cool down (BOC) type.

Note: This protection's internal counter accumulates and it starts continuously decreasing when the EarthFault Current goes below **Nom EthFltCurr** (page 407). This function prevents the protection from completely resetting when the EarthFault Current goes below **Nom EthFltCurr** (page 407) for only a short period of time. This behavior emulates circuit-breaker with thermal current protection.

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Gen V unbal

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 200 [%]		
Default value	10	Force value	NO
Step	1		
Comm object	9268	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the threshold level for the generator voltage unbalance protection. The threshold is adjusted in % of the nominal generator voltage, which is either or , depending on the position of the setpoint . The protection is <i>Breaker open and cool down</i> type and is created in the default archive as universal analog protection at the value Gen V unbal (page 408), which is calculated as maximum difference between two phase voltages.</p> <p>The protection activates if the voltage unbalance gets over the threshold for time longer than Gen V unb del (page 408).</p> <p>Note: The voltage unbalance protection is created in the default archive using the mechanism of universal analog protections. That means this setpoint is one of general-purpose setpoints, which may be used for different purpose if the protection is deleted from the configuration.</p>			

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Gen V unb del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	3	Force value	NO
Step	0.1		
Comm object	9267	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay for the generator voltage unbalance protection. The threshold for the protection is adjusted by setpoint Gen V unbal (page 408).</p> <p>Note: The generator voltage unbalance protection is created in the default archive using the mechanism of universal analog protections. That means this setpoint is one of general-purpose setpoints, which may be used for different purpose if the protection is deleted from the configuration.</p>			

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Gen I unbal

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0 .. 200 [%]		

Default value	50	Force value	NO
Step	1		
Comm object	9271	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the threshold level for the generator current unbalance protection. The threshold is adjusted in % of the generator . The protection is <i>Breaker open and cool down</i> type and is created in the default archive as universal analog protection at the value <i>Gen I unbal</i>, which is calculated as maximum difference between two phase currents.</p> <p>The protection activates if the current unbalance gets over the threshold for time longer than Gen I unb del (page 409).</p> <p><i>Note: The current unbalance protection is created in the default archive using the mechanism of universal analog protections. That means this setpoint is one of general-purpose setpoints, which may be used for different purpose if the protection is deleted from the configuration.</i></p>			

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Gen I unb del

Setpoint group	Gener protect	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	3	Force value	NO
Step	0.1		
Comm object	9270	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay for the generator current unbalance protection. The threshold for the protection is adjusted by setpoint Gen I unbal (page 408).</p> <p><i>Note: The generator current unbalance protection is created in the default archive using the mechanism of universal analog protections. That means this setpoint is one of general-purpose setpoints, which may be used for different purpose if the protection is deleted from the configuration.</i></p>			

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Group: Mains protect

Mains >V MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	100.0 .. 130.0 [%]		
Default value	120.0	Force value	NO
Step	0.1		
Comm object	8305	Related applications	SPtM, SPI, Combi
Description			
<p>This setpoint adjusts the threshold level for the mains overvoltage protection. The threshold is adjusted in % of the nominal mains voltage, which is either MainsNomV (page 352) or MainsNomVph-ph (page 353), depending on the position of the setpoint FixVoltProtSel (page 353).</p> <p>The protection activates if the voltage in at least one phase gets over the threshold for time longer than .</p>			

Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).

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Mains >V Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	0.50	Force value	NO
Step	0.01[-]		
Comm object	8306	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for mains overvoltage protections. The thresholds for this protection is adjusted by setpoints Mains >V MP (page 409) .			
Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.			

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Mains >V Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	NO
Step	0.1		
Comm object	14132	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains overvoltage protections. The thresholds for this protection is adjusted by setpoints Mains >V MP (page 409) .			
Note: Hysteresis is calculated as % value from nominal voltage.			

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Mains >>V MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	Mains <<V MP (page 413) .. 130.0 [%]		
Default value	120.0	Force value	YES
Step	0.1		
Comm object	11345	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the second level of mains overvoltage protection. The threshold is adjusted in % of the nominal mains voltage.			

The protection activates if the voltage in at least one phase gets over the threshold for time longer than **Mains >>V Del (page 411)**.

Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).

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Mains >>V Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	11347	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for second level of mains overvoltage protections. The thresholds for this protection is adjusted by setpoints Mains >>V MP (page 410) .			
Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.			

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Mains >>V Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	NO
Step	0.1		
Comm object	14133	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains over-overvoltage protections. The thresholds for this protection is adjusted by setpoints Mains >>V MP (page 410) .			
Note: Hysteresis is calculated as % value from nominal voltage.			

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MainsAv10>V MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	OFF; 100.1 .. 150.0 [%]		
Default value	110.0	Force value	YES
Step	0.1		
Comm object	13795	Related applications	SPtM, SPI, Combi
Description			

This setpoint defines the trip level for mains overvoltage protection based on 10-minutes moving average of mains phase-phase or phase-neutral voltage (refer to the setpoint **FixVoltProtSel** (page 353)). This protection is evaluated in each phase and is activated immediately when the moving average value exceeds limit adjusted by this setpoint.

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MainsAv10>Vdel

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	16898	Related applications	SPtM, SPI, Combi
Description			
Delay to evaluate the protection MainsAv10>V MP (page 411).			

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Mains <V MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	10.0 .. 100.0 [%]		
Default value	80.0	Force value	YES
Step	0.1		
Comm object	8307	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the mains undervoltage protection. The threshold is adjusted in % of the nominal mains voltage, which is either MainsNomV (page 352) or MainsNomVph-ph (page 353), depending on the position of the setpoint FixVoltProtSel (page 353).			
The protection activates if the voltage in at least one phase drops under the threshold for time longer than.			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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Mains <V Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	0.50	Force value	NO
Step	0.01		
Comm object	8308	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for mains undervoltage protections. The thresholds for this protection is adjusted by setpoints Mains <V MP (page 412).			

Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.

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Mains <V Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	NO
Step	0.1		
Comm object	14130	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains undervoltage protections. The thresholds for this protection is adjusted by setpoints Mains <V MP (page 412) .			
Note: Hysteresis is calculated as % value from nominal voltage.			

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Mains <<V MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	10.0 .. Mains >>V MP (page 410) [%]		
Default value	30.0	Force value	YES
Step	0.1		
Comm object	11346	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the second level of mains undervoltage protection. The threshold is adjusted in % of the nominal mains voltage.			
The protection activates if the voltage in at least one phase drops under the threshold for time longer than Mains <<V Del (page 413) .			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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Mains <<V Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 600.00 [s]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	11348	Related applications	SPtM, SPI, Combi
Description			

The setpoint adjusts the delay for mains undervoltage protections. The thresholds for this protection is adjusted by setpoints **Mains <<V MP (page 413)**.

Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.

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Mains <<V Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	NO
Step	0.1		
Comm object	14131	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains under-undervoltage protections. The thresholds for this protection is adjusted by setpoints Mains <<V MP (page 413) .			
Note: Hysteresis is calculated as % value from nominal voltage.			

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Mains >f MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 10.00 [Hz]		
Default value	1.50	Force value	YES
Step	0.01		
Comm object	8310	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the mains overfrequency protection. The threshold is adjusted in offset of the system frequency.			
The protection activates if the frequency in phase L3 gets over the threshold for time longer than Mains >f Del (page 414)			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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Mains >f Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1000.00 [s]		
Default value	5.00	Force value	NO
Step	0.01		

Comm object	16632	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for mains overfrequency protections. The thresholds for this protection is adjusted by setpoints Mains >f MP (page 414) and Mains <f MP (page 416) .			
<i>Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.</i>			

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Mains >f Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1.00 [Hz]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	14134	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains overfrequency protections. The thresholds for this protection is adjusted by setpoints Mains >f MP (page 414) .			

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Mains >>f MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 10.00 [Hz]		
Default value	2.50	Force value	YES
Step	0.01		
Comm object	16074	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the threshold level for the mains overfrequency protection. The threshold is adjusted in offset of the system frequency.			
The protection activates if the frequency in phase L3 gets over the threshold for time longer than Mains >>f Del (page 415)			
<i>Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).</i>			

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Mains >>f Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1000.00 [s]		
Default value	0.00	Force value	NO

Step	0.01		
Comm object	16628	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for mains overfrequency protections. The thresholds for this protection is adjusted by setpoints Mains >>f MP (page 415) .			
<i>Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.</i>			

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Mains >>f Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1.00 [Hz]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	16076	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains overfrequency protections. The thresholds for this protection is adjusted by setpoints Mains >>f MP (page 415) .			

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Mains <f MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	-10.00 .. 0.00 [Hz]		
Default value	-2.50	Force value	YES
Step	0.01		
Comm object	14587	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the mains underfrequency protection. The threshold is adjusted in offset of the system frequency.			
The protection activates if the frequency in phase L3 gets under the threshold for time longer than Mains >f Del (page 414) .			
<i>Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).</i>			

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Mains <f Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1000.00 [s]		

Default value	0.00	Force value	NO
Step	0.01		
Comm object	16633	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for mains underfrequency protections. The thresholds for this protection is adjusted by setpoint Mains <f MP (page 416) .			
<i>Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50Hz systems or 0.0166 s for 60Hz systems. E.g. if the delay is set to 0.03 s at 50Hz system the real delay will be 0.04 s.</i>			

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Mains <f Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1.00 [Hz]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	14135	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains underfrequency protections.			

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Mains <<f MP

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	-10.00 .. 0.00 [Hz]		
Default value	-2.50	Force value	YES
Step	0.01		
Comm object	16629	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the mains underfrequency protection. The threshold is adjusted in offset of the system frequency.			
The protection activates if the frequency in phase L3 gets under the threshold for time longer than Mains <<f Del (page 417) .			
<i>Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).</i>			

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Mains <<f Del

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1000.00 [s]		

Default value	0.00	Force value	NO
Step	0.01		
Comm object	16630	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay for mains underfrequency protections. The thresholds for this protection is adjusted by setpoint Mains <<f MP (page 417) .			
Note: Although the resolution of this setpoint is 0.01 s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02 s for 50 Hz systems or 0.0166 s for 60 Hz systems. E.g. if the delay is set to 0.03 s at 50 Hz system the real delay will be 0.04 s.			

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Mains <<f Hys

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.00 .. 1.00 [Hz]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	16555	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the hysteresis for deactivation of mains underfrequency protections.			

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VectorS prot

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	DISABLED, PARALLEL ONLY, ENABLED [-]		
Default value	PARALLEL ONLY	Force value	YES
Step	[-]		
Comm object	10551	Related applications	SPtM, SPI, Combi
Description			

This setpoint selects the function of the built-in vectorshift protection.

DISABLED	The vectorshift protection is disabled.
PARALLEL ONLY	The vectorshift protection is enabled only while the Gen-set is running parallel to the mains, i.e. the both MCB and GCB are closed.
ENABLED	The vectorshift protection is active always while the MCB is closed, regardless of the GCB position.

Note: The vectorshift protection is recorded into the history file, however it is not indicated in the Alarm list. When it occurs the controller opens either MCB or GCB depending on the setpoint VS/ROCOF CB sel (in SPI application GCB is always opened, VS/ROCOF CB sel setpoint is not available). If the MCB is not controlled in the particular application then GCB is opened.

Note: If a vectorshift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then reclosed again after **Mains ret del (page 428)**, as the mains is evaluated as healthy.

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VS/ROCOF CBsel

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	MCB, GCB [-]		
Default value	MCB	Force value	YES
Step	[-]		
Comm object	10552	Related applications	SPtM, Combi
Description			
This setpoint selects which breaker will be opened when the VectorS prot (page 418) or ROCOF1-4 protection is detected.			
Note: If the GCB is selected and a mains failure occurs the GCB will be opened immediately when the vectorshift or ROCOF is detected, however also MCB will be opened consequently due to other mains protection as underfrequency or undervoltage.			
Note: In Combi-SPI application GCB is always opened regardless of this setpoint. In Combi-SPI application controller controls only GCB.			

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VectorS limit

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	1 .. 45 [°]		
Default value	10	Force value	NO
Step	1		
Comm object	9843	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the threshold level for the vectorshift protection.			
Note: To adjust this setpoint properly, check the value Max VectorS. The value is available on the controller screen, contains the maximal measured vectorshift value since the gen-set has been synchronized to the mains and after opening of GCB or MCB it is "frozen". In normal conditions the value should not be higher than 3° and the most common setting of the threshold is about 7°.			

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ROCOF1 prot

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	DISABLED, PARALLEL ONLY, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	9840	Related applications	SPtM, SPI, Combi

Description

This setpoint activates or deactivates ROCOF protection.

Note: See also setpoints **ROCOF1 Win** (page 420), **ROCOF1 df/dt** (page 420) and **VS/ROCOF CB sel** (not available in SPI application).

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ROCOF1 Win

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	3 .. 30 [-]		
Default value	5	Force value	YES
Step	1		
Comm object	9990	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the averaging level for the ROCOF1 protection. It defines number of periods of the mains voltage in which the ROCOF1 protection is evaluated. The higher is the ROCOF1 Win the less sensitive is the protection for short oscillations of the frequency to both directions from the nominal value and the higher is the delay of evaluation.			

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ROCOF1 df/dt

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.1 .. 10.0 [Hz/s]		
Default value	1.0	Force value	YES
Step	0.1		
Comm object	9844	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the trip level for ROCOF protection (Rate Of Change Of Frequency). The "filtration level" for the ROCOF protection is adjusted by setpoint ROCOF1 Win (page 420).			
Note: To activate or deactivate ROCOF protection use ROCOF1 prot (page 419). Choose proper breaker which will be opened if ROCOF protection activates by adjusting setpoint VS/ROCOF CB sel (not available in SPI application).			

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ROCOF2 Prot

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	DISABLED, PARALLEL ONLY [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	16145	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates or deactivates ROCOF protection.			

Note: See also setpoints **ROCOF2 Win** (page 421), **ROCOF2 df/dt** (page 421) and **VS/ROCOF CB sel** (not available in SPI application).

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ROCOF2 Win

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.1 .. 2.5 [s]		
Default value	0.5	Force value	YES
Step	0.1		
Comm object	16137	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the averaging level for the ROCOF2 protection. It defines the averaging window in seconds in which the ROCOF2 protection is evaluated. The higher is the ROCOF2 Win the less sensitive is the protection for short oscillations of the frequency to both directions from the nominal value and the higher is the delay of evaluation.			

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ROCOF2 df/dt

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.01 .. 10.00 [Hz/s]		
Default value	2.00	Force value	YES
Step	0.01		
Comm object	16141	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the trip level for ROCOF protection (Rate Of Change Of Frequency). The "filtration level" for the ROCOF protection is adjusted by setpoint ROCOF2 Win (page 421).			
Note: To activate or deactivate ROCOF protection use ROCOF2 Prot (page 420). Choose proper breaker which will be opened if ROCOF protection activates by adjusting setpoint VS/ROCOF CB sel (not available in SPI application).			

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ROCOF3 Prot

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	DISABLED, PARALLEL ONLY [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	16146	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates or deactivates ROCOF protection.			
Note: See also setpoints ROCOF3 Win (page 422), ROCOF3 df/dt (page 422) and VS/ROCOF CB sel (not available in SPI application).			

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ROCOF3 Win

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.1 ..2.5 [s]		
Default value	1.0	Force value	NO
Step	0.1		
Comm object	16138	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the averaging level for the ROCOF3 protection. It defines the averaging window in seconds in which the ROCOF3 protection is evaluated. The higher is the ROCOF3 Win the less sensitive is the protection for short oscillations of the frequency to both directions from the nominal value and the higher is the delay of evaluation.			

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ROCOF3 df/dt

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.01 .. 10.00 [Hz/s]		
Default value	1.50	Force value	YES
Step	0.01		
Comm object	16142	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the trip level for ROCOF protection (Rate Of Change Of Frequency). The "filtration level" for the ROCOF protection is adjusted by setpoint ROCOF3 Win (page 422).			
Note: To activate or deactivate ROCOF protection use ROCOF3 Prot (page 421). Choose proper breaker which will be opened if ROCOF protection activates by adjusting setpoint VS/ROCOF CB sel (not available in SPI application).			

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ROCOF4 Prot

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	DISABLED, PARALLEL ONLY [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	16147	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates or deactivates ROCOF protection.			
Note: See also setpoints ROCOF4 Win (page 423), ROCOF4 df/dt (page 423) and VS/ROCOF CB sel (not available in SPI application).			

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ROCOF4 Win

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.1 .. 2.5 [s]		
Default value	2.0	Force value	YES
Step	0.1		
Comm object	16139	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the averaging level for the ROCOF4 protection. It defines the averaging window in seconds in which the ROCOF4 protection is evaluated. The higher is the ROCOF4 Win the less sensitive is the protection for short oscillations of the frequency to both directions from the nominal value and the higher is the delay of evaluation.			

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ROCOF4 df/dt

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0.1 .. 10.00 [Hz/s]		
Default value	1.25	Force value	YES
Step	0.1		
Comm object	16143	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjusts the trip level for ROCOF protection (Rate Of Change Of Frequency). The "filtration level" for the ROCOF protection is adjusted by setpoint ROCOF4 Win (page 423).			
<i>Note: To activate or deactivate ROCOF protection use ROCOF4 Prot (page 422). Choose proper breaker which will be opened if ROCOF protection activates by adjusting setpoint VS/ROCOF CB sel (not available in SPI application).</i>			

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Pave

Setpoint group	Mains protect	Related FW	2.2.0
Range [units]	0 (OFF) .. InstalledPower (page 346) [kW] (this depends on selected Power formats (page 165))		
Default value	0 (OFF) (this depends on selected Power formats (page 165))	Force value	YES
Step	1 (this depends on selected Power formats (page 165))		
Comm object	16544	Related applications	SPtM, SPI, Combi
Description			
This setpoint defines the maximum exported power agreed with the grid. It is used by the PAV, E monitoring (page 223) function.			

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Group: AMF settings

EmergStart del

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	8301	Related applications	SPtM, Combi
Description			
The setpoint adjusts the delay of automatic Gen-set start in AUT mode after the mains failed. See the setpoint MCB Close del (page 424) for a time diagram of all AMF-related delays.			
Note: Use the setpoint MFStart enable (page 338) to enable/disable automatic start of the Gen-set due to mains failure.			

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MCB Close del

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0.0 .. 60.0 [s]		
Default value	5.0	Force value	YES
Step	0.1		
Comm object	8389	Related applications	SPtM
Description			
This setpoint adjusts the delay of automatic return from dead bus to mains-powered bus (i.e. closing of the MCB) after the mains restored. This delay applies if the mains failure duration is short and the Gen-set has not been connected to the bus yet or if the Gen-set is not running and supplying the bus from any other reason (failure, not in AUT etc.)			
Note: The delay of return from Gen-set-powered bus to mains-powered bus (i.e. reverse synchronizing or changeover) is adjusted by setpoint Mains ret del (page 428).			

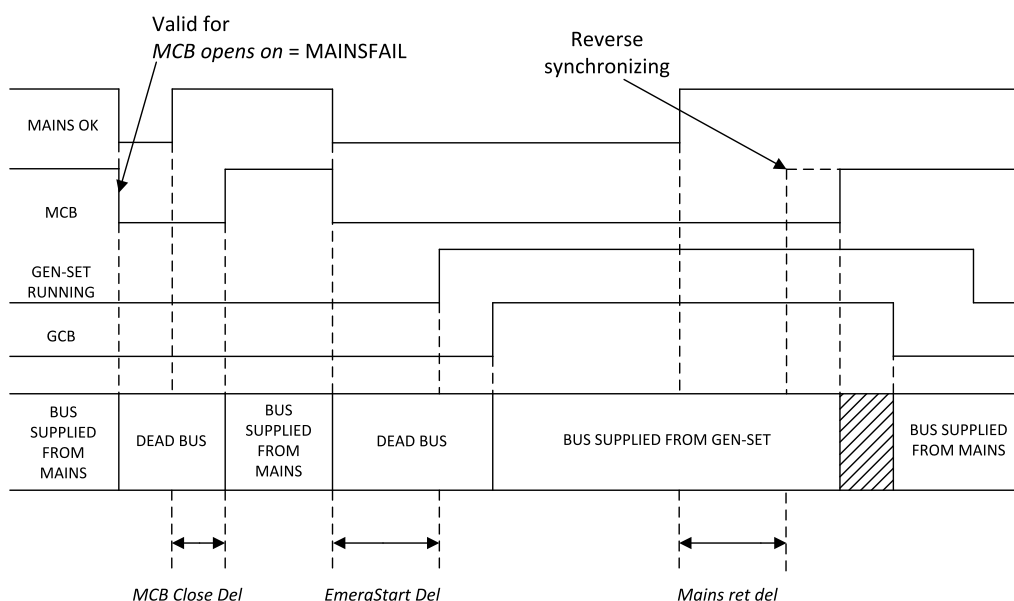


Image 9.7 AMF-related delays

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MCB Opens on

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	MAINSFAIL, GEN RUN [-]		
Default value	MAINSFAIL	Force value	YES
Step	[-]		
Comm object	9850	Related applications	SPtM, Combi
Description			
This setpoint selects the in which moment the MCB is opened after the mains failed.			
MAINSFAIL	The MCB is opened immediately when the mains failure is detected. This option expects the breaker is able to be controlled even there is no AC voltage at the moment, as the mains is failed and the Gen-set is not running yet. Use this option for contactors, for breakers equipped with undervoltage release coil or for breakers controlled by 24 VDC.		
GEN RUN	The MCB open command is issued not until the Gen-set is running and providing voltage (prior to GCB is closed!!). Use this option for AC controlled breakers. The wiring of the breaker control must be provided in such a way, that it automatically switches the AC control voltage either from the mains incomer (before MCB) or directly from the generator.		

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ReturnWithIntr

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	9862	Related applications	SPtM, Combi
Description			
The setpoint adjusts behavior of the controller if the reverse synchronizing to the restored mains was not successful.			
ENABLED	If the reverse synchronization to the restored mains is not successful (i.e. <i>Sync fail</i> alarm is issued) the load is then transferred back to the mains by "changeover" sequence.		
DISABLED	The load remains to be supplied from the Gen-set if the reverse synchronization is not successful. After the <i>Sync fail</i> alarm is reset the controller performs next attempt of reverse synchronization.		

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BreakerOverlap

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0.0 .. 300.0 [s]		
Default value	1	Force value	YES
Step	0.1		
Comm object	8661	Related applications	SPtM, Combi
Description			
This setpoint takes place in following situations:			
<ul style="list-style-type: none"> ➤ In AUT mode after reverse synchronization if the Gen-set will not continue in parallel operation. The setpoint adjusts the maximum time the both GCB and MCB breaker are closed together and the Gen-set is being unloaded. The actual time can be shorter if the Gen-set reaches the GCB open level (page 452) earlier. The GCB open del (page 452) does not take place. ➤ During the Test on load procedure, after forward synchronization. The setpoint adjusts the minimum time the both GCB and MCB breakers are closed together and the load is being transferred from the mains to the Gen-set. The actual time can be longer if the Gen-set is not able to take over the load and fully unload the mains. 			

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ReturnWithIntr

Setpoint group	AMF settings	Related FW	2.2.0				
Range [units]	DISABLED, ENABLED [-]						
Default value	DISABLED	Force value	YES				
Step	[-]						
Comm object	9862	Related applications	SPtM, Combi				
Description							
The setpoint adjusts behavior of the controller if the reverse synchronizing to the restored mains was not successful.							
<table><tr><td>ENABLED</td><td>If the reverse synchronization to the restored mains is not successful (i.e. <i>Sync fail</i> alarm is issued) the load is then transferred back to the mains by "changeover" sequence.</td></tr><tr><td>DISABLED</td><td>The load remains to be supplied from the Gen-set if the reverse synchronization is not successful. After the <i>Sync fail</i> alarm is reset the controller performs next attempt of reverse synchronization.</td></tr></table>				ENABLED	If the reverse synchronization to the restored mains is not successful (i.e. <i>Sync fail</i> alarm is issued) the load is then transferred back to the mains by "changeover" sequence.	DISABLED	The load remains to be supplied from the Gen-set if the reverse synchronization is not successful. After the <i>Sync fail</i> alarm is reset the controller performs next attempt of reverse synchronization.
ENABLED	If the reverse synchronization to the restored mains is not successful (i.e. <i>Sync fail</i> alarm is issued) the load is then transferred back to the mains by "changeover" sequence.						
DISABLED	The load remains to be supplied from the Gen-set if the reverse synchronization is not successful. After the <i>Sync fail</i> alarm is reset the controller performs next attempt of reverse synchronization.						

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BreakerOverlap

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0.0 .. 300.0 [s]		
Default value	1	Force value	YES
Step	0.1		
Comm object	8661	Related applications	SPtM, Combi

Description

This setpoint takes place in following situations:

- **In AUT mode after reverse synchronization** if the Gen-set will not continue in parallel operation. The setpoint adjusts the **maximum** time the both GCB and MCB breaker are closed together and the Gen-set is being unloaded. The actual time can be shorter if the Gen-set reaches the **GCB open level** (page 452) earlier. The **GCB open del** (page 452) does not take place.
- **During the Test on load procedure, after forward synchronization.** The setpoint adjusts the **minimum** time the both GCB and MCB breakers are closed together and the load is being transferred from the mains to the Gen-set. The actual time can be longer if the Gen-set is not able to take over the load and fully unload the mains.

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RetFromIsland

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	MANUAL, AUTO [-]		
Default value	AUTO	Force value	YES
Step	[-]		
Comm object	9590	Related applications	SPtM, Combi
Description			
The setpoint selects the behavior of the controller in the moment the GCB is closed to a dead bus (i.e. transition to the island operation).			
MANUAL	Controller remains in AUT mode and the manual return to Mains is done via MCB button. "Manual Restore" message is displayed in alarmlist to notify operator – it will disappear automatically after MCB close button is pushed (i.e. reverse synchronizing is started).		
	Note: This option is intended for applications where the moment of reverse transfer of the load to the restored mains is to be controlled manually. Setting to MANUAL might be important only for applications with break transfers (with synchronizing disabled).		
AUTO	IMPORTANT: If the controller is in MAN mode the MCB is not closed automatically when the mains is restored even if e.g. the Gen-set has been stopped due to a failure.		
	The controller remains in AUT or TEST mode and the transfer of the load back to the mains is initiated automatically with delay adjusted by the setpoint Mains ret del (page 428).		

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ReturnTo mains

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES

Step	[-]						
Comm object	8618	Related applications	SPtM, Combi				
Description							
This setpoint selects the behavior of the controller in TEST mode if the load is currently supplied from the Gen-set and the mains has restored.							
<table><tr><td>DISABLED</td><td>The load remains to be supplied from the Gen-set until the controller switched to different mode, e.g. to AUT mode., regardless of the fact that the mains is restored.</td></tr><tr><td>ENABLED</td><td>When the mains has restored the Gen-set is reverse-synchronized to the mains, then the load is transferred to the mains, GCB is opened and the Gen-set remains running unloaded in TEST mode.</td></tr></table>				DISABLED	The load remains to be supplied from the Gen-set until the controller switched to different mode, e.g. to AUT mode., regardless of the fact that the mains is restored.	ENABLED	When the mains has restored the Gen-set is reverse-synchronized to the mains, then the load is transferred to the mains, GCB is opened and the Gen-set remains running unloaded in TEST mode.
DISABLED	The load remains to be supplied from the Gen-set until the controller switched to different mode, e.g. to AUT mode., regardless of the fact that the mains is restored.						
ENABLED	When the mains has restored the Gen-set is reverse-synchronized to the mains, then the load is transferred to the mains, GCB is opened and the Gen-set remains running unloaded in TEST mode.						

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FwRet break

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0.0 .. 60.0 [s]		
Default value	1	Force value	YES
Step	0.1		
Comm object	8303	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay between the GCB is opened and consequently MCB is closed and vice versa changeover is used instead of synchronizing (i.e. synchronizing is disabled). This delay is also applied between MCB opening and GCB closing in TEST mode when the Gen-set is running without load and then mains fails.			

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Mains ret del

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	8302	Related applications	SPtM, SPI, Combi
Description			
This setpoint adjust the delay of start of the reverse synchronizing (SPtM, Combi) or forward synchronizing (SPI) after the mains has recovered. See the setpoint MCB Close del (page 424) for the time diagram of all AMF-related delays.			

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Mains stab del

Setpoint group	AMF settings	Related FW	2.2.0
Range [units]	0 .. 60 [s]		
Default value	0	Force value	YES

Step	0.1		
Comm object	14435	Related applications	SPtM, SPI, Combi

Description

This setpoint adjusts the time that Mains parameters need to remain within limits of voltage and frequency protections before the return to Mains is initiated. This delay is active only when the GCB is not closed and the load is not powered from the Gen-set.

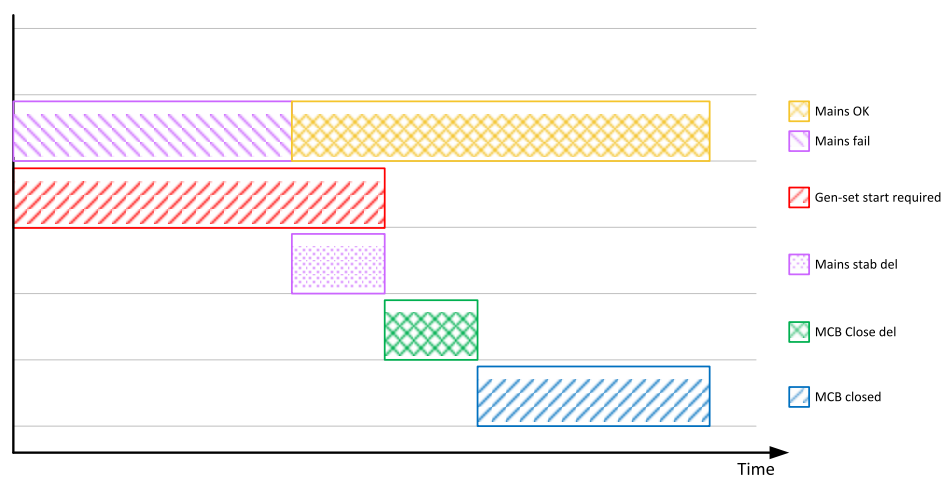


Image 9.8 Behavior in SPtM when the GCB is not closed yet when Mains fails

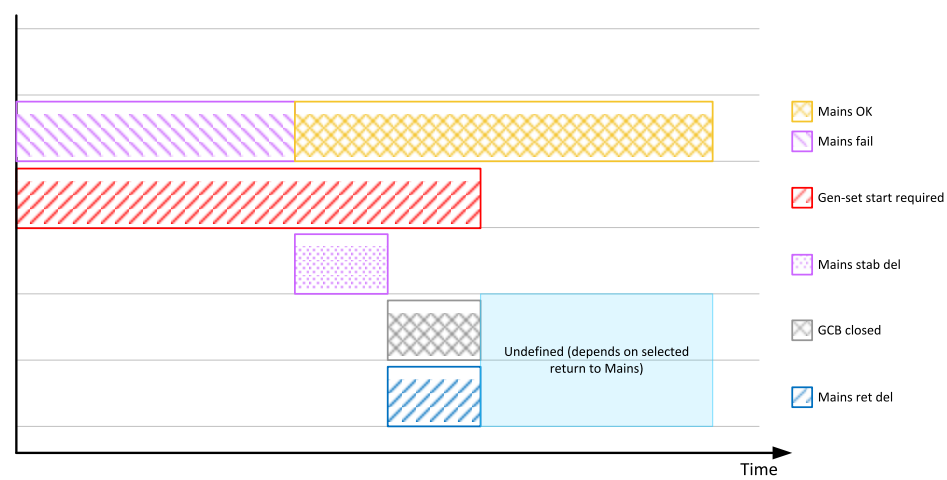
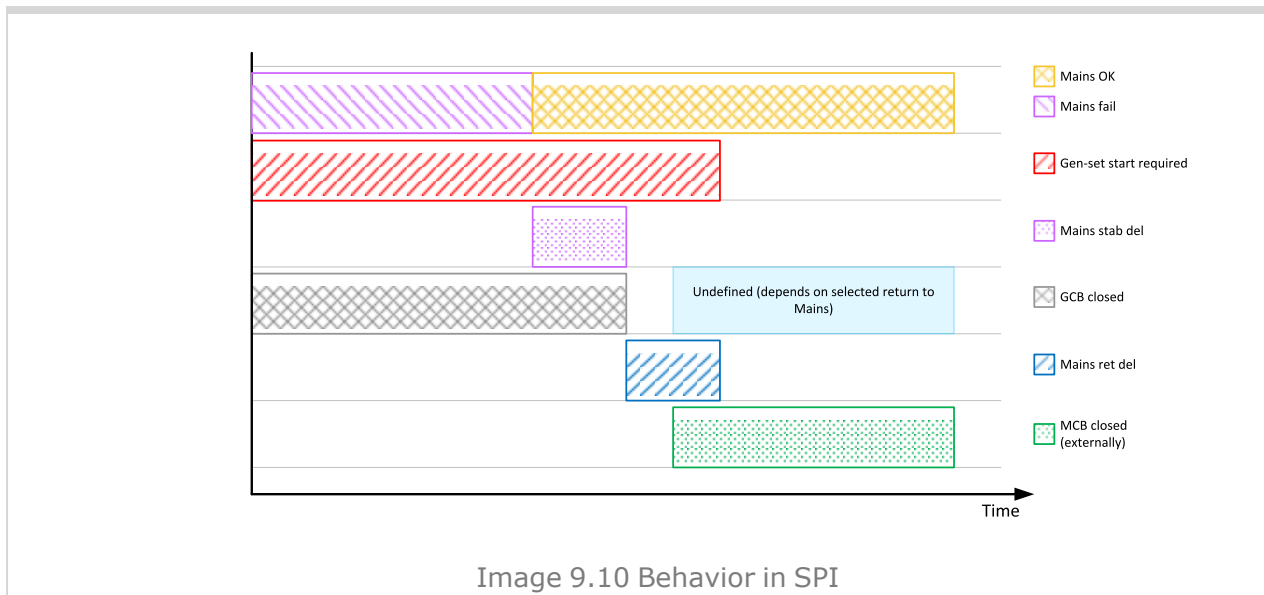


Image 9.9 Behavior in SPtM when the GCB is closed during the **Mains stab del** countdown



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Group: Power Management

Pwr Management

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	ENABLED	Force value	YES
Step	-		
Comm object	8551	Related applications	MINT, COX, Combi
Description			
This setpoint is used to enable/disable the Power management function (get more information in the chapter Power Management (page 168)) in the particular controller.			
If the function is disabled the start and stop of the Gen-set is performed only according to the position of the binary input SYS START/STOP (PAGE 747) , i.e. if the input is active the Gen-set is running and vice versa.			

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Pwr mgmt mode

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	ABS(kW), ABS(kVA), REL(%LOAD) [-]		
Default value	ABS(kW)	Force value	NO
Step	-		
Comm object	9874	Related applications	MINT, COX, Combi
Description			
This setpoint is used to select the Power management mode (get more information in the chapter Power Management (page 168)).			

ABS (kW)	The power management is based on the actual Act power (page 592) and the Gen-set Nomin power (page 345) . The reserves are calculated and adjusted in kW.
ABS (kVA)	The power management is based on actual Appar pwr (page 595) and Gen-set "nominal apparent power" is calculated as $3 * \text{Nomin current (page 347)} * \text{GenNomV (page 351)}$. The reserves are calculated and adjusted in kVA. <i>Note: This mode is intended for systems supplying loads with low power factor. It prevents the Gen-sets from operating at high currents.</i>
REL (%)	The power management is based on the relative load, i.e. ratio active power to nominal power. The reserves are calculated and adjusted in %.

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Priority

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	1 .. 32 [-]		
Default value	1	Force value	YES
Step	1		
Comm object	8488	Related applications	MINT, COX, Combi
Description			
This setpoint is used for adjusting of the Gen-set priority (get more information in the chapter Power Management (page 168)). Value of 1 represents the highest priority (lowest starting order), value of 32 is the lowest priority (highest starting order). To "push" the particular Gen-set temporarily into the highest priority, value of 0 can be forced (see FORCEVALUEIN 1 (PAGE 695)) into this setpoint.			

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PriorAutoSwap

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	DISABLED, RUN HOURS EQU, LD DEMAND SWAP, EFFICIENT [-]		
Default value	DISABLED	Force value	NO
Step	-		
Comm object	10593	Related applications	MINT, COX, Combi
Description			
This setpoint selects the method of optimization of priorities (get more information in the chapter Power Management (page 168)):			
DISABLED	Optimalization is disabled. Priorities are given directly by the values adjusted into the setpoints Priority (page 431) .		
RUN HOURS EQU	The priority setpoints are automatically updated (swapped) to equalize running hours of the Gen-sets or to keep constant difference of running hours.		
LD DEMAND SWAP	This method changes the priorities (not the setpoints itself) of up to 3 gen-		

	sets of different capacity to optimize which Gen-sets are running according to their capacities and actual load demand (if more Gen-sets are needed, please use IGS-NT-PSC firmware in additional controller – more information about this FW can be found on our webpages www.comap-control.com). Note that this priority swapping function may be used only if Pwr mgmt mode (page 430) is set to ABS (kW).
EFFICIENT	The Efficient mode is a combination of Running Hours Equalization and Load Demand Swap priority optimization modes. In the first step, the controller sorts the Gen-sets according to their nominal power. In the second step, the controller sorts the Gen-sets with the same nominal power according to their RHE. The Gen-set(s) their nominal power fits the most are chosen. From these with same nominal power, the Gen-set(s) with lowest RHE are chosen.

Note: Setpoint Priority in Gen-set controllers is not actually changed by AutoSwap functions – the priority is changed only locally during AutoSwap function is enabled. Note that after RHE is activated any changes in the actual priority setpoints need to be confirmed by disabling and enabling RHE again to take effect.

Note: If the optimization is enabled at least one Gen-set in the group must be set as the master for the optimization (**Priority ctrl (page 432) = MASTER**). It is possible to have more than one master, the one with lowest CAN address will play the role of the master and if it is switched off the next one will take the master role.

IMPORTANT: If the controller which is set to MASTER in PriorAutoSwap function is in EMERG. MANUAL (PAGE 679), priority autoswapping will not work and no other controller will assume MASTER role.

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Priority ctrl

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	SLAVE, MASTER [-]		
Default value	SLAVE	Force value	YES
Step	-		
Comm object	10592	Related applications	MINT, COX, Combi
Description			
This setpoint is used to select the role of this particular controller in the optimization of priorities.			
SLAVE	The controller plays only passive role. Priority can be changed from other controller (active master).		
MASTER	The controller can play both active or passive role. It plays active master role, i.e. changes priorities in slave controllers, if it has the lowest address from all the controllers being switched to MASTER position. Otherwise it plays the passive role as if switched to SLAVE position.		

Note: It is possible to have more than one master; always only the one with lowest CAN address will play the master role.

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#SysAMFstrDel

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8549	Related applications	MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay between closing of the input SYS START/STOP (PAGE 747) and activation of the Gen-set group into island operation (i.e. the MCB FEEDBACK (PAGE 725) is open). The delay of activation of the group into parallel-to-mains operation is fixed 1s.</p> <p>The setpoint is primarily intended for adjusting the "Mains failure autostart" delay in sites, where the input SYS START/STOP (PAGE 747) is controlled directly by a mains decoupling relay.</p>			

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#SysAMFstopDel

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8550	Related applications	MINT, COX, Combi
Description			
<p>This setpoint adjusts the delay between opening of the input SYS START/STOP (PAGE 747) and deactivation of the Gen-set group if MCB FEEDBACK (PAGE 725) is open. If the MCB feedback is closed, the the delay is fixed 1s.</p> <p>The setpoint is primarily intended for adjusting the "Mains return" delay in sites, where the input SYS START/STOP (PAGE 747) is controlled directly by a mains decoupling relay.</p>			

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Dynam Spin Res

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	14126	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to ENABLE / DISABLE the dynamic spinning reserves functionality. For details, see chapter Dynamic Spinning Reserves (page 193) and values DynSpinRes (page 615), DynamSpinResOffs (page 616).</p>			

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LoadResStrt 1

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	-32000 .. LoadResStop 1 (page 434) [kX] (this depends on selected Power formats (page 165))		
Default value	140 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8489	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the load reserve for start in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #1 is active (get more information in the chapter Power Management (page 168)).</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722), LOAD RES 3 (PAGE 722) and LOAD RES 4 (PAGE 723). If none of these inputs is active the set #1 is selected.</p> <p>Note: If the absolute power management is selected, this setpoint (or the setpoints LoadResStrt 2 (page 435), LoadResStrt 3 (page 436) or LoadResStrt 4 (page 437) depending on which load reserve set is selected) determines also the number of Gen-set (that are part of the power management) which will start (according to their priority and nominal power).</p> <p>Note: There is a possibility to assign this setpoint negative number. This can be used in some situations to allow Gen-set start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the chapter Troubleshooting (page 273) for more information (chapter "MGCB is not closed although Gen-set are running").</p> <p>Note: # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.</p>			

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LoadResStop 1

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	LoadResStrt 1 (page 434) .. 32000 [kX] (this depends on selected Power formats (page 165))		
Default value	170 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8491	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #1 is active (get more information in the chapter Power Management (page 168)).</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722), LOAD RES 3</p>			

(PAGE 722) and LOAD RES 4 (PAGE 723). If none of these inputs is active the set #1 is selected.

Note: The reserve for stop must be always adjusted higher than the reserve for start.

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LoadResStrt 2

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	-32000 .. LoadResStop 2 (page 435) [kX] (this depends on selected Power formats (page 165))		
Default value	150 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8490	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust the load reserve for start in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #2 is active (get more information in the chapter Power Management (page 168)).			
The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722) , LOAD RES 3 (PAGE 722) and LOAD RES 4 (PAGE 723) . If none of these inputs is active the set #1 is selected.			
Note: If the absolute power management is selected, this setpoint (or the setpoints LoadResStrt 2 (page 435) , LoadResStrt 3 (page 436) or LoadResStrt 4 (page 437) depending on which load reserve set is selected) determines also the number of Gen-set (that are part of the power management) which will start (according to their priority and nominal power).			
Note: There is a possibility to assign this setpoint negative number. This can be used in some situations to allow Gen-set start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the chapter Troubleshooting (page 273) for more information (chapter "MGCB is not closed although Gen-set are running").			
Note: # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.			

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LoadResStop 2

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	LoadResStrt 2 (page 435) .. 32000 [kX] (this depends on selected Power formats (page 165))		
Default value	170 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8633	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #2 is active (get more information in the chapter Power Management (page 168)).			

430) = ABS (kW) or ABS (kVA) if the reserve set #2 is active (get more information in the chapter **Power Management (page 168)**)).

The currently active reserve set is selected by binary inputs **LOAD RES 2 (PAGE 722)**, **LOAD RES 3 (PAGE 722)** and **LOAD RES 4 (PAGE 723)**. If none of these inputs is active the set #1 is selected.

Note: The reserve for stop must be always adjusted higher than the reserve for start.

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LoadResStrt 3

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	-32000 .. LoadResStop 3 (page 436) [kX] (this depends on selected Power formats (page 165))		
Default value	140 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8331	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust the load reserve for start in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #3 is active (get more information in the chapter Power Management (page 168))).			
The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722) , LOAD RES 3 (PAGE 722) and LOAD RES 4 (PAGE 723) . If none of these inputs is active the set #1 is selected.			
Note: If the absolute power management is selected, this setpoint (or the setpoints LoadResStrt 2 (page 435) , LoadResStrt 3 (page 436) or LoadResStrt 4 (page 437) depending on which load reserve set is selected) determines also the number of Gen-set (that are part of the power management) which will start (according to their priority and nominal power).			
Note: There is a possibility to assign this setpoint negative number. This can be used in some situations to allow Gen-set start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the chapter Troubleshooting (page 273) for more information (chapter "MGCB is not closed although Gen-set are running").			
Note: # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.			

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LoadResStop 3

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	LoadResStrt 3 (page 436) .. 32000 [kX] (this depends on selected Power formats (page 165))		
Default value	170 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		

Comm object	8833	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #3 is active (get more information in the chapter Power Management (page 168)).</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722), LOAD RES 3 (PAGE 722) and LOAD RES 4 (PAGE 723). If none of these inputs is active the set #1 is selected.</p> <p>Note: The reserve for stop must be always adjusted higher than the reserve for start.</p>			

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LoadResStrt 4

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	-32000 .. LoadResStop 4 (page 437) [kX] (this depends on selected Power formats (page 165))		
Default value	140 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8832	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the load reserve for start in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #4 is active (get more information in the chapter Power Management (page 168)).</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722), LOAD RES 3 (PAGE 722) and LOAD RES 4 (PAGE 723). If none of these inputs is active the set #1 is selected.</p> <p>Note: If the absolute power management is selected, this setpoint (or the setpoints LoadResStrt 2 (page 435), LoadResStrt 3 (page 436) or LoadResStrt 4 (page 437) depending on which load reserve set is selected) determines also the number of Gen-set (that are part of the power management) which will start (according to their priority and nominal power).</p> <p>Note: There is a possibility to assign this setpoint negative number. This can be used in some situations to allow Gen-set start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the chapter Troubleshooting (page 273) for more information (chapter "MGCB is not closed although Gen-set are running").</p> <p>Note: # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.</p>			

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LoadResStop 4

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	LoadResStrt 4 (page 437) .. 32000 [kX] (this depends on selected Power formats (page 165))		
Default value	170 (this depends on	Force value	NO

	selected Power formats (page 165)		
Step	1 (this depends on selected Power formats (page 165))		
Comm object	8834	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. Pwr mgmt mode (page 430) = ABS (kW) or ABS (kVA) if the reserve set #4 is active (get more information in the chapter Power Management (page 168)).</p> <p>The currently active reserve set is selected by binary inputs LOAD RES 2 (PAGE 722), LOAD RES 3 (PAGE 722) and LOAD RES 4 (PAGE 723). If none of these inputs is active the set #1 is selected.</p> <p>Note: The reserve for stop must be always adjusted higher than the reserve for start.</p>			

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NextStrt Del

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8492	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust the delay of starting the next Gen-set when the actual load reserve (get more information in the chapter Power Management (page 168)) drops below the adjusted reserve for start, but the group is still not overloaded.</p>			

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#OverIdNextDel

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8493	Related applications	MINT, COX, Combi
Description			
<p>If the system reserve drops below the start limit for next Gen-set the delay NextStrt Del (page 438) will begin to count down. But if the load raises too quickly it might happen that the system gets overloaded already before the delay NextStrt Del (page 438) reaches zero.</p> <p>This setpoint is used to prevent this situation. If the NextStrt Del (page 438) timer is already counting down (i.e. the condition for starting of next Gen-set based on reserves is fulfilled), the total load of running Gen-sets reaches 90% of their nominal capacity and the remaining time of the running timer is higher than #OverIdNextDel (page 438), the running timer is shortened to the value of #OverIdNextDel (page 438) to speed up the start-up of the next Gen-set.</p> <p>Note: The setpoint takes place only in island operation.</p>			

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NextStopDel

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8494	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust the delay of stopping the next gen-set when the actual load reserve (get more information on load reserves in the chapter (get more information in the chapter Power Management (page 168)) rises above the adjusted load reserve for stop.			

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SlowStopDel

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8495	Related applications	MINT, COX, Combi
Description			
This setpoint is used to adjust how long the particular Gen-set will suppress it's own <i>Slow stop</i> alarm to give chance to another Gen-set to start and replace the defective one. If there isn't any available Gen-set to start, the alarm is not suppressed.			

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SlowStopLoad

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	UNLOAD, LDSHARING [-]		
Default value	UNLOAD	Force value	YES
Step	-		
Comm object	16648	Related applications	MINT, COX, Combi
Description			
This setpoint defines behaviour of the genset with active Slow stop protection: <ul style="list-style-type: none">➤ UNLOAD - Genset is unloaded as much as possible (other gensets are not overloaded). The unloading is limited to 20% of its Nomin power rating to avoid reverse power issue. Genset load can be lower than 20%, if system load is low and all gensets are forced to operate with such a low load level.➤ LDSHARING - Genset is not unloaded, load sharing with other gensets is done until a backup genset is started and loaded.			

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MinRunPower 1

Setpoint group	Power Management	Related FW	2.2.0
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Range [units]	0 .. 6500 [kW] (this depends on selected Power formats (page 165))		
Default value	100 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	9584	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust certain minimum value of the sum of nominal power of all running Gen-sets. If the function is active, then the Gen-sets would not be stopped, although the reserve for stop is fulfilled, if the total remaining nominal power dropped below this minimal value.</p> <p>There are 3 different <i>MinRunPower</i> setpoints, this particular one is activated by the input MINRUN POWER 1 (PAGE 726).</p> <p>Note: If more than one binary input for <i>MinRunPower</i> activation is closed <i>MinRunPower</i> with higher number is used (i.e. binary inputs with higher number have higher priority). When no binary input is closed, then minimal running power is 0.</p>			

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MinRunPower 2

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 6500 [kW] (this depends on selected Power formats (page 165))		
Default value	200 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		
Comm object	9585	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust certain minimum value of the sum of nominal power of all running Gen-sets. If the function is active, then the Gen-sets would not be stopped, although the reserve for stop is fulfilled, if the total remaining nominal power dropped below this minimal value.</p> <p>There are 3 different <i>MinRunPower</i> setpoints, this particular one is activated by the input MINRUN POWER 2 (PAGE 727).</p> <p>Note: If more than one binary input for <i>MinRunPower</i> activation is closed <i>MinRunPower</i> with higher number is used (i.e. binary inputs with higher number have higher priority). When no binary input is closed, then minimal running power is 0.</p>			

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MinRunPower 3

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 6500 [kW] (this depends on selected Power formats (page 165))		
Default value	300 (this depends on selected Power formats (page 165))	Force value	NO
Step	1 (this depends on selected Power formats (page 165))		

Comm object	9586	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used to adjust certain minimum value of the sum of nominal power of all running Gen-sets. If the function is active, then the Gen-sets would not be stopped, although the reserve for stop is fulfilled, if the total remaining nominal power dropped below this minimal value.</p> <p>There are 3 different <i>MinRunPower</i> setpoints, this particular one is activated by the input MINRUN POWER 3 (PAGE 727).</p> <p>Note: If more than one binary input for <i>MinRunPower</i> activation is closed <i>MinRunPower</i> with higher number is used (i.e. binary inputs with higher number have higher priority). When no binary input is closed, then minimal running power is 0.</p>			

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RunHoursBase

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 2000000 [h]		
Default value	0	Force value	YES
Step	1		
Comm object	10600	Related applications	MINT, COX, Combi
Description			
<p>This setpoint is used for adjustment of the "initial point" of the Running Hours Equalization function (get more information in the chapter Power Management (page 168)). It is used either for reflecting the difference of engine hours in the moment when the RHE function was activated or for keeping certain constant difference in the engine hours.</p>			

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RunHrsMaxDiff

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 65000 [h]		
Default value	100	Force value	NO
Step	1		
Comm object	9919	Related applications	MINT, COX, Combi
Description			
<p>This setpoint adjusts the "deadband" for the Running Hours Equalization function (get more information in the chapter Power Management (page 168)). The priorities are swapped not until the relative engine hours (RHE) difference is higher than this deadband.</p>			

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PwrBandContr 1

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]		
Default value	1	Force value	NO
Step	-		

Comm object	10594	Related applications	MINT, COX, Combi
Description			
This setpoint is used to select the Gen-sets which will run within the power band #1 if the optimization according to Gen-set size is active (get more information in the chapter Power Management (page 168)).			
Note: <i>The combinations of Gen-sets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.</i>			

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PwrBandContr 2

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]		
Default value	1	Force value	NO
Step	-		
Comm object	10595	Related applications	MINT, COX, Combi
Description			
This setpoint is used to select the Gen-sets which will run within the power band #2 if the optimization according to Gen-set size is active (get more information in the chapter Power Management (page 168)).			
Note: <i>The combinations of Gen-sets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.</i>			

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PwrBandContr 3

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]		
Default value	1	Force value	NO
Step	-		
Comm object	10596	Related applications	MINT, COX, Combi
Description			
This setpoint is used to select the Gen-sets which will run within the power band #3 if the optimization according to Gen-set size is active (get more information in the chapter Power Management (page 168)).			
Note: <i>The combinations of Gen-sets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.</i>			

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PwrBandContr 4

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]		
Default value	1	Force value	NO
Step	-		
Comm object	10597	Related applications	MINT, COX, Combi

Description

This setpoint is used to select the Gen-sets which will run within the power band #4 if the optimization according to Gen-set size is active (get more information in the chapter **Power Management (page 168)**).

Note: The combinations of Gen-sets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.

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PwrBnChngDIUp

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	10795	Related applications	MINT, COX, Combi
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 (get more information in the chapter Power Management (page 168)).			

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PwrBnChngDIDn

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	8896	Related applications	MINT, COX, Combi
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand dropped below the lower limit of the current power band (get more information in the chapter Power Management (page 168)).			

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Control group

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	COMMON (=1), 2..32[-]		
Default value	COMMON	Force value	YES
Step	1		
Comm object	10589	Related applications	MINT, COX, Combi
Description			
This setpoint selects the control group (get more information in the chapter Power Management (page 168)) to which the particular Gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1 (COMMON).			

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GroupLinkLeft

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	COMMON (=1), 2..32 [-]		
Default value	COMMON	Force value	YES
Step	1		
Comm object	10590	Related applications	MINT, COX, Combi
Description			
If the input GROUPLINK (PAGE 708) of this particular controller is used to provide the "group link" information for two control groups (get more information in the chapter Power Management (page 168)), then 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 (COMMON).			

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GroupLinkRight

Setpoint group	Power Management	Related FW	2.2.0
Range [units]	COMMON (=1), 2..32 [-]		
Default value	COMMON	Force value	YES
Step	1		
Comm object	10591	Related applications	MINT, COX, Combi
Description			
If the input GROUPLINK (PAGE 708) of this particular controller is used to provide the "group link" information for two control groups (get more information in the chapter Power Management (page 168)), then 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 (COMMON).			

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Group: Sync/Load ctrl

SpeedRegChar

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	POSITIVE, NEGATIVE [-]		
Default value	POSITIVE	Force value	NO
Step	-		
Comm object	9054	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint selects the characteristic of the speed governor output of the controller. Adjust it according to the behavior of the remote speed input of your speed governor:			

POSITIVE	Select this option if raising of the voltage on the governor remote speed input causes engine speed to raise .
NEGATIVE	Select this option if raising of the voltage on the governor remote speed input causes engine speed to lower .

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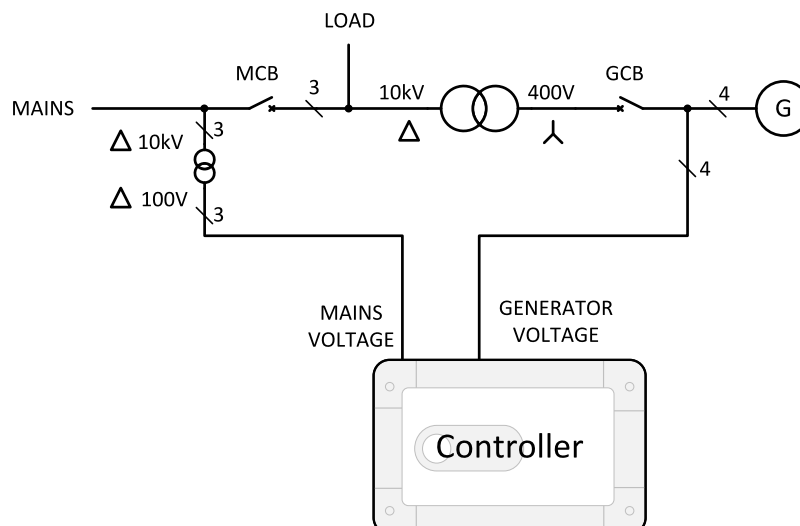
Voltage window

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8650	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts maximum difference between generator and mains/bus voltage in respective phases for voltage matching during synchronizing.			

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GtoM AngleReq

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	-45 .. 45 [°]		
Default value	10	Force value	NO
Step	1		
Comm object	9578	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>Requested angle between the phasors of the generator and mains voltage for synchronizing. This setpoint is intended for correction of the phase shift caused by a delta-triangle transformer located between the generator and mains voltage measuring points. In other situations the setpoint should be adjusted to 0.</p> <p>The diagram below shows a situation where the 230V/10kV triangle-delta transformer causes 30° phase shift between the primary and secondary side. That means when there is 0° phase difference at the both sides of the GCB the phase difference measured by the controller is 30°. Correct setting for this kind of wiring is then <i>GtoM AngleReq</i> = 30.</p>			



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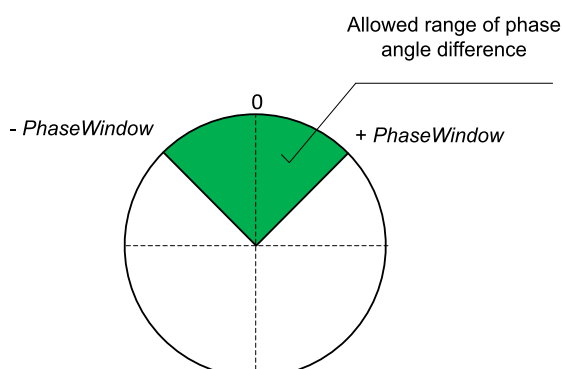
Phase window

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. 90 [°]		
Default value	10	Force value	YES
Step	1		
Comm object	8652	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts maximum absolute value of difference between actual phase angle between the generator and mains/bus voltages for synchronizing.

Note: To disable issuing the breaker close command (i.e. for test purpose) adjust this setpoint to 0. Synchronizing will continue until timeout occurs or the breaker is closed externally.



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Dwell time

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
----------------	----------------	------------	-------

Range [units]	0.0 .. 25.0 [s]		
Default value	0.3	Force value	YES
Step	0.1		
Comm object	8653	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the period of time that the phase angle difference must stay within ±Phase window (page 446) and voltage difference within Voltage window (page 445) before the respective breaker, which is actually being synchronized, is closed.</p> <p>Note: In Async applications, this setpoint adjusts the period of time that the actual engine speed must be within Slip Freq Win / RPM window (page 455) before the breaker is closed when RPM matching is used. The engine speed must get into 25 % of the Slip Freq Win / RPM window (page 455) and then stay in the Slip Freq Win / RPM window (page 455) at least for the time adjusted by this setpoint Dwell time (page 446).</p>			

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Freq gain / RPM gain

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8715	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop. The integration factor (I-factor) for the frequency loop is adjusted by the setpoint Freq int / RPM int (page 447).</p> <p>Note: In Async applications, this setpoint has name RPM gain and it is used in the speed control PI loop.</p> <p>Note: See the chapter Regulation loops (page 101) for general information about regulation loops and their adjustment.</p>			

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Freq int / RPM int

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	50	Force value	YES
Step	1		
Comm object	8716	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the relative integration factor (I-factor) of the frequency control PI loop. The gain factor (P-factor) for the frequency loop is adjusted by the setpoint Freq gain / RPM gain (page 447).</p> <p>Note: In Async applications, this setpoint has name RPM int and it is used in the speed control PI loop.</p>			

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Freq reg loop / RPM reg loop

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	ALL THE TIME, SYNC ONLY, GCB OPEN [-]		
Default value	SYNC ONLY	Force value	YES
Step	-		
Comm object	9891	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint selects when is the frequency regulation loop active.			
SYNC ONLY	The frequency regulation loop is active only during synchronizing to match the generator and mains frequencies together. It is assumed that in all other situations where the frequency is to be regulated the engine governor maintains itself. Note: This option is suitable for most governors.		
ALL THE TIME	SPtM, SPI, Combi: This option activates the frequency regulation loop also while the Gen-set is running without load and during the island operation. The controller maintains frequency at it's nominal value adjusted by the system frequency (Nominal Freq (page 354) + Nom frq offset (page 354)). Note: This option can be used e.g. for elimination of the droop at governors that do not support isochronous mode.		
GCB OPEN	MINT, COX: This option activates the frequency regulation loop also while the Gen-set is running without load The controller maintains frequency at it's nominal value adjusted by the system frequency (Nominal Freq (page 354) + Nom frq offset (page 354)).		

The P and I factors of the frequency regulation loop are adjusted by setpoints **Freq gain / RPM gain (page 447)** and **Freq int / RPM int (page 447)**.

Note: In Async applications, this setpoint has name **RPM reg loop** and it is used in the speed regulation loop. It has options **RPM MATCH ONLY** and **ALL THE TIME**.

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Angle Gain

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8718	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop.</p> <p>The synchronizing process contains two following steps:</p> <ol style="list-style-type: none"> 1. The first step is to match the generator frequency to the mains frequency. In this step the frequency 			

regulation loop (**Freq reg loop / RPM reg loop (page 448)**) is active.

2. The following step is to match the phase angle difference of the mains and generator voltages to the setpoint **GtoM AngleReq (page 445)**. The angle regulation loop is active in this step.

As soon as the phase angle difference stays within the window adjusted by **Phase window (page 446)** and the voltage difference stays in the **Voltage window (page 445)**, both for period **Dwell time (page 446)**, the circuit breaker closing command is issued.

Note: See the chapter **Regulation loops (page 101)** for general information about regulation loops and their adjustment.

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Speed gov bias

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	SpeedGovLowLim (page 449) .. SpeedGovHiLim (page 450) [V]		
Default value	0	Force value	YES
Step	0.1		
Comm object	8656	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the initial voltage level for the speed governor output, which is present on the output, if no speed or power regulation loop is active.			
Note: The relation is 10 V ~ 100 % PWM.			

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SpdGovPWM rate

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	500 .. 3000 [Hz]		
Default value	1200	Force value	NO
Step	1		
Comm object	10911	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the frequency of the speed governor output in PWM mode. The PWM mode of the speed governor output is activated by the jumper located next to the speed governor output terminals. The PWM interface is used for several governor types as e.g. CAT or Cummins. Adjust the PWM frequency according to the governor specification. Adjust the setpoint to 1200 Hz if the PWM interface is not used.			

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SpeedGovLowLim

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	-10.00 .. SpeedGovHiLim (page 450) [V]		
Default value	-10	Force value	NO
Step	0.01		
Comm object	10115	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Lower limit of the speed governor output. Use this setpoint to adapt the governor output range to the input range of your governor.

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SpeedGovHiLim

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	SpeedGovLowLim (page 449) .. 10.00 [V]		
Default value	10	Force value	NO
Step	0.01		
Comm object	10559	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Upper limit of the speed governor output. Use this setpoint to adapt the governor output range to the input range of your governor.			

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TauSpeedActuat

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	1.0 .. 300.0 [s]		
Default value	10	Force value	NO
Step	0.1		
Comm object	10784	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the transformation ratio of the speed governor output to the pulses at the binary outputs SPEED DN (PAGE 842) and SPEED UP (PAGE 842) . Adjust the setpoint to the pulse duration which is needed for the speed control device to travel from minimal position to the maximal position.			

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Load gain

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8659	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the gain factor (P-factor) of the load control PI loop. The integration factor (I-factor) for the load control loop is adjusted by the setpoint Load int (page 451) .			
Note: See the chapter Regulation loops (page 101) for general information about regulation loops and their adjustment.			

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Load int

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	50	Force value	YES
Step	1		
Comm object	8713	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the relative integration factor (I-factor) of the load control PI loop. The gain factor (P-factor) for the load control loop is adjusted by the setpoint Load gain (page 450) .			

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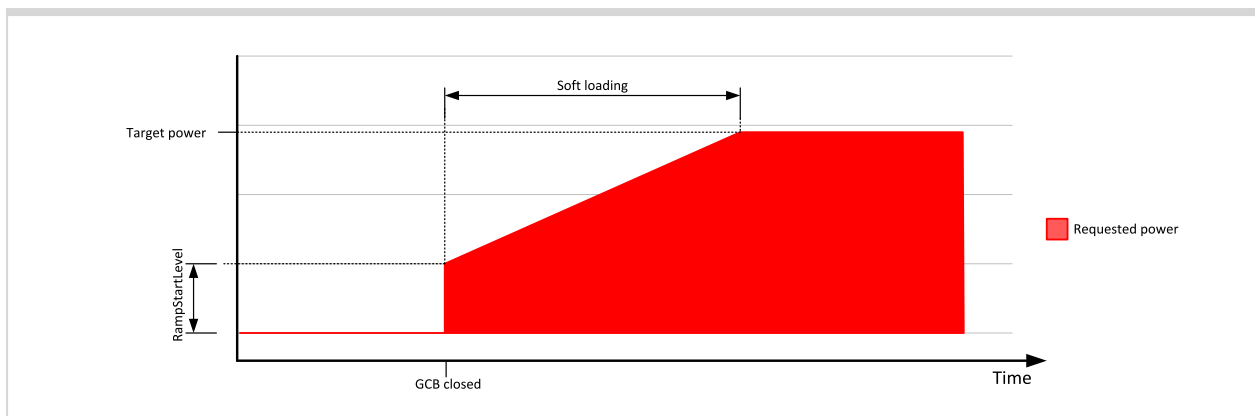
Load Ramp

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. GCB open del (page 452) [s]		
Default value	5	Force value	YES
Step	1		
Comm object	8658	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
All changes of requested Gen-set load (except in loadsharing mode) are not made as one step, but are ramped – i.e. the requested load is changing slowly with the rate adjusted by this setpoint. The rate is adjusted in seconds for 100% load change (from 0 to 100 % of nominal power). The ramp takes place in following situations:			
<ul style="list-style-type: none"> ➤ The Gen-set has been just synchronized and is ramping up to the target load level (e.g. baseload in parallel to mains operation or average Gen-set load in multiple loadsharing operation). The starting point of the ramp for this case is adjustable by the setpoint RampStartLevel (page 451). ➤ The Gen-set is running parallel to the mains and baseload is changed. ➤ The Gen-set is being unloaded before opening the GCB and stop. In this case the end load level is adjusted by setpoint GCB open level (page 452) and the timeout for unloading is adjusted by setpoint GCB open del (page 452). 			

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RampStartLevel

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	2	Force value	NO
Step	1		
Comm object	10912	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the load level at which the Load Ramp (page 451) starts after the GCB has been closed. The intention of this setpoint is to give the Gen-set certain "loading impulse" right after closing the GCB to avoid possible oscillations around 0 kW or even reverse power if the ramp begun at 0 kW.			



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GCB open level

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	10	Force value	NO
Step	1		
Comm object	8547	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the end point of the Gen-set unloading ramp, i.e. power level at which the GCB is opened. If this level is not reached within time period adjusted by setpoint GCB open del (page 452) the GCB is then opened regardless of the Gen-set power.			
<i>Note: The speed of the ramp is adjusted by the setpoint Load Ramp (page 451).</i>			

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GCB open del

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	Load Ramp (page 451) .. 1800 [s]		
Default value	30	Force value	YES
Step	1		
Comm object	8548	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the maximum duration of the gen-set unloading ramp. If the end point of the ramp (GCB open level (page 452)) is not reached within time period adjusted by this setpoint the GCB is then opened regardless of the gen-set power.			
<i>Note: The speed of the ramp is adjusted by the setpoint Load Ramp (page 451).</i>			

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Sync timeout / RPM match TOut

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	1 .. 1800, NO TIMEOUT [s]		
Default value	30	Force value	NO

Step	1		
Comm object	8657	Related applications	SPtM, SPI, MINT, Combi
Description			
<p>This setpoint adjusts the maximum duration of forward or reverse synchronization. If the synchronizing is not successful within this period of time, the <i>Sync Timeout</i> or <i>RevSyncTimeout</i> alarm will be issued.</p> <p>Note: <i>If the synchronizing is not successful within 1/10 of the Sync timeout or 60 s (if Sync timeout <600 s) the synchronization process is automatically restarted again, i.e. the speed governor output is reset to Speed gov bias (page 449) value and then frequency regulation loop is started again. If NO TIMEOUT is selected the automatic restart occurs every 180 s. This method helps to synchronize successfully even in difficult conditions.</i></p> <p>The process of synchronization can be repeated automatically when the timeout elapses. See the setpoint Sync attempts (page 453) for more details.</p> <p>When the synchronization is unsuccessful the last adjusted time the controller will issue red synchronization alarm and the Gen-set is stopped.</p> <p>Note: <i>In Async applications, this setpoint has name RPM match TOut and it adjusts the maximum duration of RPM matching. If it is not successful within this period of time, the RPM match fail alarm will be issued.</i></p>			

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Sync attempts

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	1 .. 9, OFF (10) [s]		
Default value	OFF (10)	Force value	NO
Step	1		
Comm object	12894	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>The controller can repeat the synchronization attempts when they are unsuccessful. Adjust to 10 to disable this function (the controller will repeat the synchronization attempts until the first successful attempt. See the setpoint Sync timeout / RPM match TOut (page 452) to get more details on synchronization function.</p>			

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Sync type

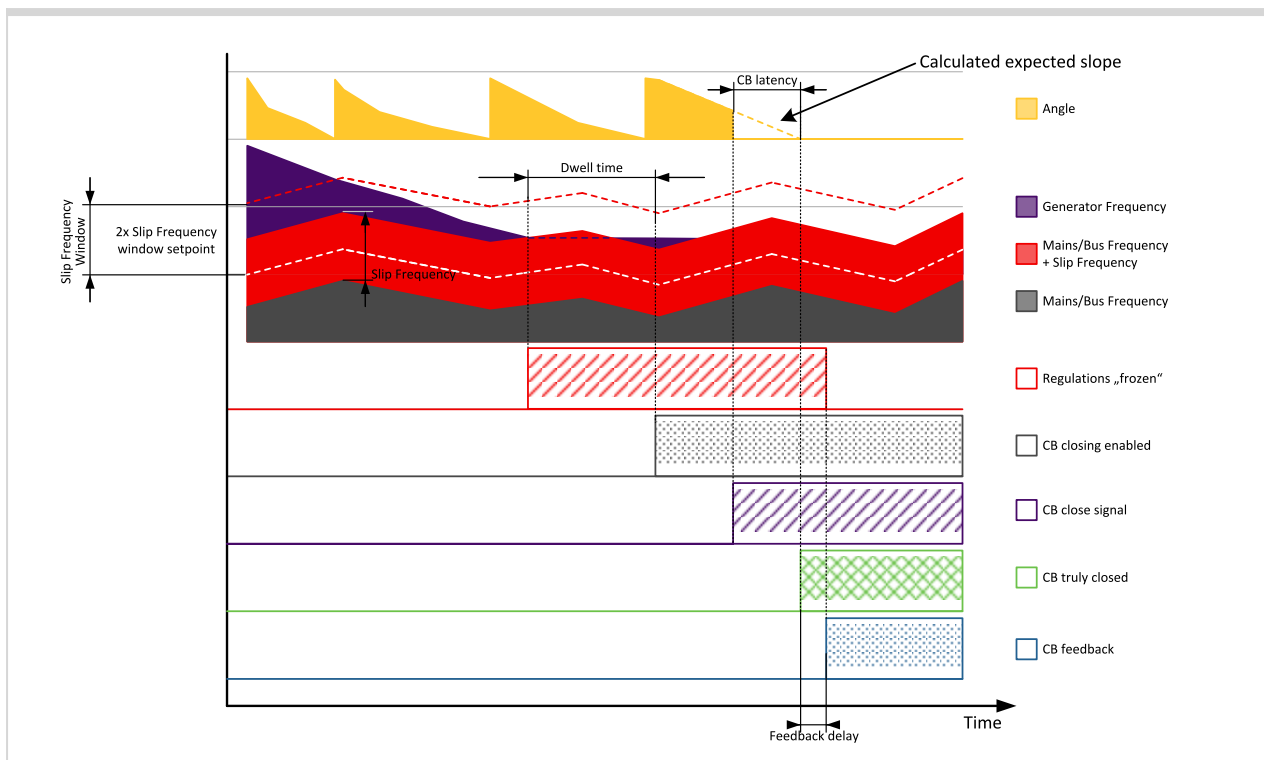
Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	PHASE MATCH, SLIP SYNC [-]		
Default value	PHASE MATCH	Force value	NO
Step	-		
Comm object	14802	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint selects when is the frequency regulation loop active.</p>			

PHASE MATCH	This type of synchronization is based on voltage and phase shift match. Limits are adjusted via setpoints Voltage window (page 445) and Phase window (page 446) . When voltage and phase shift are match, Dwell time (page 446) starts countdown. After that the command for breaker closing is activated.
SLIP SYNC	This type of synchronization regulates the value of frequency to the value Mains/Bus frequency + Slip Frequency (page 454) . When this frequency is reached, Dwell time (page 446) starts countdown. After that the command for breaker closing is activated. The closing breaker command is issued in advance due to latency of breakers (adjusted via setpoints GCB Latency (page 456) and MCB Latency (page 457)). <i>Note: Condition of Voltage window (page 445) has to be also fulfilled.</i>

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Slip Frequency

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	-0.50 .. 0.50 [Hz]		
Default value	-0.25	Force value	NO
Step	0.01		
Comm object	14798	Related applications	SPTM, SPI, Combi
Description			
Setpoint related for slip synchronization (Sync type (page 453) = Slip Synchro).			
The gen-set controller regulates to (Mains/Bus Frequency + Slip frequency) value and the window is set to setpoint Slip Freq Win / RPM window (page 455) to each direction from this value. When the generator frequency reaches (Mains/Bus Frequency + Slip frequency) value regulation loop is stopped (output is frozen at the actual value).			
If the generator frequency remains inside the window for the time longer than setpoint Dwell time (page 446) the controller will allow GCB closing.			
The controller calculates periodically so called preclosing angle (based on the actual value Slip frequency and CB closing delay given by the setpoint CB Latency).			
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).			



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Slip Freq Win / RPM window

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0.01 .. 0.50 [Hz]		
Default value	0.15	Force value	NO
Step	0.01		
Comm object	14799	Related applications	SPtM, SPI, MINT, COX, Combi

Description

1) Setpoint in standard applications

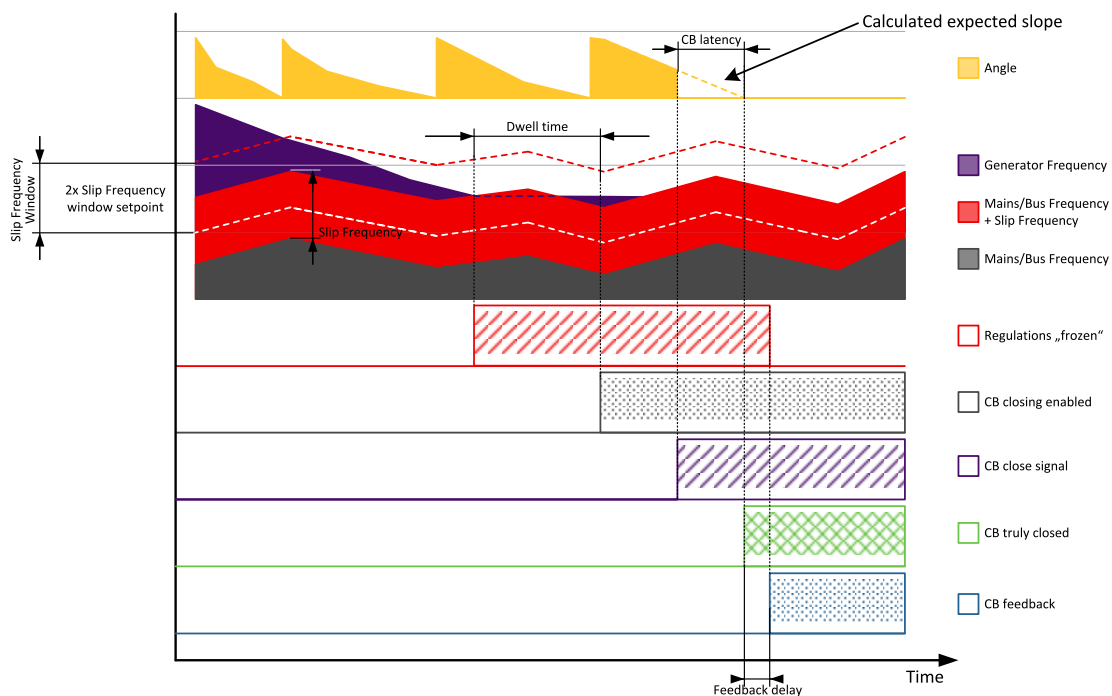
In standard applications, this setpoint has name **Slip Freq Win**.

Window of slip frequency for slip synchronization (**Sync type (page 453)** = Slip Synchro).

If the generator frequency goes out of the window (either because generator frequency changes or Mains/Bus frequency changes or setpoint SlipFreqWin changes) the controller will reactivate regulation loop and try to reach the target value again.

The sync timeout timer runs regardless of this.

If the generator frequency reaches the target frequency again the regulations are frozen and if the generator frequency remains in the window for the time longer than setpoint **Dwell time (page 446)** the controller will continue in the standard sequence as seen in the previous case.



2) Setpoint in Async applications

In Async applications, this setpoint has name **RPM window**.

This setpoint adjusts maximum absolute value of difference between actual engine speed and required engine speed to allow GCB closing.

When this setpoint is adjusted to 0.00 %, the GCB close command is disabled.

Note: The engine speed must get into 25 % of the *Slip Freq Win / RPM window* (page 455) and then stay in the *Slip Freq Win / RPM window* (page 455) at least for the time adjusted by the setpoint *Dwell time* (page 446).

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GCB Latency

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	20 .. 1000 [ms]		
Default value	80	Force value	NO
Step	1		
Comm object	14800	Related applications	SPtM, SPI, Combi

Description

Setpoint related for slip synchronization (**Sync type** (page 453) = Slip Synchro).

The controller calculates periodically so called preclosing angle (based on the actual value **Slip freq** (page 601) and GCB closing delay given by the setpoint GCB Latency).

When the preclosing angle is reached the controller issues GCB closing command.

The breaker will close and GCB feedback confirms that to the controller.

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MCB Latency

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	20 .. 1000 [ms]		
Default value	80	Force value	NO
Step	1		
Comm object	14801	Related applications	SPtM, SPI, Combi
Description			
Setpoint related for slip synchronization (Sync type (page 453) = Slip Synchro).			
The controller calculates periodically so called preclosing angle (based on the actual value Slip freq (page 601) and MCB closing delay given by the setpoint MCB Latency).			
When the preclosing angle is reached the controller issues MCB closing command.			
The breaker will close and MCB feedback confirms that to the controller.			

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ManualFuseSync

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	9906	Related applications	Combi
Description			
Select controlling of MCB output when reverse synchronization is in process.			
ENABLED: External device controls connecting of MCB. The unlimited timeout of synchronization can be reached Sync/Load ctrl: Sync timeout / RPM match TOut (page 452) = NO TIMEOUT.			
DISABLED: IntelliGen controls MCB output.			

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LS gain

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	NO
Step	0.1		
Comm object	8725	Related applications	MINT, COX, Combi
Description			
This setpoint adjusts the gain factor (P-factor) of the load-sharing PI loop. The integration factor (I-factor) for the load-sharing loop is adjusted by the setpoint LS int (page 458) .			
Note: See the chapter Regulation loops (page 101) for general information about regulation loops and their adjustment.			

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LS int

Setpoint group	Sync/Load ctrl	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	50	Force value	NO
Step	1		
Comm object	9035	Related applications	MINT, COX, Combi
Description			
This setpoint adjusts the relative integration factor (I-factor) of the load-sharing PI loop. The gain factor (P-factor) for the load-sharing loop is adjusted by the setpoint LS gain (page 457) .			

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Group: ActPwrRamps

Load Ramp

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. GCB open del (page 452) [s]		
Default value	5	Force value	YES
Step	1		
Comm object	8658	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
All changes of requested Gen-set load (except in loadsharing mode) are not made as one step, but are ramped – i.e. the requested load is changing slowly with the rate adjusted by this setpoint. The rate is adjusted in seconds for 100 % load change (from 0 to 100% of nominal power). The ramp takes place in following situations:			
<ul style="list-style-type: none"> ➤ The Gen-set has been just synchronized and is ramping up to the target load level (e.g. baseload in parallel to mains operation or average Gen-set load in multiple loadsharing operation). The starting point of the ramp for this case is adjustable by the setpoint RampStartLevel (page 451). ➤ The Gen-set is running parallel to the mains and baseload is changed. ➤ The Gen-set is being unloaded before opening the GCB and stop. In this case the end load level is adjusted by setpoint GCB open level (page 452) and the timeout for unloading is adjusted by setpoint GCB open del (page 452). ➤ Always, when the RampEventType Load ramp is used 			

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MainsFrqRisePr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	3	Force value	NO
Step	1		
Comm object	14488	Related applications	SPtM, SPI
Description			
Event is activated in case the mains frequency is increasing in ranges 50.2 → 52.5 Hz or from 47.5 →			

49.8 Hz.

Because more Events can occur at the same time, there is setpoint for definition of the priority.

Higher number means lower priority.

LBO MAINSFRQRISE (PAGE 788) is active.

If now described event occurs, then is always active.

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MainsFrqFallPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	4	Force value	NO
Step	1		
Comm object	14489	Related applications	SPtM, SPI, Combi
Description			
Event is activated in case the mains frequency has falling tendency in ranges 52.5 Hz → 50.2 Hz or from 49.8 → 47.5 Hz.			
Because more Events can occur at the same time, there is setpoint for definition of the priority.			
Higher number means lower priority.			
LBO MAINSFRQFALL (PAGE 787) is active.			
If now described event occurs, then is always active.			

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LoadReductPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	2	Force value	NO
Step	1		
Comm object	14490	Related applications	SPtM, SPI, Combi
Description			
Event means situation when the load is reduced due to activation of LBI LOADREDUCT 1 (PAGE 723) or LAI LOAD REDUCTION (PAGE 885).			
Because more Events can occur at the same time, there is setpoint for definition of the priority.			
Higher number means lower priority.			
LBO LOADREDUCT (PAGE 785) is active.			
If now described event occurs, then is always active.			

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MainsTripPerPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	6	Force value	NO

Step	1		
Comm object	14491	Related applications	SPtM, SPI
Description			
Event means situation within period of time MainsTripPerT (page 480) after Mains Trip due to Mains Protection.			
Because more Events can occur at the same time, there is setpoint for definition of the priority.			
Higher number means lower priority.			
LBO MAINSTRIPPER (PAGE 788) is active.			
If now described event occurs, then is always active.			

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PforQPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	5	Force value	NO
Step	1		
Comm object	14492	Related applications	SPtM, SPI, Combi
Description			
Event is activated in case the active power P has to be reduced to reach required Q.			
Because more Events can occur at the same time, there is setpoint for definition of the priority.			
Higher number means lower priority.			
LBO PFORQ (PAGE 829) is active.			
If now described event occurs, then is always active.			

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SoftUnloadPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	1	Force value	NO
Step	1		
Comm object	14493	Related applications	SPtM, SPI, Combi
Description			
Event means situation when the standard soft unload mode is active.			
Because more Events can occur at the same time, there is setpoint for definition of the priority.			
Higher number means lower priority.			
LBO SOFT UNLD (PAGE 842) is active.			
If now described event occurs, then is always active.			

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PwrReductAPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
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Range [units]	1 .. 254; OFF [-]		
Default value	7	Force value	NO
Step	1		
Comm object	14503	Related applications	SPtM, SPI, Combi
Description			
<p>Event means situation when power reduction A is active.</p> <p>Because more Events can occur at the same time, there is setpoint for definition of the priority.</p> <p>Higher number means lower priority.</p> <p>LBO PWRREDUCTACTA (PAGE 834) is active.</p> <p>If now described event occurs, then is always active.</p>			

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PwrReductBPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	8	Force value	NO
Step	1		
Comm object	5152	Related applications	SPtM, SPI, Combi
Description			
<p>Event means situation when power reduction B is active.</p> <p>Because more Events can occur at the same time, there is setpoint for definition of the priority.</p> <p>Higher number means lower priority.</p> <p>LBO PWRREDUCTACTB (PAGE 834) is active.</p> <p>If now described event occurs, then is always active.</p>			

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PwrReductCPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	9	Force value	NO
Step	1		
Comm object	15153	Related applications	SPtM, SPI, Combi
Description			
<p>Event means situation when power reduction C is active.</p> <p>Because more Events can occur at the same time, there is setpoint for definition of the priority.</p> <p>Higher number means lower priority.</p> <p>LBO PWRREDUCTACTC (PAGE 835) is active.</p> <p>If now described event occurs, then is always active.</p>			

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PostVRTPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	2	Force value	NO
Step	1		
Comm object	15656	Related applications	SPtM, SPI, Combi
Description			
<p>Event means situation after VRT (voltage right through). In case the LVRT or OVRT is active, it is very usual that the generator current is higher then Nominal current. The active power has to be reduced till the actual generator current is equal to Nominal current.</p> <p>Because more Events can occur at the same time, there is setpoint for definition of the priority.</p> <p>Higher number means lower priority.</p> <p>LBO PostVRT (PAGE 830) is active.</p> <p>If now described event occurs, then is always active.</p>			

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RetOvUnFreq

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16494	Related applications	SPtM, SPI, Combi
Description			
<p>Event is activated when there was a situation of over or under frequency and now is the mains frequency back in the safety range 49.8 .. 50.2 Hz. In this situation is counted internal timer for the time RetOvUnFreqT (page 469). Any power change is possible with ramp given by this event.</p> <p>With this setpoint you can change which type of ramp is activated in above mentioned situation.</p> <p>LBO RETOVUNFREQ (PAGE 840) is active.</p> <p>If now described event occurs, than is always active.</p>			

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RetOvUnFreqPr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	2	Force value	NO
Step	1		
Comm object	16187	Related applications	SPtM, SPI
Description			
<p>Event is active for the time RetOvUnFreqT (page 469) in following situations:</p> <ul style="list-style-type: none"> ➤ when Mains Frequency goes from Underfrequency and across >49.8 Hz ➤ when Mains Frequency goes from Overfrequency and across <50.2 Hz 			

Because more Events can occur at the same time, there is setpoint for definition of the priority.
Higher number means lower priority.
LBO RETOVUNFREQ (PAGE 840) is active.
If now described event occurs, than is always active.

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P(Um)Pr

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	1 .. 254; OFF [-]		
Default value	11	Force value	NO
Step	1		
Comm object	16565	Related applications	SPtM, SPI, Combi
Description			
Event is activated in case the active power P has to be reduced based on actual mains voltage. Because more Events can occur at the same time, there is setpoint for definition of the priority. Higher number means lower priority. LBO P(UM) (PAGE 833) is active. If now described event occurs, than is always active.			

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MainsFrqRise

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16484	Related applications	SPtM, SPI, Combi
Description			
Event is activated in case the mains frequency is increasing in ranges 50.2 → 52.5 Hz or from 47.5 → 49.8 Hz. With this setpoint you can change which ramp will be activated in above mentioned situation. LBO MAINSFRQRISE (PAGE 788) is active. If now described event occurs, then is always active.			

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MainsFrqFall

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16485	Related applications	SPtM, SPI, Combi
Description			

Event is activated in case the mains frequency has falling tendency in ranges 52.5 Hz → 50.2 Hz or from 49.8 → 47.5 Hz.

With this setpoint you can change the which ramp will be activated in above mentioned situation.

LBO MAINSFRQFALL (PAGE 787) is active.

If now described event occurs, then is always active.

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LoadReduct

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	5	Force value	YES
Step	1		
Comm object	16486	Related applications	SPtM, SPI, Combi
Description			
Event means situation when the load is reduced due to activation of LBI LOADREDUCT 1 (PAGE 723) or LAI LOAD REDUCTION (PAGE 885).			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO LOADREDUCT (PAGE 785) is active.			
If now described event occurs, then is always active.			
For activation binary or analog load reduction must be simultaneously activated LBI LOAD REDUCTION (PAGE 721).			

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MainsTripPer

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	600	Force value	YES
Step	1		
Comm object	16487	Related applications	SPtM, SPI, Combi
Description			
Event means situation within period of time MainsTripPerT (page 480) after Mains Trip due to Mains Protection.			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO MAINSTRIPPER (PAGE 788) is active.			
If now described event occurs, then is always active.			

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PforQ

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES

Step	1		
Comm object	16488	Related applications	SPtM, SPI, Combi
Description			
Event is activated in case the active power P has to be reduced to reach required Q.			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO PFORQ (PAGE 829) is active.			
If now described event occurs, than is always active.			

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SoftUnload

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16489	Related applications	SPtM, SPI, Combi
Description			
Event means situation when the standard soft unload mode is active.			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO SOFT UNLD (PAGE 842) is active.			
If now described event occurs, then is always active.			

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PwrReductA

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16490	Related applications	SPtM, SPI, Combi
Description			
Event means situation when power reduction A is active.			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO PWRREDUCTACTA (PAGE 834) is active.			
If now described event occurs, then is always active.			

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PwrReductB

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16491	Related applications	SPtM, SPI, Combi

Description

Event means situation when power reduction B is active.

With this setpoint you can change the which ramp will be activated in above mentioned situation.

LBO **PWRREDUCTACTB** (PAGE 834) is active.

If now described event occurs, then is always active.

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PwrReductC

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16492	Related applications	SPtM, SPI, Combi
Description			
Event means situation when power reduction C is active.			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO PWRREDUCTACTC (PAGE 835) is active.			
If now described event occurs, then is always active.			

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PostVRT

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16493	Related applications	SPtM, SPI, Combi
Description			
Event is activated after VRT situation, when the voltage is still not in the range $\pm 10\%$ around nominal. In this case could be increased the current over the nominal value and it can lead to opening the breaker. To prevent this, the active power has to be reduced according to nominal current.			
With this setpoint you can change the which ramp will be activated in above mentioned situation.			
LBO PostVRT (PAGE 830) is active.			
If now described event occurs, then is always active.			

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P(Um)

Setpoint group	ActPwrRamps	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	16635	Related applications	SPtM, SPI, Combi

Description

Event is activated in case the active power P has to be reduced based on actual mains voltage.
With this setpoint you can change the which ramp will be activated in above mentioned situation.
LBO P(UM) (PAGE 833) is active.
If now described event occurs, than is always active.

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Group: Grid Codes

GridCodesTest

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	NOTEST, TEST [-]		
Default value	NOTEST	Force value	NO
Step	-		
Comm object	14129	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates simulation mode for following functions: PWROVRF, PforQ Function can be activated only in OFF mode and when the engine is stopped. Alarm message Wrn TestPQF is initialized. When you start (in MAN or AUT mode), can you provide the simulation. After stopping the engine the simulation mode is automatically deactivated (Setpoint is switched to NOTEST, alarm message deactivated) If you want to simulate mains frequency for function PWROVRF, there is LAI: TESTF (PAGE 896) . This LAI can be configured to PLC output or to analog input. If you want to simulate PforQ function, there are two LAI: TESTP (PAGE 896) and TESTQ (PAGE 896) . These LAI can be configured to PLC output or to analog input.			

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LoadReduct1

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	NO
Step	0.1		
Comm object	16132	Related applications	SPtM, SPI
Description			
Setpoint defines the value of power reduction in case the LBI: LOADREDUCT 1 (PAGE 723) is activated. In case more LBI's is active at once, the lowest value (biggest reduction) will win. The LBI: LOAD REDUCTION (PAGE 721) must be activated to generally enable the load reduction.			

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LoadReduct2

Setpoint group	Grid Codes	Related FW	2.2.0
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Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	60.0	Force value	NO
Step	0.1		
Comm object	16133	Related applications	SPtM, SPI
Description			
Setpoint defines the value of power reduction in case the LBI: LOADREDUCT 2 (PAGE 723) is activated. In case more LBI's is active at once, the lowest value (biggest reduction) will win.			
The LBI: LOAD REDUCTION (PAGE 721) must be activated to generally enable the load reduction.			

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LoadReduct3

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	30.0	Force value	YES
Step	0.1		
Comm object	16134	Related applications	SPtM, SPI
Description			
Setpoint defines the value of power reduction in case the LBI: LOADREDUCT 3 (PAGE 724) is activated. In case more LBI's is active at once, the lowest value (biggest reduction) will win.			
The LBI: LOAD REDUCTION (PAGE 721) must be activated to generally enable the load reduction.			

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LoadReduct4

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	5.0	Force value	YES
Step	0.1		
Comm object	16135	Related applications	SPtM, SPI, Combi
Description			
Setpoint defines the value of power reduction in case the LBI: LOADREDUCT 4 (PAGE 724) is activated. In case more LBI's is active at once, the lowest value (biggest reduction) will win.			
The LBI: LOAD REDUCTION (PAGE 721) must be activated to generally enable the load reduction.			

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PwrOvUnFreq

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	ENABLE / DISABLE [-]		
Default value	DISABLE	Force value	NO
Step	-		
Comm object	16631	Related applications	SPtM, SPI, Combi
Description			

This setpoint enables/disables the function "Control of active power based on over or under frequency". If the setpoint is switched to DISABLED the over or under frequency function is not evaluated and no responsible event or alarm will be active.

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PwrFreqDel

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	OFF; 0.1 .. 2.0 [s]		
Default value	0.2	Force value	YES
Step	0.1		
Comm object	9661	Related applications	SPtM, SPI, Combi
Description			
The setpoint adjusts the delay of PWROVRFREQ or PWRUNDRFREQ function.			
Note: PWROVRFREQ and PWRUNDRFREQ function is set up as user curve in GenConfig			

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RetOvUnFreqT

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 3600 [s]		
Default value	600	Force value	NO
Step	1		
Comm object	16186	Related applications	SPtM, SPI, Combi
Description			
This setpoint defines the length of event after return from over or under frequency.			

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RetOvUnFreqDel

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	0	Force value	NO
Step	1		
Comm object	16886	Related applications	SPtM, SPI, Combi
Description			
This setpoint defines the delay of event after return from over or under frequency. After this delay will firstly activated the Event RetOvUnFreq, until that is not allowed increase or decrease the power. Only in case there is another active event.			

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Q&U Protection

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		

Default value	DISABLED	Force value	NO
Step	-		
Comm object	14519	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates or deactivates Q for U protection.			
Note: See also setpoints Q&U < V (page 470), Q&U < Q (page 470)			

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Q&U Prot Del

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 600.00 [s]		
Default value	0.40	Force value	YES
Step	0.01		
Comm object	16078	Related applications	SPtM, SPI, Combi
Description			
In case the conditions Q&U < V and Q&U < Q are fulfilled timer adjusted by this timer is activated.			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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Q&U < V

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	75.0	Force value	YES
Step	0.1		
Comm object	14137	Related applications	SPtM, SPI, Combi
Description			
If the Mains Voltage in all phases is under value written in this setpoint and at the same time is Q on mains site lower than value in setpoint Q&U < Q (page 470), than is activated Q&U mains protection			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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Q&U < Q

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 32000 (this depends on selected Power formats (page 165))		
Default value	0	Force value	YES

Step	(this depends on selected Power formats (page 165))		
Comm object	14139	Related applications	SPtM, SPI, Combi
Description			
If the Mains Voltage in all phases is under value in setpoint Q&U < V (page 470) and at the same time is Q on mains site lower than value in this setpoint, than is mains protection Q&U activated			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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Q&U Prot CBsel

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	GCB / MCB [-]		
Default value	GCB	Force value	YES
Step	[-]		
Comm object	16079	Related applications	SPtM, SPI, Combi
Description			
In SPtM application is possible to chose type of breaker which should be open in case the Q&U protection is active. For other applications is automatically opened GCB breaker.			
Note: The associated protection to this setpoint is Mains protect type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of Mains protect type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).			

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DynamicSupport

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	14136	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates or deactivates the Dynamic Network Support function defined via user curve LVRT (1/2/3 phase) or OVRT in GenConfig. The protection type is selected by the setpoint DynSupProtType (page 471) .			

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DynSupProtType

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	NO PROTECTION / HIST RECORD / WARNING / MAINSPROTECT [-]		

Default value	Mains protect	Force value	YES
Step	-		
Comm object	16559	Related applications	SPtM, SPI, Combi
Description			
Type of protection in case the Dynamic Support is ENABLED and there are fulfilled conditions for releasing the LVRT or OVRT.			
The selected alarm type is written to the history as a prefix in the alarm name, so possible alarms are:			
<ul style="list-style-type: none"> > Hst VRT Trip > Wrn VRT Trip > MP VRT Trip. 			

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DynSupPF/Qctrl

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	ACTIVE / STOPPED [-]		
Default value	ACTIVE	Force value	YES
Step	-		
Comm object	16569	Related applications	SPtM, SPI, Combi
Description			
This setpoint determines whether the PF/Q regulation should be active (ACTIVE) or not (STOPPED) when LVRT / OVRT protection is activated.			

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Q Ramp

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	1 .. 60 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	16151	Related applications	SPtM, SPI, Combi
Description			
Setpoint defines the length of the ramp from actual value to 95 % of the new request value. The ramp is active in case the Q DeadBand limit is crossed.			

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P Ramp Filter

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	ENABLE / DISABLE [-]		
Default value	DISABLE	Force value	YES
Step	-		
Comm object	16634	Related applications	SPtM, SPI, Combi
Description			

Setpoint switch the possibility that the power ramp (Slow load ramp or Load ramp or Fast load ramp) will be provided according standard linear ramp (DISABLE) or PT1 Filter ramp (ENABLE).

In case the setpoint is set to ENABLE and the time set on the ramps means, that in this time will the power reach 95% of his requested value.

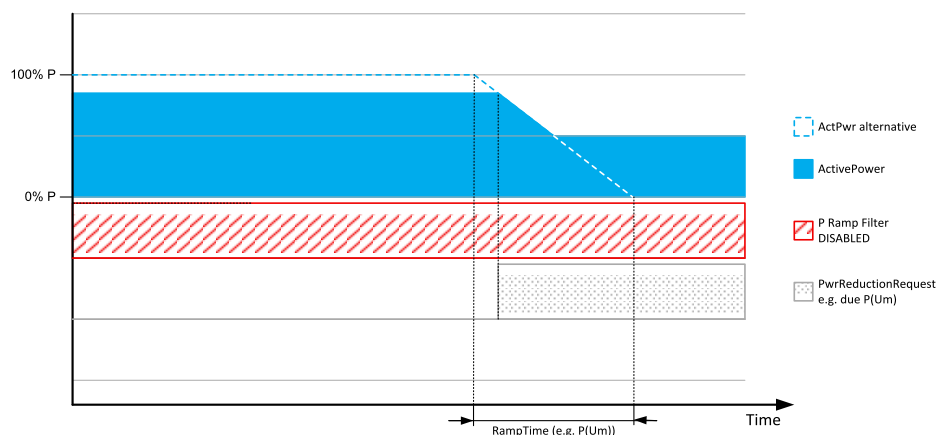


Image 9.11 Behavior in case the Ramp Filter is disabled and the power reduction is according the standard ramp

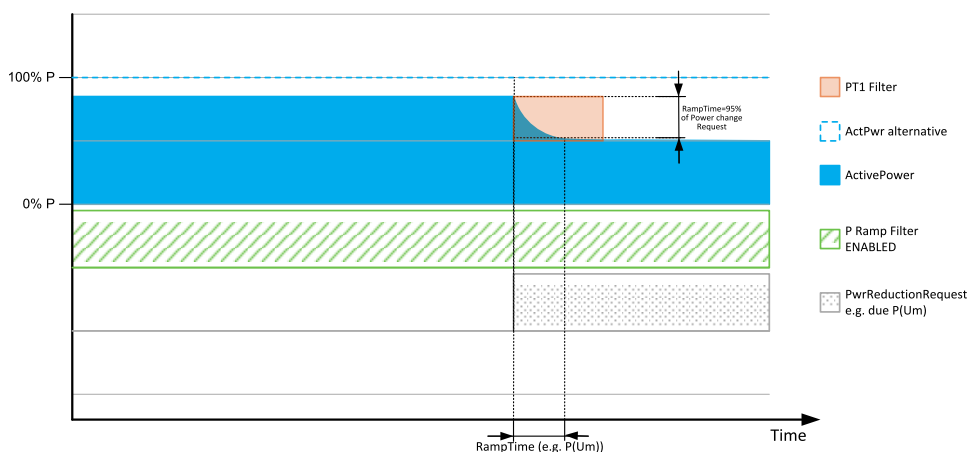


Image 9.12 Behavior in case the Ramp Filter is enabled and the power reduction is according the filtered PT1 ramp which is placed on the actual power change request

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Q DeadBand

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	2.0	Force value	YES
Step	0.1		
Comm object	16150	Related applications	SPtM, SPI, Combi
Description			
In case the request value of Q cross the limit defined by this setpoint the Q ramp is activated.			

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Q(Um)DeadBand

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	YES
Step	0.1		
Comm object	14127	Related applications	SPtM, SPI, Combi
Description			
In case the voltage cross the limit of this dead band parameter, is calculated the new value of requested Q according to adjusted curve.			
Note: this is dead band only in case the voltage moves, in case the Q0UmRef value changes this dead band is not evaluated.			

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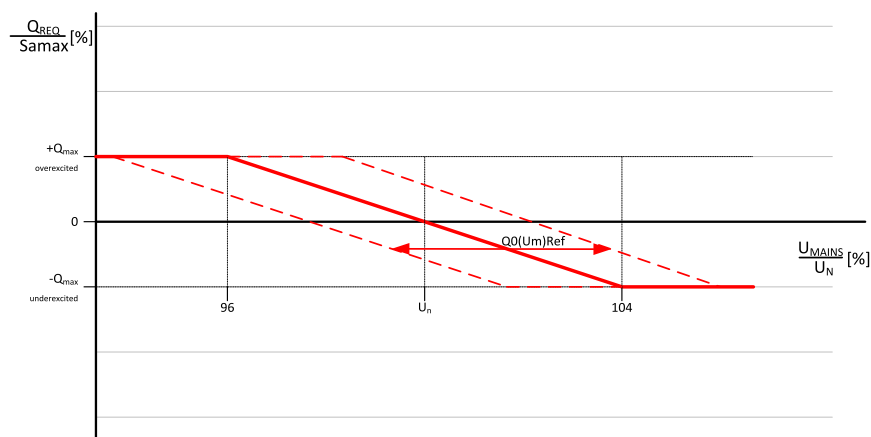
Q(P)DeadBand

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	YES
Step	0.1		
Comm object	16126	Related applications	SPtM, SPI, Combi
Description			
In case the power change cross the limit of this dead band parameter, is calculated the new value of requested Q according to adjusted curve.			

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Q0(Um)ref

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	75 .. 125 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	16125	Related applications	SPtM, SPI, Combi
Description			
Offset for reference point of mains voltage when Q=0. This parameter moves the adjusted curve. The gradient of the curve remains.			



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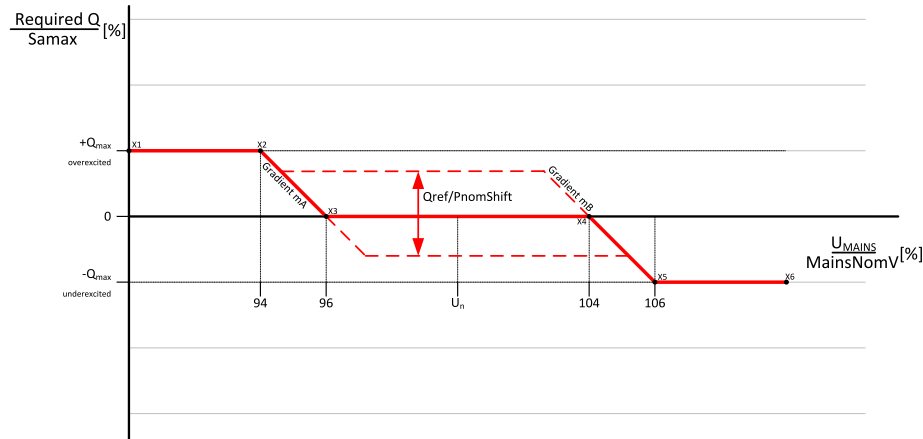
P(Um)Function

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	DISABLE / Pnom(Um)Enable / Pact(Um)Enable [-]		
Default value	DISABLE	Force value	YES
Step	-		
Comm object	16567	Related applications	SPtM, SPI, Combi
Description			
DISABLE	Function P(Um) is not evaluated, no LBO or events are activated.		
Pnom(Um)Enable	Function is evaluated according to adjusted App Curve P(Um), but the reduction is based on the Setpoint InstalledPower, the Value Pm is in that case not saved.		
Pact(Um)Enable	Function is evaluated according to adjusted App Curve P(Um), but the reduction is based on the actual power.		

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Qref/PnomShift

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	-33 .. 33 [%]		
Default value	0	Force value	YES
Step	1		
Comm object	16128	Related applications	SPtM, SPI, Combi
Description			
Offset for the curve Qref/Ulim. This offset moves on the Y axe the part of the curve between points 3-4. If there is any non zero value is calculated related X coordinate according to given formula with known Y points and known gradient.			



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QrefUlimDdBand

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.0 .. 5.0 [%]		
Default value	0.0	Force value	YES
Step	0.1		
Comm object	16129	Related applications	SPtM, SPI, Combi
Description			
In case the voltage cross the limit of this dead band parameter, is calculated the new value of requested Q according to adjusted curve.			
Note: this is dead band only in case the voltage moves, in case the QrefPnom value changes this dead band is not evaluated.			

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PforQ limit

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	14481	Related applications	SPtM, SPI, Combi
Description			
When is setpoint ENABLED, than you can use PforQ functions in all modes which are possible to chose in PF/Qctrl PtM (page 328)			
PforQ function is used in case you need to reach required Q and from this reason you have to derate the actual power of Gen-set. This dependence is also called as working area of the generator and generator manufacturer has to be able define it.			
Adjusting of working area (PforQ) curve is possible via user sensor curve in GenConfig. There are to different curves:			
➤ CapabilityQL is part for overexcited mode			

➤ CapabilityQC is part for underexcited mode

Create every user curve is possible.

Note: For PforQ setting see *PforQDeadBand* (page 477)

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PforQDeadBand

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 130 [%]		
Default value	1	Force value	YES
Step	1		
Comm object	14486	Related applications	SPtM, SPI, Combi
Description			
Dead band preventing oscillation of actual power P.			

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Mains/MP Sync

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	ENABLED/DISABLED [-]		
Default value	DISABLED	Force value	YES
Step	-		
Comm object	16636	Related applications	SPtM, SPI, Combi
Description			
This setpoint activates/deactivates the evaluation of mains connection requirements for synchronization to mains.			
In case the setpoint is set to DISABLED, all evaluations, values, logical binary outputs and alarms related to this function are disabled.			

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MainsSyncVMax

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	MainsSyncVMin (page 477) .. 130 [%]		
Default value	110	Force value	YES
Step	1		
Comm object	13012	Related applications	SPtM, SPI, Combi
Description			
Overvoltage value which disables synchronization to mains. In case this value is crossed, the synchronization is disabled, active synchronization is interrupted.			

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MainsSyncVMin

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	10 .. MainsSyncVMax (page 477) [%]		

Default value	90	Force value	NO
Step	1		
Comm object	13013	Related applications	SPtM, SPI, Combi
Description			
Undervoltage value which disables synchronization to mains. In case this value is crossed, the synchronization is disabled, active synchronization is interrupted.			

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MainsSyncFMax

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.00 .. 2.00 [Hz]		
Default value	0.20	Force value	YES
Step	0.01		
Comm object	13014	Related applications	SPtM, SPI, Combi
Description			
Overfrequency value which disables synchronization to mains. In case this value is crossed, the synchronization is disabled, active synchronization is interrupted.			

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MainsSyncFMin

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	-2.50 .. 00 [Hz]		
Default value	-2.50	Force value	YES
Step	0.01		
Comm object	14586	Related applications	SPtM, SPI, Combi
Description			
Underfrequency value which disables synchronization to mains. In case this value is crossed, the synchronization is disabled, active synchronization is interrupted.			

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MainsSyncDel

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	60	Force value	YES
Step	1		
Comm object	13017	Related applications	SPtM, SPI, Combi
Description			
This delay is the minimum time the mains voltage and frequency must stay in limits to allow synchronization (and also engine start in AUT and SEM mode). The limits for mains values are given by the setpoints MainsSyncVMax (page 477), MainsSyncVMin (page 477), MainsSyncFMax (page 478) and MainsSyncFMin (page 478).			

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MP SyncVMax

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	MP SyncVMin (page 479) .. 130 [%]		
Default value	110	Force value	YES
Step	1		
Comm object	16393	Related applications	SPtM, SPI, Combi
Description			
When the mains voltage is recovered after mains failure the timer MP SyncDel (page 480) is counted down and alarm message "SyncNotAllowed" is present in alarm list. Voltage must be during this time in limit adjusted by this setpoint. In case the value cross this limit, the counting is interrupted until the value is back in limit. Once the value is in limit the timer MP SyncDel (page 480) counts again from beginning.			

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MP SyncVMin

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	10 .. MP SyncVMax (page 479) [%]		
Default value	95	Force value	YES
Step	1		
Comm object	16394	Related applications	SPtM, SPI, Combi
Description			
When the mains voltage is recovered after mains failure the timer MP SyncDel (page 480) is counted down and alarm message "SyncNotAllowed" is present in alarm list. Voltage must be during this time in limit adjusted by this setpoint. In case the value cross this limit, the counting is interrupted until the value is back in limit. Once the value is in limit the timer MP SyncDel (page 480) counts again from beginning.			

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MP SyncFMax

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0.00 .. 2.00 [Hz]		
Default value	0.01	Force value	YES
Step	0.01		
Comm object	16395	Related applications	SPtM, SPI, Combi
Description			
When the mains voltage is recovered after mains failure the timer MP SyncDel (page 480) is counted down and alarm message "SyncNotAllowed" is present in alarm list. Frequency must be during this time in limit adjusted by this setpoint. In case the value cross this limit, the counting is interrupted until the value is back in limit. Once the value is in limit the timer MP SyncDel (page 480) counts again from beginning.			

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MP SyncFMin

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	-2.50 .. 0.00 [Hz]		
Default value	-0.10	Force value	YES

Step	0.01		
Comm object	16396	Related applications	SPtM, SPI, Combi
Description			
When the mains voltage is recovered after mains failure the timer MP SyncDel (page 480) is counted down and alarm message "SyncNotAllowed" is present in alarm list. Frequency must be during this time in limit adjusted by this setpoint. In case the value cross this limit, the counting is interrupted until the value is back in limit. Once the value is in limit the timer MP SyncDel (page 480) counts again from beginning.			

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MP SyncDel

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	600	Force value	YES
Step	1		
Comm object	16397	Related applications	SPtM, SPI, Combi
Description			
This delay is the minimum time the mains voltage and frequency must stay in limits to allow synchronization after mains failure. The limits for mains values are given by the setpoints MP SyncVMax (page 479) , MP SyncVMin (page 479) , MP SyncFMax (page 479) and MP SyncFMin (page 479) .			

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MainsTripPerT

Setpoint group	Grid Codes	Related FW	2.2.0
Range [units]	0 .. 1800 [s]		
Default value	1200	Force value	YES
Step	1		
Comm object	14601	Related applications	SPtM, SPI, Combi
Description			
This is time period after trip due to mains protection. The loading ramp is activated according to settings of setpoint RampEvtType4 .			

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Group: Power reduction

PwrReduction1A

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15128	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to define the reduction of actual power based on the actual Value of related LAI:			

PWRREDUCTIONA (PAGE 891).

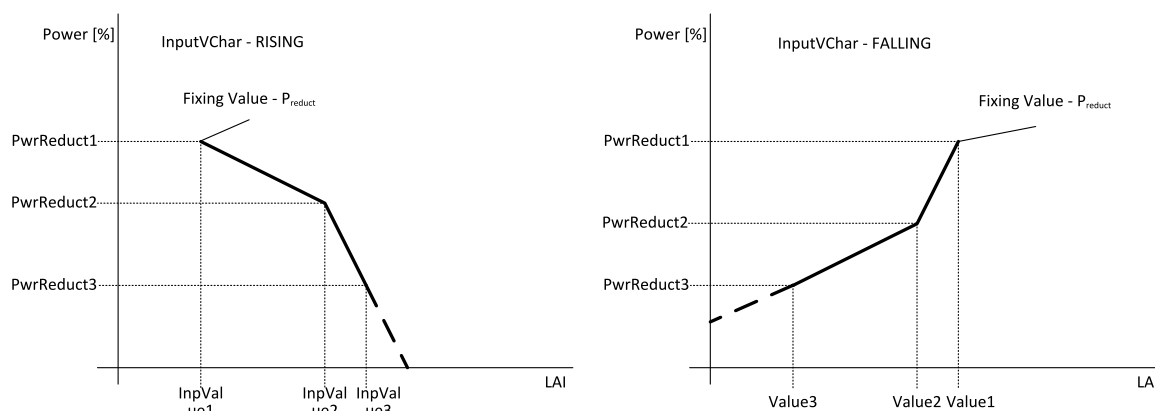
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A** (page 480), **PwrReduction2A** (page 482), **PwrReduction1A** (page 480)) and on the other side InputValueX (e.g. **InputValue1A** (page 481), **InputValue2A** (page 483), **InputValue3A** (page 484)) which is value of LAI: **PWRREDUCTIONA** (PAGE 891).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA** (PAGE 891) or on the FALLING value of LAI: **PWRREDUCTIONA** (PAGE 891).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA** (page 485).



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InputValue1A

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15131	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONA** (PAGE 891).

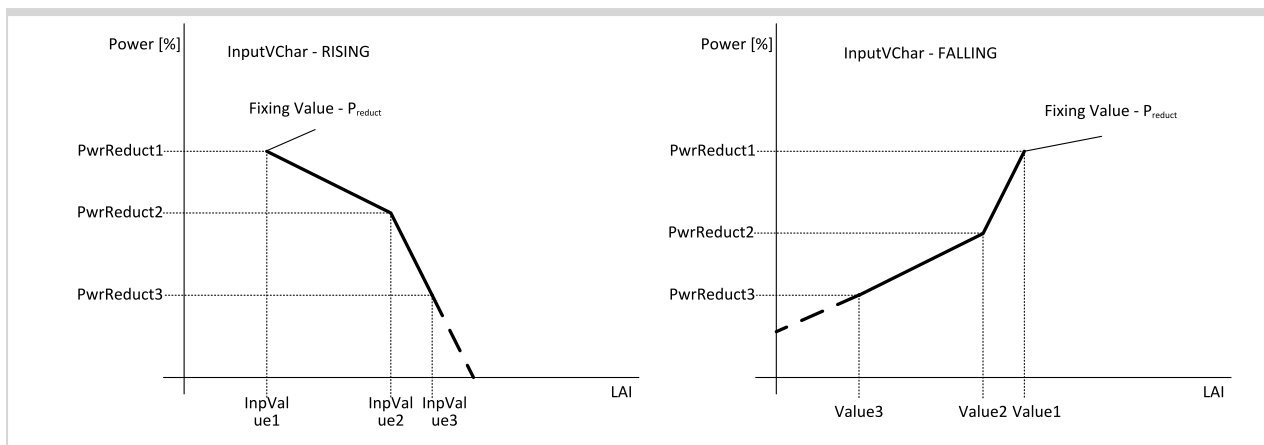
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A** (page 480), **PwrReduction2A** (page 482), **InputValue1A** (page 481)) and on the other side InputValueX (e.g. **InputValue1A** (page 481), **InputValue2A** (page 483), **InputValue3A** (page 484)) which is value of LAI: **PWRREDUCTIONA** (PAGE 891).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA** (PAGE 891) or on the FALLING value of LAI: **PWRREDUCTIONA** (PAGE 891).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA** (page 485).



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PwrReduction2A

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15129	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONA (PAGE 891)**.

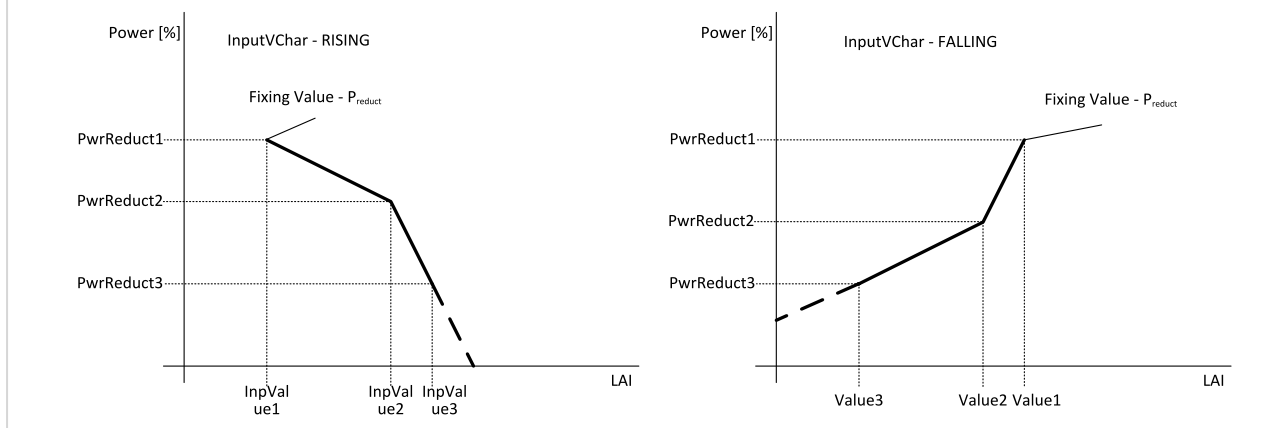
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A (page 480)**, **PwrReduction2A (page 482)**, **PwrReduction3A (page 484)**) and on the other side InputValueX (e.g. **InputValue1A (page 481)**, **InputValue2A (page 483)**, **InputValue3A (page 484)**) which is value of LAI: **PWRREDUCTIONA (PAGE 891)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA (PAGE 891)** or on the FALLING value of LAI: **PWRREDUCTIONA (PAGE 891)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA (page 485)**.



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InputValue2A

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15132	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONA (PAGE 891)**.

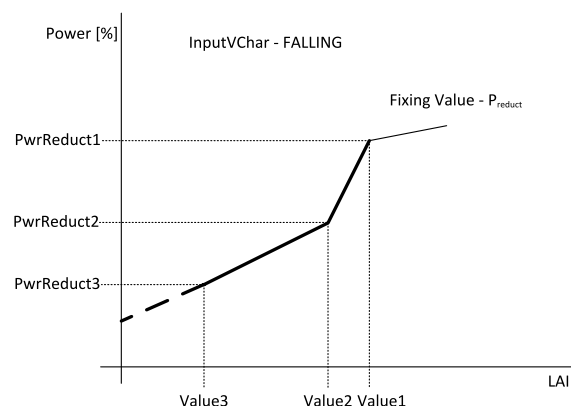
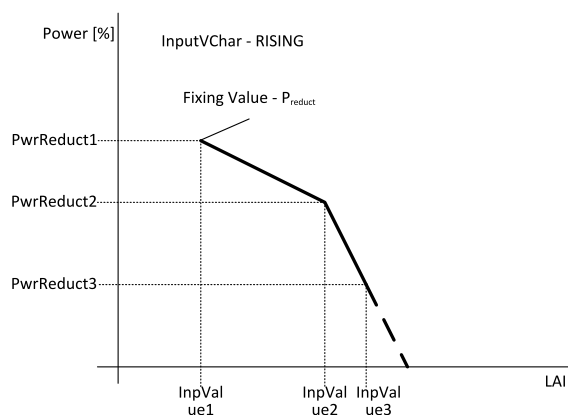
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A (page 480)**, **PwrReduction2A (page 482)**, **InputValue2A (page 483)**) and on the other side **InputValueX (e.g. InputValue1A (page 481)**, **InputValue2A (page 483)**, **InputValue3A (page 484)**) which is value of LAI: **PWRREDUCTIONA (PAGE 891)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA (PAGE 891)** or on the FALLING value of LAI: **PWRREDUCTIONA (PAGE 891)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA (page 485)**.



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PwrReduction3A

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15130	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONA (PAGE 891)**.

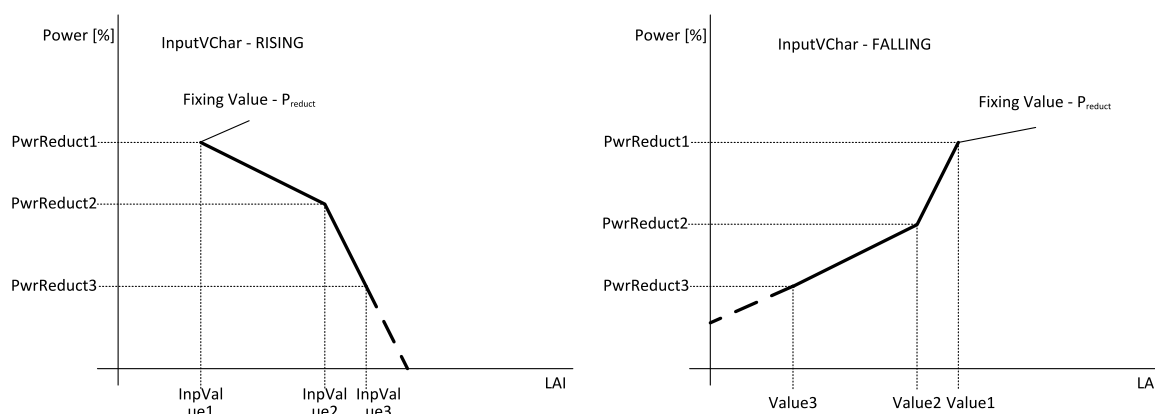
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A** (page 480), **PwrReduction2A** (page 482), **PwrReduction3A** (page 483)) and on the other side InputValueX (e.g. **InputValue1A** (page 481), **InputValue2A** (page 483), **InputValue3A** (page 484)) which is value of LAI: **PWRREDUCTIONA** (PAGE 891).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA** (PAGE 891) or on the FALLING value of LAI: **PWRREDUCTIONA** (PAGE 891).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA** (page 485).



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InputValue3A

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15133	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONA** (PAGE 891).

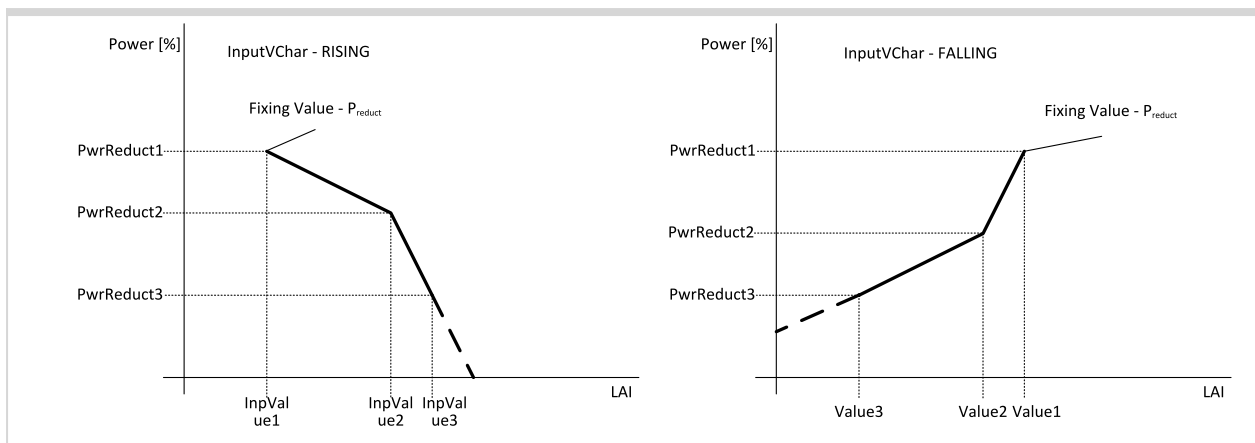
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A** (page 480), **PwrReduction2A** (page 482), **InputValue3A** (page 484)) and on the other side InputValueX (e.g. **InputValue1A** (page 481), **InputValue2A** (page 483), **InputValue3A** (page 484)) which is value of LAI: **PWRREDUCTIONA** (PAGE 891).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA** (PAGE 891) or on the FALLING value of LAI: **PWRREDUCTIONA** (PAGE 891).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA** (page 485).



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InputValueChA

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	RISING / FALLING [-]		
Default value	RISING	Force value	NO
Step	-		
Comm object	15134	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONA (PAGE 891)**.

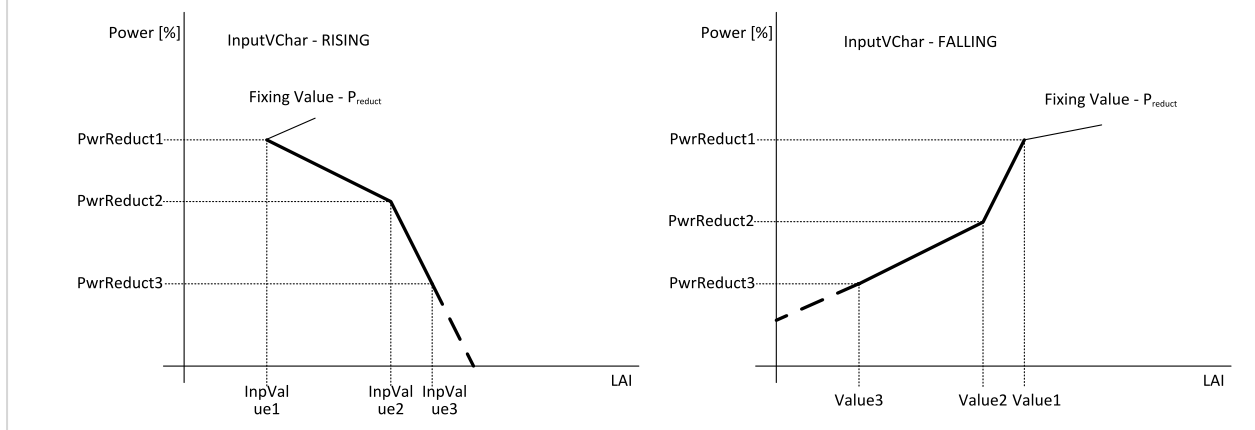
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1A (page 480)**, **PwrReduction2A (page 482)**, **InputValueChA (page 485)**) and on the other side InputValueX (e.g. **InputValue1A (page 481)**, **InputValue2A (page 483)**, **InputValue3A (page 484)**) which is value of LAI: **PWRREDUCTIONA (PAGE 891)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONA (PAGE 891)** or on the FALLING value of LAI: **PWRREDUCTIONA (PAGE 891)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChA (page 485)**.



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PwrReductBaseA

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	ACTIVE PWR / INSTALLED PWR [-]		
Default value	ACTIVE PWR	Force value	NO
Step	-		
Comm object	17504	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to define whether the Power Reduction A should be based from Act power (page 592) or from InstalledPower (page 346).			

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PwrReduction1B

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15136	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB** (PAGE 892).

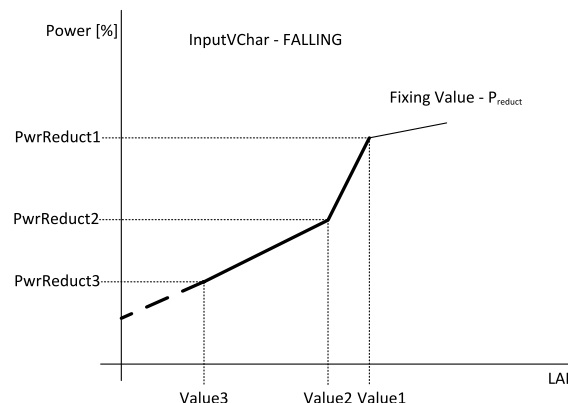
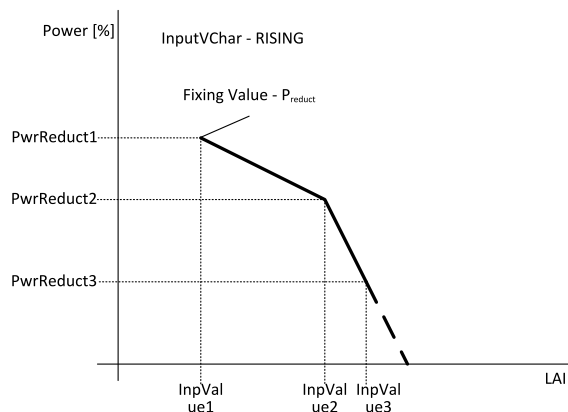
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B** (page 486), **PwrReduction2B** (page 487), **PwrReduction1B** (page 486)) and on the other side InputValueX (e.g. **InputValue1B** (page 487), **InputValue2B** (page 488), **InputValue3B** (page 490)) which is value of LAI: **PWRREDUCTIONB** (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB** (PAGE 892) or on the FALLING value of LAI: **PWRREDUCTIONB** (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB** (page 490).



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InputValue1B

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15139	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB (PAGE 892)**.

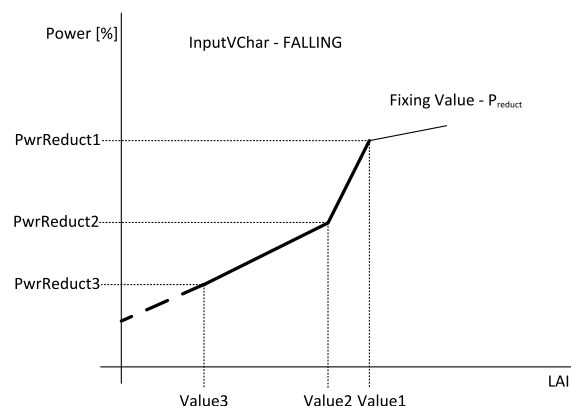
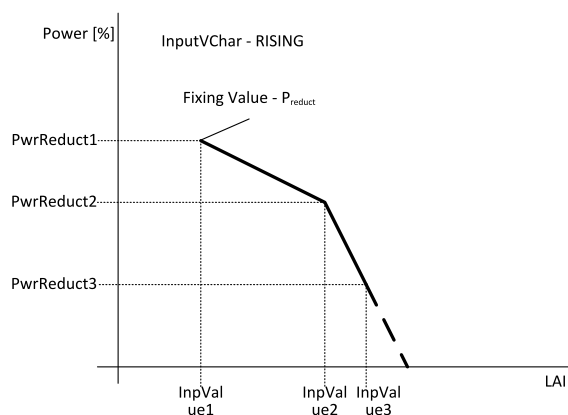
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B (page 486)**, **PwrReduction2B (page 487)**, **InputValue1B (page 487)**) and on the other side **InputValueX (e.g. InputValue1B (page 487)**, **InputValue2B (page 488)**, **InputValue3B (page 490)**) which is value of LAI: **PWRREDUCTIONB (PAGE 892)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB (PAGE 892)** or on the FALLING value of LAI: **PWRREDUCTIONB (PAGE 892)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB (page 490)**.



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PwrReduction2B

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15137	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB (PAGE 892)**.

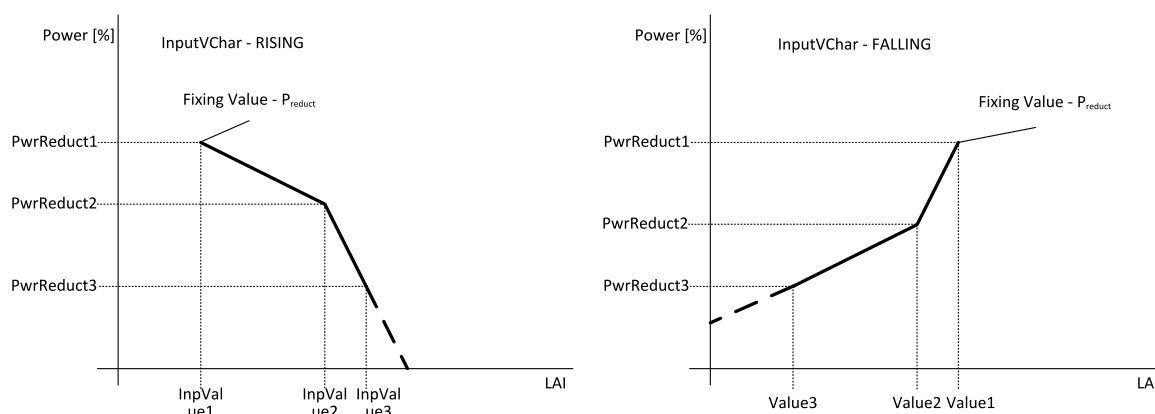
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B** (page 486), **PwrReduction2B** (page 487), **PwrReduction2B** (page 487)) and on the other side InputValueX (e.g. **InputValue1B** (page 487), **InputValue2B** (page 488), **InputValue3B** (page 490)) which is value of LAI: **PWRREDUCTIONB** (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB** (PAGE 892) or on the FALLING value of LAI: **PWRREDUCTIONB** (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB** (page 490).



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InputValue2B

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15140	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB** (PAGE 892).

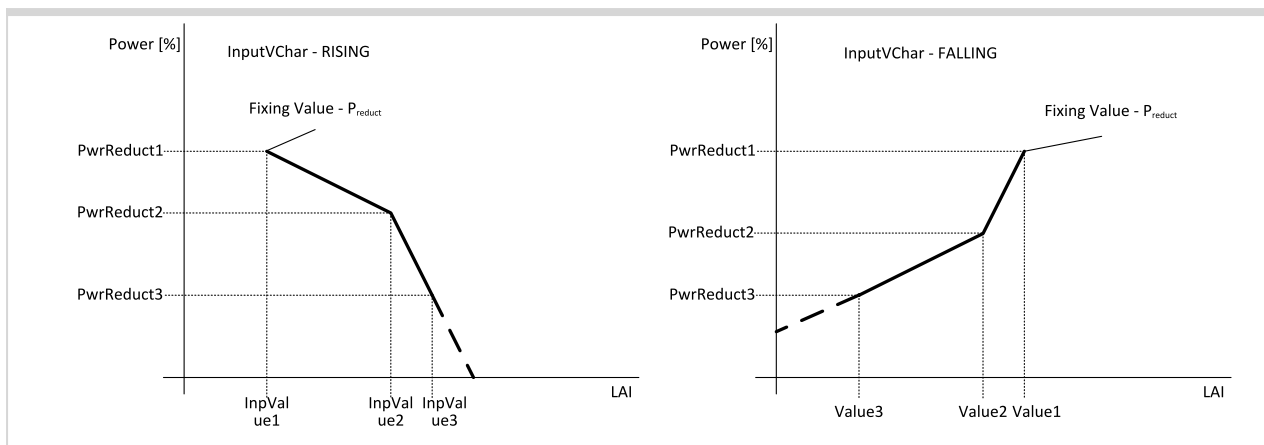
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B** (page 486), **PwrReduction2B** (page 487), **InputValue2B** (page 488)) and on the other side InputValueX (e.g. **InputValue1B** (page 487), **InputValue2B** (page 488), **InputValue3B** (page 490)) which is value of LAI: **PWRREDUCTIONB** (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB** (PAGE 892) or on the FALLING value of LAI: **PWRREDUCTIONB** (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB** (page 490).



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PwrReduction3B

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15138	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB (PAGE 892)**.

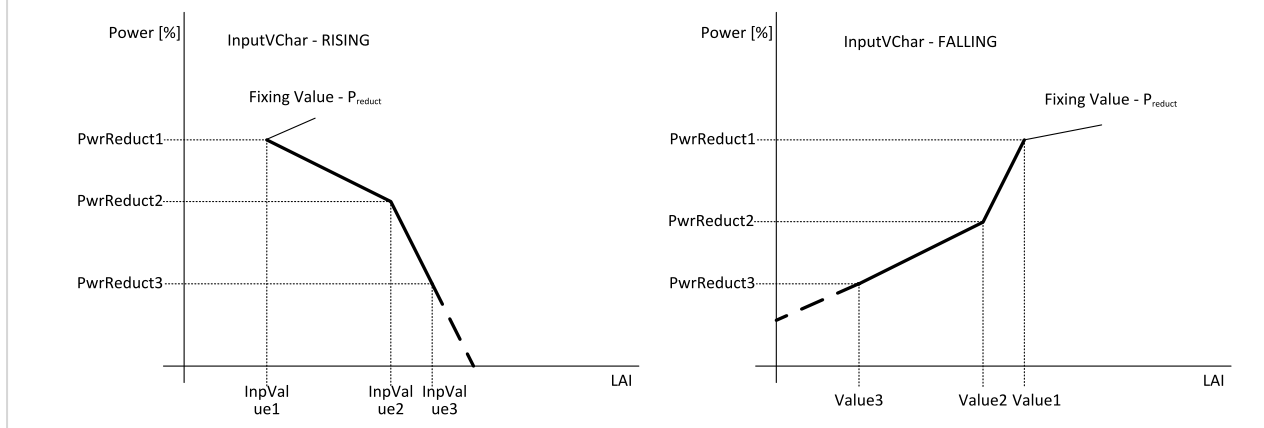
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B (page 486)**, **PwrReduction2B (page 487)**, **PwrReduction3B (page 489)**) and on the other side InputValueX (e.g. **InputValue1B (page 487)**, **InputValue2B (page 488)**, **InputValue3B (page 490)**) which is value of LAI: **PWRREDUCTIONB (PAGE 892)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB (PAGE 892)** or on the FALLING value of LAI: **PWRREDUCTIONB (PAGE 892)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB (page 490)**.



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InputValue3B

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15141	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB (PAGE 892)**.

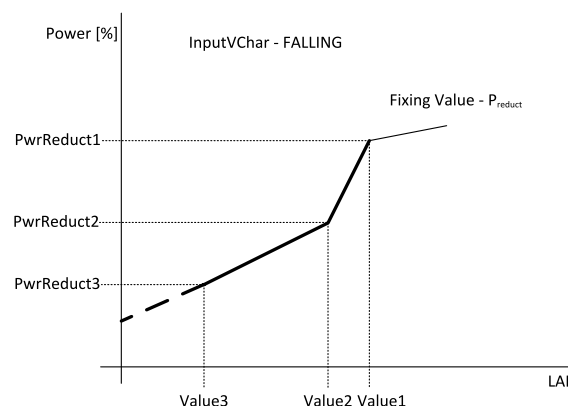
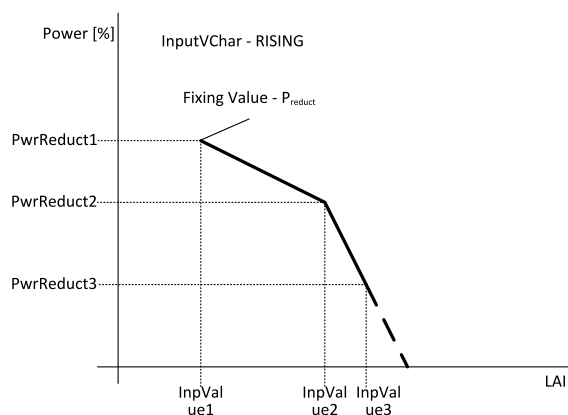
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B (page 486)**, **PwrReduction2B (page 487)**, **InputValue3B (page 490)**) and on the other side **InputValueX (e.g. InputValue1B (page 487)**, **InputValue2B (page 488)**, **InputValue3B (page 490)**) which is value of LAI: **PWRREDUCTIONB (PAGE 892)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB (PAGE 892)** or on the FALLING value of LAI: **PWRREDUCTIONB (PAGE 892)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB (page 490)**.



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InputValueChB

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	RISING / FALLING [-]		
Default value	RISING	Force value	NO
Step	-		
Comm object	15142	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONB (PAGE 892)**.

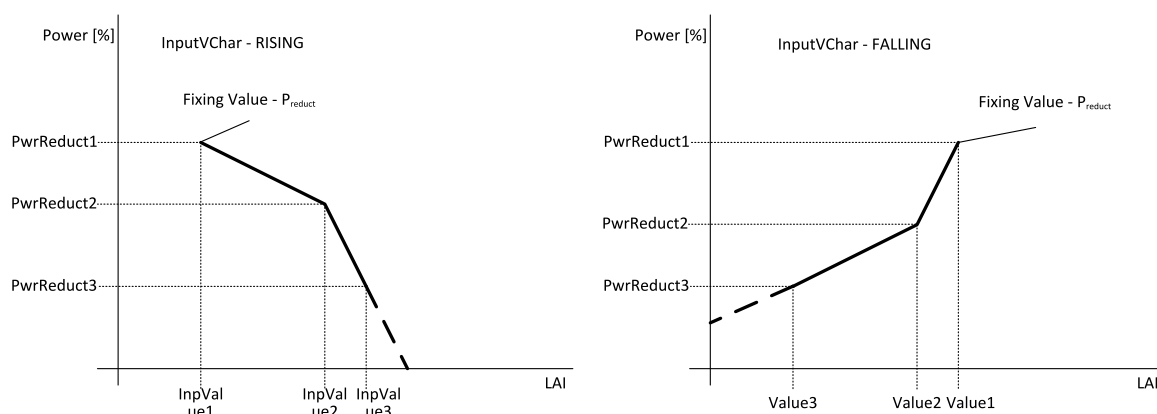
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1B** (page 486), **PwrReduction2B** (page 487), **InputValueChB** (page 490)) and on the other side **InputValueX** (e.g. **InputValue1B** (page 487), **InputValue2B** (page 488), **InputValue3B** (page 490)) which is value of LAI: **PWRREDUCTIONB** (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONB** (PAGE 892) or on the FALLING value of LAI: **PWRREDUCTIONB** (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChB** (page 490).



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PwrReductBaseB

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	ACTIVE PWR / INSTALLED PWR [-]		
Default value	ACTIVE PWR	Force value	NO
Step	-		
Comm object	17505	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to define whether the Power Reduction B should be based from Act power (page 592) or from InstalledPower (page 346).			

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PwrReduction1C

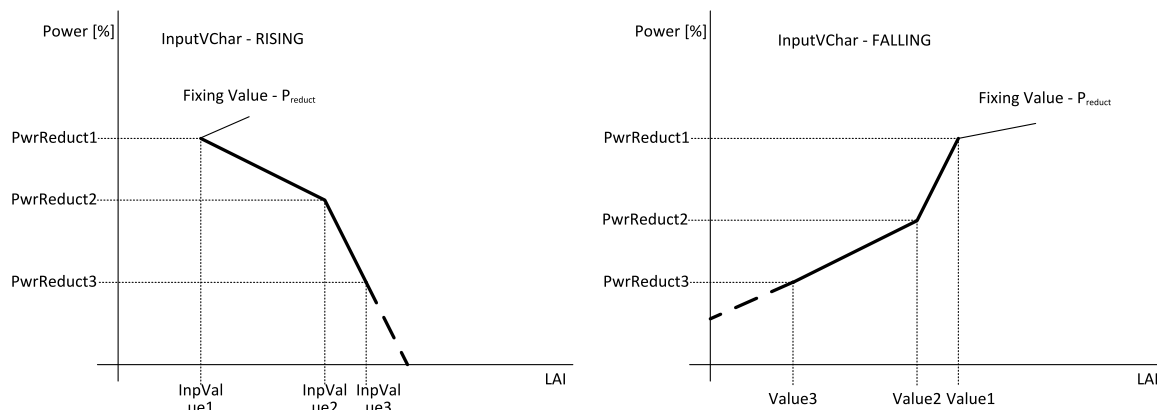
Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15144	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: PWRREDUCTIONC (PAGE 892).			
Power reduction is defined with 3-point curve.			
Points of curve are defined on one side with setpoints of required power reduction (e.g. PwrReduction1C			

(page 491), PwrReduction2C (page 493), PwrReduction1C (page 491)) and on the other side InputValueX (e.g. InputValue1C (page 492), InputValue2C (page 494), InputValue3C (page 495)) which is value of LAI: PWRREDUCTIONC (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: PWRREDUCTIONC (PAGE 892) or on the FALLING value of LAI: PWRREDUCTIONC (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: InputValueChC (page 496).



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InputValue1C

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15147	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: PWRREDUCTIONC (PAGE 892).

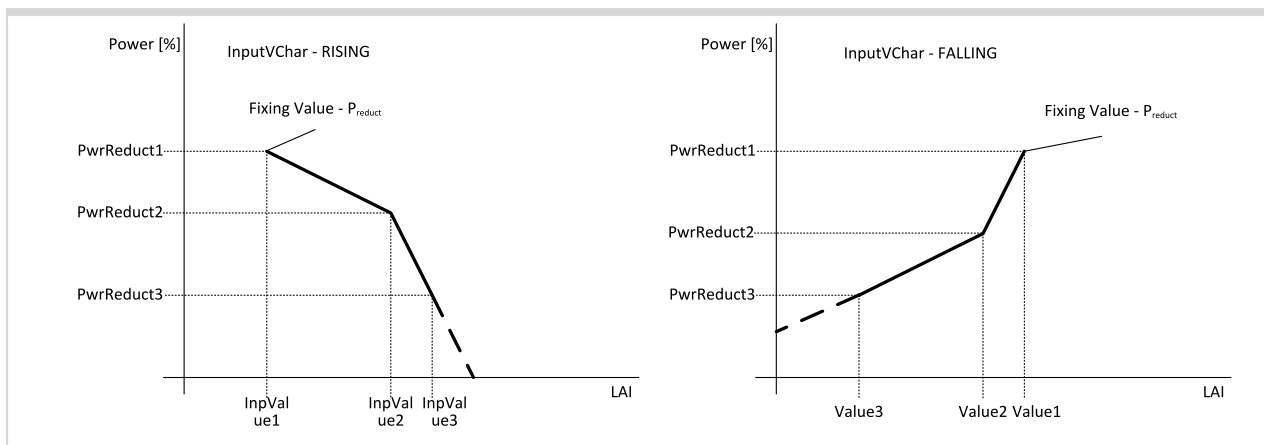
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. PwrReduction1C (page 491), PwrReduction2C (page 493), InputValue1C (page 492)) and on the other side InputValueX (e.g. InputValue1C (page 492), InputValue2C (page 494), InputValue3C (page 495)) which is value of LAI: PWRREDUCTIONC (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: PWRREDUCTIONC (PAGE 892) or on the FALLING value of LAI: PWRREDUCTIONC (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: InputValueChC (page 496).



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PwrReduction2C

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15145	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONC (PAGE 892)**.

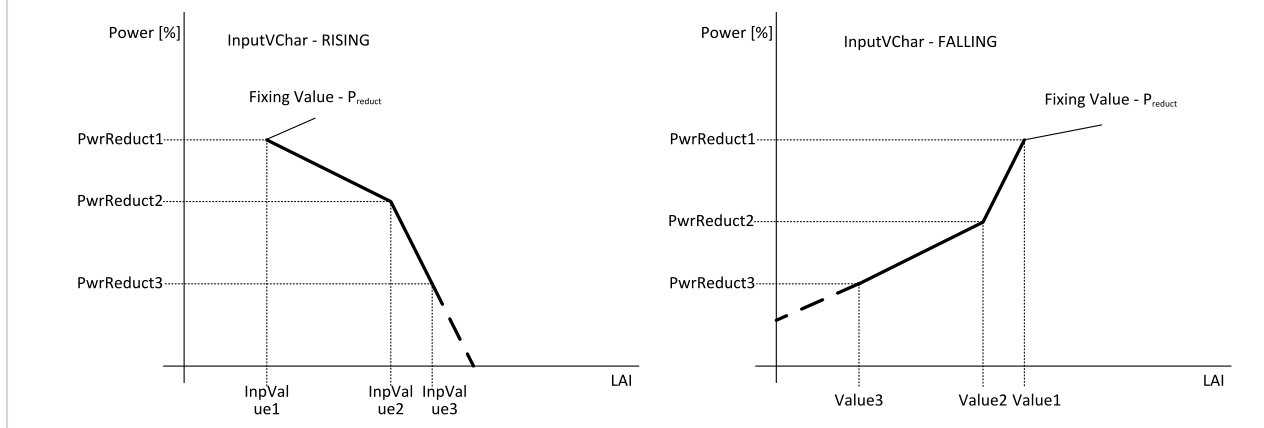
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1C (page 491)**, **PwrReduction2C (page 493)**, **PwrReduction3C (page 495)**) and on the other side InputValueX (e.g. **InputValue1C (page 492)**, **InputValue2C (page 494)**, **InputValue3C (page 495)**) which is value of LAI: **PWRREDUCTIONC (PAGE 892)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONC (PAGE 892)** or on the FALLING value of LAI: **PWRREDUCTIONC (PAGE 892)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChC (page 496)**.



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InputValue2C

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15148	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONC (PAGE 892)**.

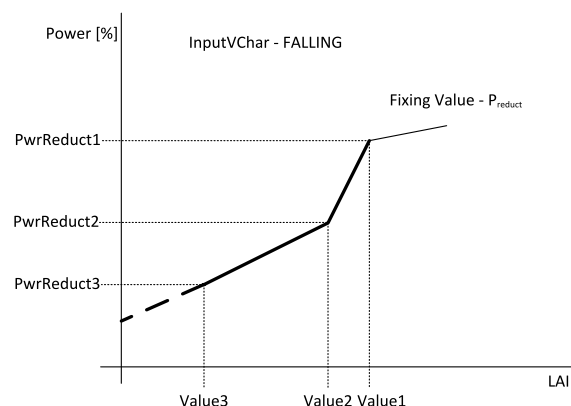
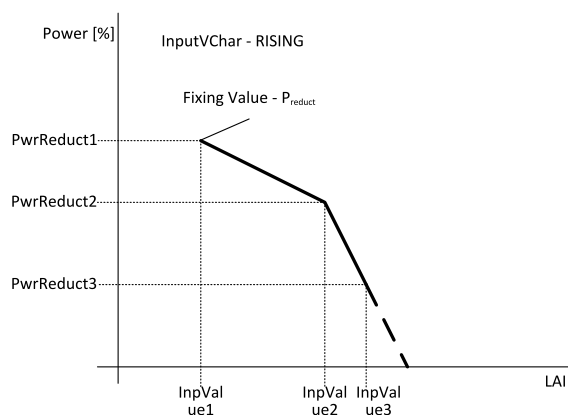
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1C (page 491)**, **PwrReduction2C (page 493)**, **InputValue2C (page 494)**) and on the other side **InputValueX (e.g. InputValue1C (page 492)**, **InputValue2C (page 494)**, **InputValue3C (page 495)**) which is value of LAI: **PWRREDUCTIONC (PAGE 892)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONC (PAGE 892)** or on the FALLING value of LAI: **PWRREDUCTIONC (PAGE 892)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChC (page 496)**.



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PwrReduction3C

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100.0 [%]		
Default value	100.0	Force value	YES
Step	0.1		
Comm object	15146	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONC (PAGE 892)**.

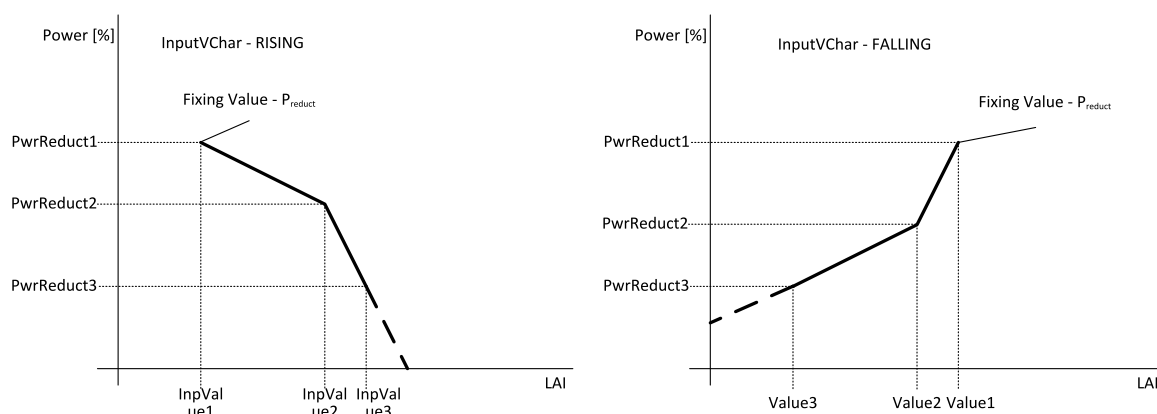
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1C** (page 491), **PwrReduction2C** (page 493), **PwrReduction3C** (page 494)) and on the other side InputValueX (e.g. **InputValue1C** (page 492), **InputValue2C** (page 494), **InputValue3C** (page 495)) which is value of LAI: **PWRREDUCTIONC** (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONC** (PAGE 892) or on the FALLING value of LAI: **PWRREDUCTIONC** (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChC** (page 496).



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InputValue3C

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	Min Power PtM (page 401) .. 100 [%]		
Default value	100	Force value	YES
Step	1		
Comm object	15149	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONC** (PAGE 892).

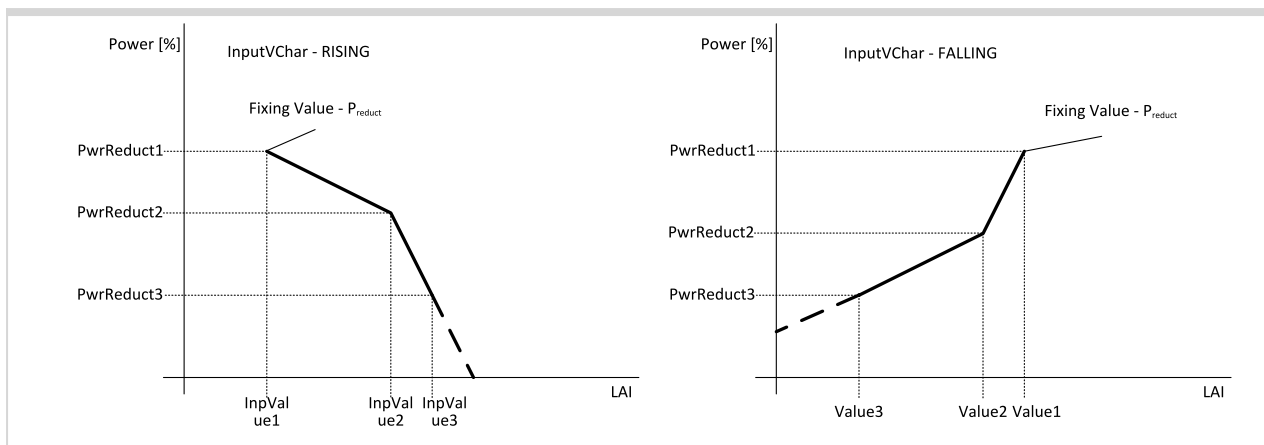
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1C** (page 491), **PwrReduction2C** (page 493), **InputValue3C** (page 495)) and on the other side InputValueX (e.g. **InputValue1C** (page 492), **InputValue2C** (page 494), **InputValue3C** (page 495)) which is value of LAI: **PWRREDUCTIONC** (PAGE 892).

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONC** (PAGE 892) or on the FALLING value of LAI: **PWRREDUCTIONC** (PAGE 892).

Characteristic of the power reduction is adjustable via setpoint: **InputValueChC** (page 496).



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InputValueChC

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	RISING / FALLING [-]		
Default value	RISING	Force value	NO
Step	-		
Comm object	15150	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to define the reduction of actual power based on the actual Value of related LAI: **PWRREDUCTIONC (PAGE 892)**.

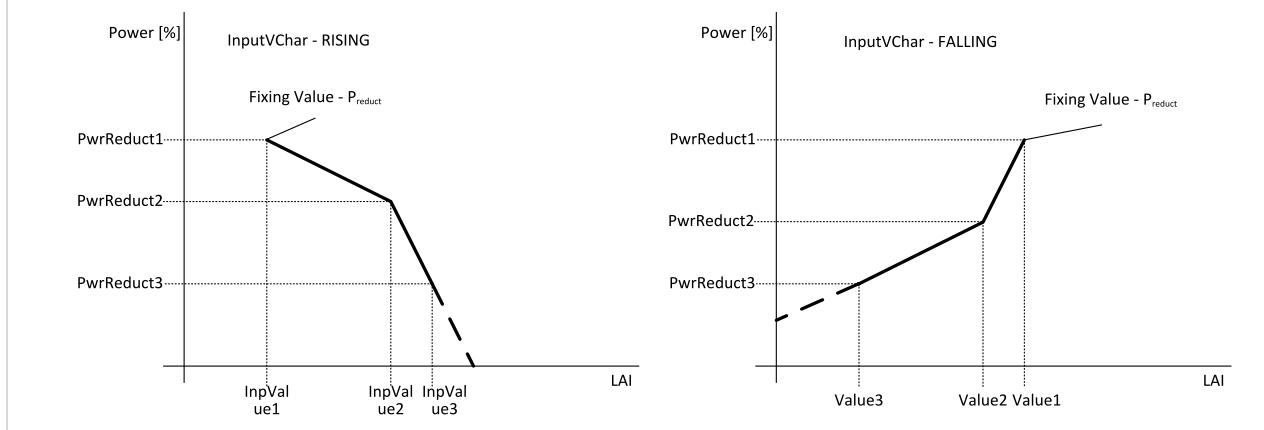
Power reduction is defined with 3-point curve.

Points of curve are defined on one side with setpoints of required power reduction (e.g. **PwrReduction1C (page 491)**, **PwrReduction2C (page 493)**, **InputValueChC (page 496)**) and on the other side InputValueX (e.g. **InputValue1C (page 492)**, **InputValue2C (page 494)**, **InputValue3C (page 495)**) which is value of LAI: **PWRREDUCTIONC (PAGE 892)**.

This setpoint defines first point of the curve.

Power reduction can be based on the RISING value of LAI: **PWRREDUCTIONC (PAGE 892)** or on the FALLING value of LAI: **PWRREDUCTIONC (PAGE 892)**.

Characteristic of the power reduction is adjustable via setpoint: **InputValueChC (page 496)**.



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PwrReductBaseC

Setpoint group	Power reduction	Related FW	2.2.0
Range [units]	ACTIVE PWR / INSTALLED PWR [-]		
Default value	ACTIVE PWR	Force value	NO
Step	-		
Comm object	17506	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to define whether the Power Reduction C should be based from Act power (page 592) or from InstalledPower (page 346) .			

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Group: Voltage/PF Control

AVRRegChar

Setpoint group	Voltage/PF Control	Related FW	2.2.0				
Range [units]	POSITIVE, NEGATIVE [-]						
Default value	POSITIVE	Force value	NO				
Step	[-]						
Comm object	9055	Related applications	SPtM, SPI, MINT, COX, Combi				
Description							
This setpoint selects the characteristic of the AVRi output of the controller. Adjust it according to the behavior of the remote voltage adjustment input of your AVR:							
<table><tr><td>POSITIVE</td><td>Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to raise.</td></tr><tr><td>NEGATIVE</td><td>Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to lower.</td></tr></table>				POSITIVE	Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to raise .	NEGATIVE	Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to lower .
POSITIVE	Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to raise .						
NEGATIVE	Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to lower .						
Note: The characteristic can be also inverted by swapping the AVRi outputs that are connected to the AVR. However, it is recommended to use the AVRRegChar setpoint for selection of the characteristic instead of swapping the wires.							

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Voltage gain

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8501	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop. The integration factor (I-factor) for the voltage control loop is adjusted by the setpoint Voltage Int (page 498) .			

Note: See the chapter *Regulation loops (page 101)* for general information about regulation loops and their adjustment.

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Voltage Int

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	50	Force value	YES
Step	1		
Comm object	8720	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the relative integration factor (I-factor) of the voltage control PI loop. The gain factor (P-factor) for the voltage control loop is adjusted by the setpoint Voltage gain (page 497) .			

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PF gain

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8503	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the gain factor (P-factor) of the cos-phi control PI loop. The integration factor (I-factor) for the cos-phi control loop is adjusted by the setpoint PF int (page 498) .			
Note: See the chapter <i>Regulation loops (page 101)</i> for general information about regulation loops and their adjustment.			

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PF int

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	50	Force value	YES
Step	1		
Comm object	8721	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the relative integration factor (I-factor) of the cos-phi control PI loop. The gain factor (P-factor) for the cos-phi control loop is adjusted by the setpoint PF gain (page 498) .			

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AVR DCount bias

Setpoint group	Voltage/PF Control	Related FW	2.2.0
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Range [units]	0.0 .. 100.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8500	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the initial level for the AVRi output. This level is present on the output if no regulation loop is active.			
Note: The resulting voltage at the input of the AVR also depends on position of the trimmer at the AVRi module.			

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VS gain

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8777	Related applications	MINT, COX, Combi
Description			
This setpoint adjusts the gain factor (P-factor) of the VAR-sharing PI loop. The integration factor (I-factor) for the VAR-sharing loop is adjusted by the setpoint VS int (page 499).			
Note: See the chapter Regulation loops (page 101) for general information about regulation loops and their adjustment.			

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VS int

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	50	Force value	NO
Step	1		
Comm object	9036	Related applications	MINT, COX, Combi
Description			
This setpoint adjusts the relative integration factor (I-factor) of the VAR-sharing PI loop. The gain factor (P-factor) for the VAR-sharing loop is adjusted by the setpoint VS gain (page 499).			

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TauVoltActuat

Setpoint group	Voltage/PF Control	Related FW	2.2.0
Range [units]	1.0 .. 300.0 [s]		
Default value	10	Force value	NO
Step	0.1		
Comm object	10785	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to adjust the transformation ratio of the AVRi output to the pulses at the binary outputs **AVR UP (PAGE 763)** and **AVR DN (PAGE 763)**. Adjust the setpoint to the pulse duration which is needed for the AVR to change the requested voltage from minimum to maximum.

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Group: Force value

Force value 1

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10667	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input FORCEVALUEIN 1 (PAGE 695) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 2

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10668	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input FORCEVALUEIN 2 (PAGE 696) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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Force value 3

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10669	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 3 (PAGE 696).			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 4

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10670	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 4 (PAGE 696).			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 5

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10671	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 5 (PAGE 697).			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 6

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10672	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 6 (PAGE 697).			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 7

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10673	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 7 (PAGE 697) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 8

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10674	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 8 (PAGE 698) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 9

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		

Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10675	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 9 (PAGE 698) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 10

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10676	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 10 (PAGE 698) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 11

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO

Step	1 (this depends on where the Force value is configured)		
Comm object	10677	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 11 (PAGE 699) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 12

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10678	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 12 (PAGE 699) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 13

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10679	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.

See also the input **FORCEVALUEIN 13 (PAGE 699)**.

Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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Force value 14

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10680	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 14 (PAGE 700) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 15

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10681	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 15 (PAGE 700) .			

Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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Force value 16

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	10682	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 16 (PAGE 700) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 17

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15616	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 17 (PAGE 701) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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Force value 18

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15617	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 18 (PAGE 701) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 19

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15618	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 19 (PAGE 701) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 20

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15619	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.</p> <p>See also the input FORCEVALUEIN 20 (PAGE 702).</p> <p>Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.</p> <p>Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.</p>			

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Force value 21

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15620	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.</p> <p>See also the input FORCEVALUEIN 21 (PAGE 702).</p> <p>Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.</p> <p>Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.</p>			

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Force value 22

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15621	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 22 (PAGE 702) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 23

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15622	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 23 (PAGE 703) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 24

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		

Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15623	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 24 (PAGE 703) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 25

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15624	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 25 (PAGE 703) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 26

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO

Step	1 (this depends on where the Force value is configured)		
Comm object	15625	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 26 (PAGE 704) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 27

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15626	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 27 (PAGE 704) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 28

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15627	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.

See also the input **FORCEVALUEIN 28 (PAGE 704)**.

Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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Force value 29

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15628	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 29 (PAGE 705) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 30

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15629	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 30 (PAGE 705) .			

Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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Force value 31

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15630	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 31 (PAGE 705) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			
Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is not related to the Force value 3 function block.			

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Force value 32

Setpoint group	Force value	Related FW	2.2.0
Range [units]	[-] (this depends on where the Force value is configured)		
Default value	0 (this depends on where the Force value is configured)	Force value	NO
Step	1 (this depends on where the Force value is configured)		
Comm object	15631	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is one of the 32 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig.			
See also the input FORCEVALUEIN 32 (PAGE 706) .			
Note: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution.			

Note: There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name Force value 3 is **not related** to the Force value 3 function block.

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ExValue1deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	0	Force value	YES
Step	1		
Comm object	11008	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 1</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 1</i> is reset by the binary input EXVALUE1 RESET (PAGE 682) .			

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ExValue2deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	0	Force value	YES
Step	1		
Comm object	11009	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 2</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 2</i> is reset by the binary input EXVALUE2 RESET (PAGE 683) .			

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ExValue3deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	11010	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 3</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 3</i> is reset by the binary input EXVALUE3 RESET (PAGE 684) .			

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ExValue4deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		

Default value	100	Force value	YES
Step	1		
Comm object	11011	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 4</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 4</i> is reset by the binary input EXVALUE4 RESET (PAGE 685) .			

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ExValue5deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16521	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 5</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 5</i> is reset by the binary input EXVALUE5 RESET (PAGE 686) .			

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ExValue6deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16522	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 6</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 6</i> is reset by the binary input EXVALUE6 RESET (PAGE 687) .			

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ExValue7deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16523	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 7</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 7</i> is reset by the binary input EXVALUE4 RESET (PAGE 685) .			

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ExValue8deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16254	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 8</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 8</i> is reset by the binary input EXVALUE8 RESET (PAGE 689) .			

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ExValue9deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16525	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 9</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 9</i> is reset by the binary input EXVALUE9 RESET (PAGE 690) .			

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ExValue10deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16526	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 10</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 10</i> is reset by the binary input EXVALUE10 RESET (PAGE 691) .			

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ExValue11deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	15527	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

This setpoint adjusts the reset (initial) value of the *ExValue 11*. This initial value is applied either when the controller is powered-on or when the *ExValue 11* is reset by the binary input **EXVALUE11 RESET (PAGE 692)**.

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ExValue12deflt

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. 32000 [x]		
Default value	100	Force value	YES
Step	1		
Comm object	16528	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the reset (initial) value of the <i>ExValue 12</i> . This initial value is applied either when the controller is powered-on or when the <i>ExValue 12</i> is reset by the binary input EXVALUE12 RESET (PAGE 693) .			

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ExValue1LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue1HiLim (page 522) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	11012	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 1</i> if the value is lowered/raised by the binary inputs EXVALUE1 UP (PAGE 681) and EXVALUE1 DOWN (PAGE 681) . The <i>ExValue 1</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 1</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue2LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue2HiLim (page 522) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	11013	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 2</i> if the value is lowered/raised by the binary inputs EXVALUE2 UP (PAGE 682) and EXVALUE2 DOWN (PAGE 682) . The <i>ExValue 2</i> is never lowered below this limit.			

Note: This limit is not taken into account if the value *ExValue 2* is written remotely from a terminal using the appropriate command *ExValue #n*.

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ExValue3LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue3HiLim (page 523) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	11014	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 3</i> if the value is lowered/raised by the binary inputs EXVALUE3 UP (PAGE 683) and EXVALUE3 DOWN (PAGE 683) . The <i>ExValue 3</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 3</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue4LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue4HiLim (page 523) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	11015	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 4</i> if the value is lowered/raised by the binary inputs EXVALUE4 UP (PAGE 684) and EXVALUE4 DOWN (PAGE 684) . The <i>ExValue 4</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 4</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue5LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue5HiLim (page 524) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16505	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 5</i> if the value is lowered/raised by the binary inputs EXVALUE5 UP (PAGE 685) and EXVALUE5 DOWN (PAGE 685) . The <i>ExValue 5</i> is never lowered below			

this limit.

Note: This limit is not taken into account if the value *ExValue 5* is written remotely from a terminal using the appropriate command *ExValue #n*.

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ExValue6LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue6HiLim (page 524) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16506	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 6</i> if the value is lowered/raised by the binary inputs EXVALUE6 UP (PAGE 686) and EXVALUE6 DOWN (PAGE 686) . The <i>ExValue 6</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 6</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue7LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue7HiLim (page 524) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16507	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 7</i> if the value is lowered/raised by the binary inputs EXVALUE7 UP (PAGE 687) and EXVALUE7 DOWN (PAGE 687) . The <i>ExValue 7</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 7</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue8LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue8HiLim (page 525) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16508	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 8</i> if the value is lowered/raised by the binary			

inputs **ExVALUE8 UP (PAGE 688)** and **ExVALUE8 DOWN (PAGE 688)**. The *ExValue 8* is never lowered below this limit.

Note: This limit is not taken into account if the value *ExValue 8* is written remotely from a terminal using the appropriate command *ExValue #n*.

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ExValue9LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue9HiLim (page 525) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16509	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 9</i> if the value is lowered/raised by the binary inputs ExVALUE9 UP (PAGE 689) and ExVALUE9 DOWN (PAGE 689) . The <i>ExValue 9</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 9</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue10LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue10HiLim (page 525) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16510	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 10</i> if the value is lowered/raised by the binary inputs ExVALUE10 UP (PAGE 690) and ExVALUE10 DOWN (PAGE 690) . The <i>ExValue 10</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 10</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue11LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue11HiLim (page 526) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16511	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

This setpoint adjusts the low limit of the value of *ExValue 11* if the value is lowered/raised by the binary inputs **EXVALUE11 UP (PAGE 691)** and **EXVALUE11 DOWN (PAGE 691)**. The *ExValue 11* is never lowered below this limit.

Note: This limit is not taken into account if the value *ExValue 11* is written remotely from a terminal using the appropriate command *ExValue #n*.

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ExValue12LoLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	-32000 .. ExValue12HiLim (page 526) [X]		
Default value	0	Force value	NO
Step	1		
Comm object	16512	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the low limit of the value of <i>ExValue 12</i> if the value is lowered/raised by the binary inputs EXVALUE12 UP (PAGE 692) and EXVALUE12 DOWN (PAGE 692) . The <i>ExValue 12</i> is never lowered below this limit.			
Note: This limit is not taken into account if the value <i>ExValue 12</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue1HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue1LoLim (page 518) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	11016	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 1</i> if the value is lowered/raised by the binary inputs EXVALUE1 UP (PAGE 681) and EXVALUE1 DOWN (PAGE 681) . The <i>ExValue 1</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 1</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			

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ExValue2HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue2LoLim (page 518) .. 32000 [X]		
Default value	0	Force value	NO
Step	1		
Comm object	11017	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the high limit of the value of *ExValue 2* if the value is lowered/raised by the binary inputs **ExVALUE2 UP (PAGE 682)** and **ExVALUE2 DOWN (PAGE 682)**. The *ExValue 2* is never raised over this limit.

Note: This limit is not taken into account if the value *ExValue 2* is written remotely from a terminal using the appropriate command *ExValue #n*.

Note: For IS-NT only.

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ExValue3HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue2LoLim (page 518) .. 32000 [X]		
Default value	0	Force value	NO
Step	1		
Comm object	11018	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 3</i> if the value is lowered/raised by the binary inputs ExVALUE3 UP (PAGE 683) and ExVALUE3 DOWN (PAGE 683) . The <i>ExValue 3</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 3</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			
Note: For IS-NT only.			

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ExValue4HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue4LoLim (page 519) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	11019	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 4</i> if the value is lowered/raised by the binary inputs ExVALUE4 UP (PAGE 684) and ExVALUE4 DOWN (PAGE 684) . The <i>ExValue 4</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 4</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			
Note: For IS-NT only.			

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ExValue5HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue5LoLim (page 519) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	16513	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 5</i> if the value is lowered/raised by the binary inputs ExVALUE5 UP (PAGE 685) and ExVALUE5 DOWN (PAGE 685) . The <i>ExValue 5</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 5</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			
Note: For IS-NT only.			

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ExValue6HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue6LoLim (page 520) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	16514	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 6</i> if the value is lowered/raised by the binary inputs ExVALUE6 UP (PAGE 686) and ExVALUE6 DOWN (PAGE 686) . The <i>ExValue 6</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 6</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			
Note: For IS-NT only.			

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ExValue7HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue7HiLim (page 524) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	16515	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 7</i> if the value is lowered/raised by the binary inputs ExVALUE7 UP (PAGE 687) and ExVALUE7 DOWN (PAGE 687) . The <i>ExValue 7</i> is never raised over this limit.			

Note: This limit is not taken into account if the value *ExValue 7* is written remotely from a terminal using the appropriate command *ExValue #n*.

Note: For IS-NT only.

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ExValue8HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue8LoLim (page 520) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	16516	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 8</i> if the value is lowered/raised by the binary inputs ExVALUE8 UP (PAGE 688) and ExVALUE8 DOWN (PAGE 688) . The <i>ExValue 8</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 8</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			
Note: For IS-NT only.			

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ExValue9HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue9LoLim (page 521) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	11019	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 9</i> if the value is lowered/raised by the binary inputs ExVALUE9 UP (PAGE 689) and ExVALUE9 DOWN (PAGE 689) . The <i>ExValue 9</i> is never raised over this limit.			
Note: This limit is not taken into account if the value <i>ExValue 9</i> is written remotely from a terminal using the appropriate command <i>ExValue #n</i> .			
Note: For IS-NT only.			

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ExValue10HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue10LoLim (page 521) .. 32000 [X]		
Default value	0	Force value	YES

Step	1		
Comm object	16518	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 10</i> if the value is lowered/raised by the binary inputs ExVALUE10 UP (PAGE 690) and ExVALUE10 DOWN (PAGE 690) . The <i>ExValue 10</i> is never raised over this limit.			
<i>Note: This limit is not taken into account if the value ExValue 10 is written remotely from a terminal using the appropriate command ExValue #n.</i>			
<i>Note: For IS-NT only.</i>			

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ExValue11HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue11LoLim (page 521) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	16519	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 11</i> if the value is lowered/raised by the binary inputs ExVALUE11 UP (PAGE 691) and ExVALUE11 DOWN (PAGE 691) . The <i>ExValue 11</i> is never raised over this limit.			
<i>Note: This limit is not taken into account if the value ExValue 11 is written remotely from a terminal using the appropriate command ExValue #n.</i>			
<i>Note: For IS-NT only.</i>			

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ExValue12HiLim

Setpoint group	Force value	Related FW	2.2.0
Range [units]	ExValue12LoLim (page 522) .. 32000 [X]		
Default value	0	Force value	YES
Step	1		
Comm object	16520	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the high limit of the value of <i>ExValue 12</i> if the value is lowered/raised by the binary inputs ExVALUE12 UP (PAGE 692) and ExVALUE12 DOWN (PAGE 692) . The <i>ExValue 12</i> is never raised over this limit.			
<i>Note: This limit is not taken into account if the value ExValue 12 is written remotely from a terminal using the appropriate command ExValue #n.</i>			
<i>Note: For IS-NT only.</i>			

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ExValue1 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	11020	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 1</i> is being changed while the input EXVALUE1 UP (PAGE 681) or EXVALUE1 DOWN (PAGE 681) is active.			

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ExValue2 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	11021	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 2</i> is being changed while the input EXVALUE2 UP (PAGE 682) or EXVALUE2 DOWN (PAGE 682) is active.			

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ExValue3 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	11022	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 3</i> is being changed while the input EXVALUE3 UP (PAGE 683) or EXVALUE3 DOWN (PAGE 683) is active.			

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ExValue4 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	11023	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 4</i> is being changed while the input EXVALUE4 UP (PAGE 684) or EXVALUE4 DOWN (PAGE 684) is active.			

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ExValue5 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16529	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 5</i> is being changed while the input EXVALUE5 UP (PAGE 685) or EXVALUE5 DOWN (PAGE 685) is active.			

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ExValue6 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16530	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 6</i> is being changed while the input EXVALUE6 UP (PAGE 686) or EXVALUE6 DOWN (PAGE 686) is active.			

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ExValue7 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16531	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 7</i> is being changed while the input EXVALUE7 UP (PAGE 687) or EXVALUE7 DOWN (PAGE 687) is active.			

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ExValue8 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16532	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

This setpoint adjusts the rate pre second at which the *ExValue 8* is being changed while the input **ExVALUE8 UP (PAGE 688)** or **ExVALUE8 DOWN (PAGE 688)** is active.

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ExValue9 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16533	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 9</i> is being changed while the input ExVALUE9 UP (PAGE 689) or ExVALUE9 DOWN (PAGE 689) is active.			

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ExValue10 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16534	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 10</i> is being changed while the input ExVALUE10 UP (PAGE 690) or ExVALUE10 DOWN (PAGE 690) is active.			

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ExValue11 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES
Step	1		
Comm object	16535	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate pre second at which the <i>ExValue 11</i> is being changed while the input ExVALUE11 UP (PAGE 691) or ExVALUE11 DOWN (PAGE 691) is active.			

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ExValue12 rate

Setpoint group	Force value	Related FW	2.2.0
Range [units]	1 .. 10000 [X/s]		
Default value	1	Force value	YES

Step	1		
Comm object	16536	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the rate per second at which the <i>ExValue 12</i> is being changed while the input ExVALUE12 UP (PAGE 692) or ExVALUE12 DOWN (PAGE 692) is active.			

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Group: Load Shedding

Ld shed active

Setpoint group	Load Shedding	Related FW	2.2.0
Range [units]	DISABLED, ISLAND ONLY, ISL+TRIP PARAL, ALL THE TIME [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	11001	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used for adjustment when the load shedding function will be active.			
DISABLED	The Load shedding function is disabled. All the outputs are open.		
ISLAND ONLY	In Island operation (e.g. MCB is open and MGCB is closed) Load shedding outputs (e.g. LDShED STAGE 1 (PAGE 784)) are controlled by load shedding function.		
ISL+TRIP PARAL	This setting adjusts the same behavior as ISLAND ONLY but in addition to it all load shedding outputs are closed when Gen-set group goes to island operation.		
ALL THE TIME	Outputs are controlled by the load shedding function regardless of breaker positions.		

Note: Learn more about load shedding in the separate chapter Load shedding (page 145).

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Ld shed level

Setpoint group	Load Shedding	Related FW	2.2.0
Range [units]	Ld recon level (page 531) .. 200 [%]		
Default value	80	Force value	YES
Step	1		
Comm object	8884	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the relative load level (in % of Nomin power (page 345) of Gen-set) for load shedding. When the relative load level exceeds this level for more than Ld shed delay (page 531) time the next load shedding output is closed.			
Note: Learn more about load shedding in the separate chapter <i>Load shedding (page 145)</i> .			

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Ld shed delay

Setpoint group	Load Shedding	Related FW	2.2.0
Range [units]	0.0 .. 600.0 [s]		
Default value	10	Force value	YES
Step	0.1		
Comm object	8887	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust time period the relative load level must be above the Ld shed level (page 530) limit to close the next load shedding output.			
Note: Learn more about load shedding in the separate chapter <i>Load shedding (page 145)</i> .			

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Ld recon level

Setpoint group	Load Shedding	Related FW	2.2.0
Range [units]	0 .. Ld shed level (page 530) [%]		
Default value	20	Force value	YES
Step	1		
Comm object	8890	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the relative load level (in % of Nomin power (page 345) of Gen-set) for load reconnection. When the relative load level drops below this level for more than Ld recon del (page 531) time the next load can be reconnected back.			
The appropriate load shedding output is either opened automatically when the condition above is fulfilled (AutoLd recon (page 532) = ENABLED) or manually by activation of the input MANUALLDRECON (PAGE 724) .			
Note: Learn more about load shedding in the separate chapter <i>Load shedding (page 145)</i> .			

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Ld recon del

Setpoint group	Load Shedding	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	YES
Step	1		
Comm object	8893	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust time period the relative load level must be below the Ld recon level (page 531) limit to allow reconnection of next load group.			
Note: Learn more about load shedding in the separate chapter <i>Load shedding (page 145)</i> .			

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AutoLd recon

Setpoint group	Load Shedding	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	ENABLED	Force value	YES
Step	[-]		
Comm object	9649	Related applications	SPtM, SPI, MINT, COX, Combi
Description <p>This setpoint selects whether the reconnection of the load occurs automatically when the relative load level stays below the Ld recon level (page 531) for a period of the Ld recon del (page 531) or the reconnection must be initiated manually by the input MANUALLDRECON (PAGE 724).</p> <p>Note: Learn more about load shedding in the separate chapter Load shedding (page 145).</p>			

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Group: Timer settings

Timer channel 1

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10969	Related applications	SPtM, SPI, MINT, COX, Combi
Description <p>This setpoint adjusts the mode of the <i>Timer channel #1</i>. Output from this channel is available in the combined output TIMERACT 1-4 (PAGE 846).</p> <p>Note: See the chapter Service timers (page 150) for more details about timers.</p>			

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Timer channel 2

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10970	Related applications	SPtM, SPI, MINT, COX, Combi
Description <p>This setpoint adjusts the mode of the <i>Timer channel #2</i>. Output from this channel is available in the combined output TIMERACT 1-4 (PAGE 846).</p> <p>Note: See the chapter Service timers (page 150) for more details about timers.</p>			

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Timer channel 3

Setpoint group	Timer settings	Related FW	2.2.0
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Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10971	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #3</i> . Output from this channel is available in the combined output TIMERACT 1-4 (PAGE 846) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 4

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10973	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #4</i> . Output from this channel is available in the combined output TIMERACT 1-4 (PAGE 846) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 5

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10974	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #5</i> . Output from this channel is available in the combined output TIMERACT 5-8 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 6

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10975	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint adjusts the mode of the *Timer channel #6*. Output from this channel is available in the combined output **TIMERACT 5-8 (PAGE 847)**.

Note: See the chapter *Service timers (page 150)* for more details about timers.

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Timer channel 7

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10976	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #7</i> . Output from this channel is available in the combined output TIMERACT 5-8 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 8

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10977	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #8</i> . Output from this channel is available in the combined output TIMERACT 5-8 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 9

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10978	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #9</i> . Output from this channel is available in the combined output TIMERACT 9-12 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 10

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10979	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #10</i> . Output from this channel is available in the combined output TIMERACT 9-12 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 11

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10980	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #11</i> . Output from this channel is available in the combined output TIMERACT 9-12 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 12

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10981	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #12</i> . Output from this channel is available in the combined output TIMERACT 9-12 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 13

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		

Default value	OFF	Force value	NO
Step	[-]		
Comm object	10982	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #13</i> . Output from this channel is available in the combined output TIMERACT 13-16 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 14

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10983	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #14</i> . Output from this channel is available in the combined output TIMERACT 13-16 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 15

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10984	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint adjusts the mode of the <i>Timer channel #15</i> . Output from this channel is available in the combined output TIMERACT 13-16 (PAGE 847) .			
Note: See the chapter <i>Service timers (page 150)</i> for more details about timers.			

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Timer channel 16

Setpoint group	Timer settings	Related FW	2.2.0
Range [units]	[-]		
Default value	OFF	Force value	NO
Step	[-]		
Comm object	10985	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

This setpoint adjusts the mode of the *Timer channel #16*. Output from this channel is available in the combined output **TIMERACT 13-16 (PAGE 847)**.

Note: See the chapter *Service timers (page 150)* for more details about timers.

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Group: Act. Calls/SMS

History record

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	10568	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as <i>History record</i> occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			
Note: As the <i>History record</i> protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.			

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Alarm only

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	10567	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as <i>Alarm only</i> occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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Warning

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	8482	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a <i>warning</i> -type protection occurs. See the chapter Protections and Alarm management (page 194) for more information about protection			

types.

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Off load

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	8483	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as <i>Off load</i> occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			
Note: As the <i>Off load</i> protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.			

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Shutdown

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	8484	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a <i>Shutdown</i> -type alarm occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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BrkOpen&CoolDn

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	10566	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a <i>BrkOpen&CoolDn</i> -type alarm occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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Mains protect

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	10117	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as <i>Mains protect</i> occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			
Note: As the <i>Mains protect</i> protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.			

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Slow stop

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	8485	Related applications	MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a <i>Slow stop</i> -type alarm occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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ShutdownOvr

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, ENABLED [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	11413	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to enable sending SMS and/or e-mail alerts when a <i>Sd Override</i> -type alarm occurs. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH1-Type

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, DATA-ANA, DATA-GSM, DATA-ISDN, DATA-CDMA, SMS-GSM, SMS-CDMA, IB-E-MAIL, IB-EML-SMS [-]		

Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	9594	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the alert type of the active calls – channel 1. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH1-Addr

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	-		
Default value	-	Force value	NO
Step	[-]		
Comm object	9597	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the recipient address for the active calls – channel 1. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH2-Type

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, DATA-ANA, DATA-GSM, DATA-ISDN, DATA-CDMA, SMS-GSM, SMS-CDMA, IB-E-MAIL, IB-EML-SMS [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	9595	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the alert type of the active calls – channel 2. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH2-Addr

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	-		
Default value	-	Force value	NO
Step	[-]		
Comm object	9598	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the recipient address for the active calls – channel 2. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is			

e-mail). See the chapter **Protections and Alarm management (page 194)** for more information about protection types.

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AcallCH3-Type

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, DATA-ANA, DATA-GSM, DATA-ISDN, DATA-CDMA, SMS-GSM, SMS-CDMA, IB-E-MAIL, IB-EML-SMS [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	9596	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the alert type of the active calls – channel 3. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH3-Addr

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	-		
Default value	-	Force value	NO
Step	[-]		
Comm object	9599	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the recipient address for the active calls – channel 3. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH4-Type

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, DATA-ANA, DATA-GSM, DATA-ISDN, DATA-CDMA, SMS-GSM, SMS-CDMA, IB-E-MAIL, IB-EML-SMS [-]		
Default value	DISABLED	Force value	YES
Step	[-]		
Comm object	13274	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the alert type of the active calls – channel 4. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH4-Addr

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
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Range [units]	-		
Default value	-	Force value	NO
Step	[-]		
Comm object	13276	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the recipient address for the active calls – channel 4. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH5-Type

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	DISABLED, DATA-ANA, DATA-GSM, DATA-ISDN, DATA-CDMA, SMS-GSM, SMS-CDMA, IB-E-MAIL, IB-EML-SMS [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	13275	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the alert type of the active calls – channel 5. See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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AcallCH5-Addr

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	-		
Default value	-	Force value	NO
Step	[-]		
Comm object	13277	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to specify the recipient address for the active calls – channel 5. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Protections and Alarm management (page 194) for more information about protection types.			

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NumberRings AA

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	1 .. 30 [-]		
Default value	3	Force value	NO
Step	1		
Comm object	24512	Related applications	SPtM, SPI, MINT, COX, Combi

Description

This setpoint is used to adjust the number of rings after which the modem, which is attached to the controller, answers the incoming call.

Number of rings prior to answering the modem connection from PC to controller.

Note: Any change of this setpoint is applied first after next switching the controller or modem off and on or after disconnecting the modem from the controller and connecting it back.

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ActCallAttempt

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	1 .. 250 [-]		
Default value	5	Force value	NO
Step	1		
Comm object	24505	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint is used to adjust the maximum number of consequent attempts to perform an active data call. The next attempt is performed 120 s after the previous unsuccessful attempt.			

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Acall+SMS lang

Setpoint group	Act. Calls/SMS	Related FW	2.2.0
Range [units]	1 .. 7 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	11394	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint specifies in which language the active SMS and e-mail messages are issued. Adjust the setpoint to the index of the required language. The index can be obtained from the tab <i>Languages</i> in GenConfig. Index 1 is always English.			

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Group: Date/Time

Time stamp act

Setpoint group	Date/Time	Related FW	2.2.0
Range [units]	DISABLED, ENGINE RUNNING, ALWAYS [-]		
Default value	ENGINE RUNNING	Force value	NO
Step	[-]		
Comm object	10532	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint selects the <i>Time stamp</i> function mode.			

DISABLED	The function is disabled.
ENGINE RUNNING	While the engine is running the <i>Time stamps</i> records are recorded into the history log with period adjusted by the setpoint Time stamp per (page 544).
ALWAYS	The <i>Time stamps</i> records are recorded into the history log with period adjusted by the setpoint Time stamp per (page 544) all the time while the controller is switched on.

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Time stamp per

Setpoint group	Date/Time	Related FW	2.2.0
Range [units]	1 .. 240 [min]		
Default value	1	Force value	NO
Step	1		
Comm object	8979	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint adjusts the time interval for <i>Time stamp</i> records. See also the setpoint Time stamp act (page 543).			

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#SummerTimeMod

Setpoint group	Date/Time	Related FW	2.2.0
Range [units]	DISABLED, WINTER, SUMMER, WINTER-S, SUMMER-S [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	8727	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The setpoint is used to select the mode of automatic daylight saving time change.			
DISABLED	The automatic change to daylight saving time and back is disabled.		
WINTER	The automatic change is enabled, the current season is winter and the controller is located in the northern hemisphere.		
SUMMER	The automatic change is enabled, the current season is summer and the controller is located in the northern hemisphere.		
WINTER-S	The automatic change is enabled, the current season is winter and the controller is located in the southern hemisphere.		
SUMMER-S	The automatic change is enabled, the current season is summer and the controller is located in the southern hemisphere.		

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PremortHistPer

Setpoint group	Date/Time	Related FW	2.2.0
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Range [units]	100 ms, 300 ms, 500 ms, 1 s, 3 s[-]		
Default value	3 [s]	Force value	NO
Step	[-]		
Comm object	24223	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This setpoint adjusts the period with which premortem history(fast history) records are written. Premortem history is triggered if level 2 alarm (for more information on alarm levels please refer to the chapter Protections and Alarm management (page 194)) is issued and the engine is running (at least one condition from Conditions (page 130) is fulfilled). For any setting of this setpoint Premortem history contains 50 records. If there are more Premortem histories close together in time line, identical records are not duplicated and only the latest Premortem records are included in a Premortem history, which closely follows previously recorded Premortem history. In this case each Premortem history (except the first one) can contain less records.</p>			

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#Time

Setpoint group	Date/Time	Related FW	2.2.0
Range [units]	[HH:MM:SS]		
Default value	0:00:00	Force value	NO
Step	[-]		
Comm object	24554	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>The setpoint shows the current time from the internal RTC clock of the controller and can be also used to readjust it.</p> <p>Note: If the controller is connected to other controllers via the CAN2 bus, the setpoints #Time and #Date are automatically synchronized each hour with the controller that has lowest address. If date/time is changed at one controller it is automatically updated also in all other controllers in the group.</p> <p>Note: Setpoints with the symbol # are synchronized between controllers.</p> <p>Note: It is possible to read/write the actual time via Modbus registers 46347-46348. For more information on Modbus, please refer to the latest version of IGS-NT Communication Guide.</p>			

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#Date

Setpoint group	Date/Time	Related FW	2.2.0
Range [units]	[dd.mm.yyyy]		
Default value	1.1.2006	Force value	NO
Step	[-]		
Comm object	24553	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>The setpoint shows the date from the internal RTC clock of the controller and can be also used to readjust it.</p>			

Note: If the controller is connected to other controllers via the CAN2 bus, the setpoints #Time and #Date are automatically synchronized each hour with the controller that has lowest address. If date/time is changed at one controller it is automatically updated also in all other controllers in the group.

Note: Setpoints with the symbol # are synchronized between controllers.

Note: It is possible to read/write the actual date via Modbus registers 46349-46350. For more information on Modbus, please refer to the latest version of **IGS-NT Communication Guide**.

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Group: AFR Control

AFRValve MODE

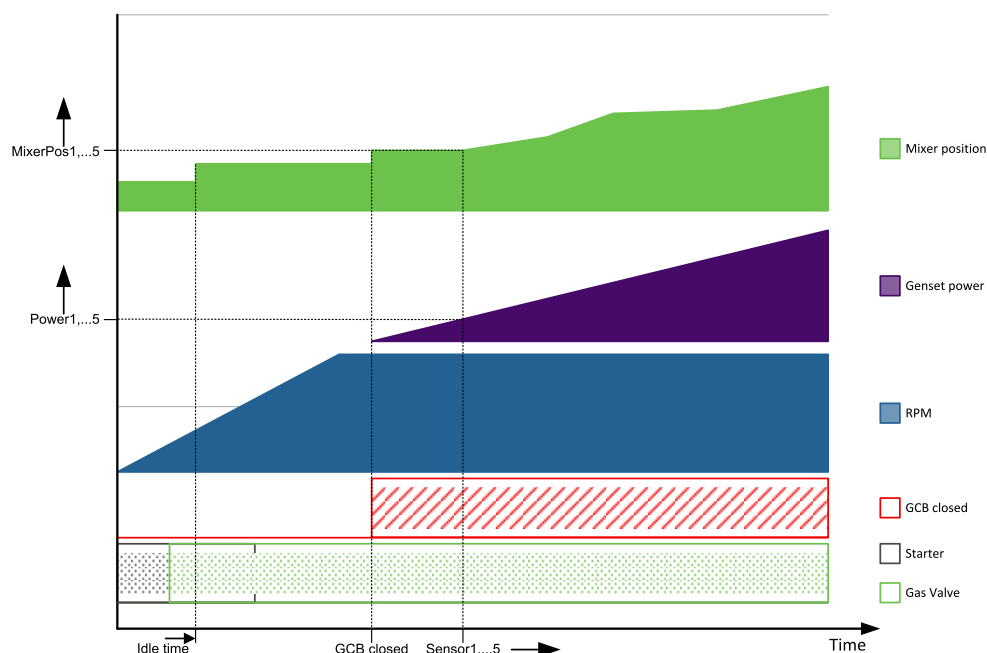
Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	MANUAL / AUTOMATIC [-]		
Default value	AUTOMATIC	Force value	NO
Step	1		
Comm object	10079	Related applications	SPtM, SPI, MINT, COX, Combi

Description

MANUAL – mixer position is defined only by setpoint **MixerPosMan** (page 547)

Note: In this case mixer takes the latest position of mixer and mixer position can be changed from this Value

AUTOMATIC – mixer position is controlled automatically according to adjusted starting, running and low power positions and then according to adjusted Sensor and power characteristics.



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MixerPosMan

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	35.00	Force value	YES
Step	0.01		
Comm object	10080	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer position when setpoint AFRValve MODE (page 546) is in position MANUAL			
<i>Note: In this case mixer takes the latest position of mixer and mixer position can be changed from this value.</i>			

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Mixer BO hyst

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	1.00	Force value	NO
Step	0.01		
Comm object	10203	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Hysteresis for Mixer binary control via Log Bout MixUPA (PAGE 792), MixDNA (PAGE 791) and MixUPB (PAGE 793), MixDNB (PAGE 792).			

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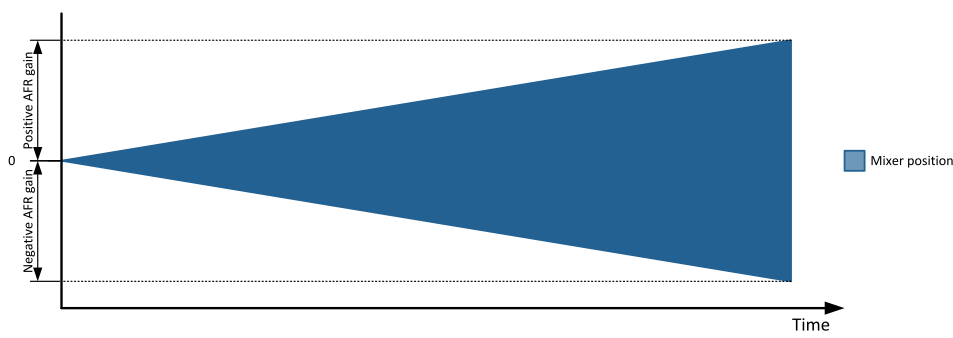
MixManOffset

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	-100.00 .. 100.00 [%]		
Default value	0.00	Force value	YES
Step	0.01		
Comm object	15086	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Adjustable setpoint for offset between two mixers. Offset is usable only if the setpoint AFRValve MODE (page 546) is in position MANUAL.			
This setpoint specify the offset of the second mixer in case of using two mixer control.			

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AFRvalve gain

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	-200.0 .. 200.0 [%]		
Default value	10.0	Force value	YES
Step	0.1		
Comm object	10876	Related applications	SPtM, SPI, MINT, COX,

			Combi
Description			
Gain for AFR control loop. AFR gain defines the direction of regulation.			
			

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AFRvalve int

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	20	Force value	YES
Step	1		
Comm object	10082	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Integration factor for AFR control loop.			
<p>Note: Rough calculation of speed of mixer position output change in %per 1 minute.</p> $\%/min = - \{sign(AFR\ gain)\}(AFR\ int \times \Delta) / 500$ <p>Where:</p> <p>AFR int = setpoint 0 to 100%</p> <p>Δ = difference between requested and actual Sensor position</p>			
<p>Example: Sensor requested value = 1,000 Bar</p> <p>Sensor actual value = 0,900 Bar</p> <p>AFR int = 50%</p> <p>- 50 x 100 / 500 = -10 %/min</p>			
<p>Note: Mixer position output speed doesn't depend on AFRvalve gain (page 547) setting.</p>			

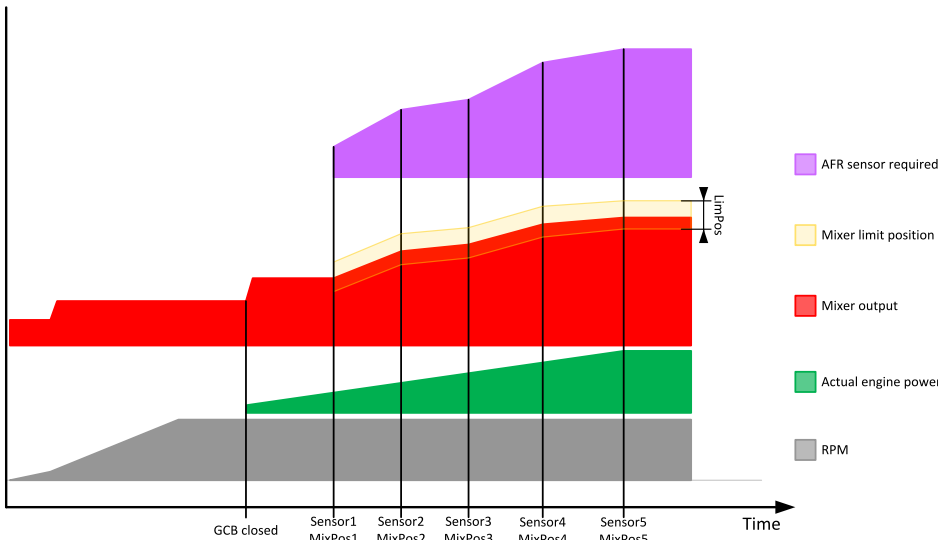
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AFRvalve der

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0 .. 100 [%]		
Default value	5	Force value	YES
Step	1		
Comm object	10083	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Derivative factor for AFR control loop.			

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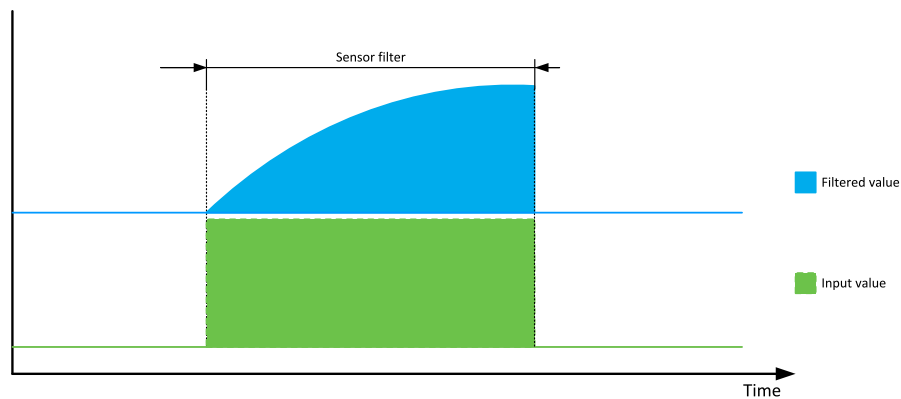
LimPos

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	5.00	Force value	YES
Step	0.01		
Comm object	13571	Related applications	SPtM, SPI, MINT, COX, Combi
Description <p>Required sensor position due to AFR PID regulation can be limited by adjusting of this setpoint.</p> <p>For each Sensor and Power value is dedicated mixer position. LimPos defines the maximum offset of this required position.</p> <p>If the maximum offset is reached, the Log Bout AFR LIMB (PAGE 761) is activated.</p>			
			

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Sensorfiltr

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0 .. 100 [-]		
Default value	0	Force value	NO
Step	1		
Comm object	13143	Related applications	SPtM, SPI, MINT, COX, Combi
Description <p>Filter on input value of the sensor.</p> <p>Mainly used for lambda sensors where can be the current value filtered on floating average.</p> <p>The time constant is given by adjusting of the setpoint, where 0 means filter OFF and 100 is 17 s.</p>			



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MATreference

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	30	Force value	NO
Step	1		
Comm object	15055	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Setpoint defines the reference value for what is AFR Sensor curve adjusted.			
IMPORTANT: Range and resolution of the setpoint is defined by setting of LAI: MAT A (PAGE 886).			

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MATcorrection

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	0	Force value	NO
Step	1		
Comm object	10074	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Setpoint defines the offset per step which is added to required Sensor Value MAT A (PAGE 886) in case the Sensor Value varies from the MATreference (page 550) setpoint.			
IMPORTANT: Because one step from MATreference (page 550) means one step of MATcorrection check always the correct resolution of MAT A (PAGE 886).			

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SensorCorrLim

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	0	Force value	YES

Step	1		
Comm object	12083	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Setpoint defines maximum allowable change of Sensor required Value due to the MATcorrection (page 550) algorithm.			
Use this setpoint to block the MATcorrection (page 550) contribution in case the MAT Value varies significantly from the MATreference (page 550) .			

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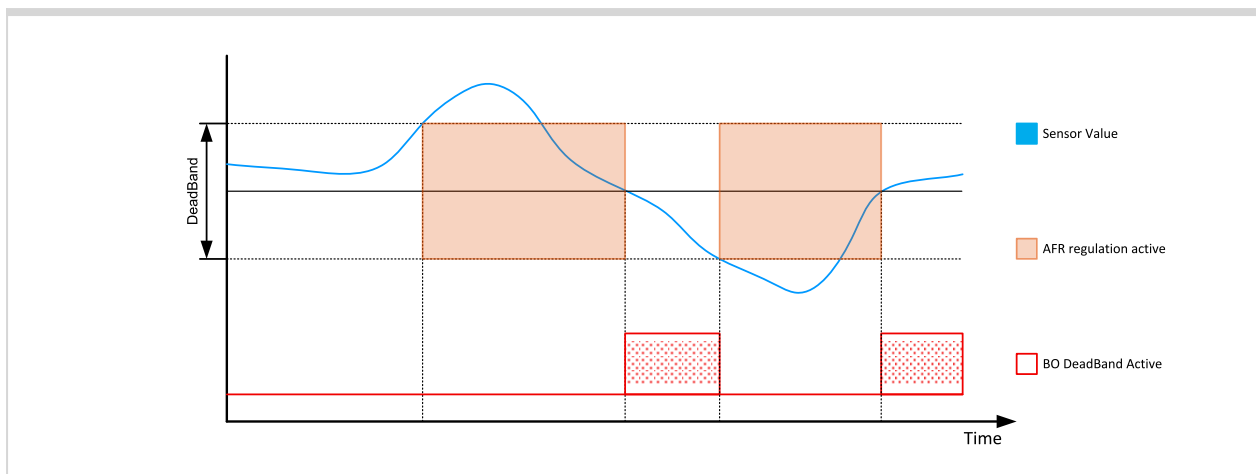
AFRPIDmulti

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	1 .. 10 [-]		
Default value	1	Force value	NO
Step	1		
Comm object	14455	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Value from this setpoint will multiply integral part of regulation and results will be used for AFR PID control.			

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DeadBand

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	01	Force value	NO
Step	1		
Comm object	15492	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Deadband defines when the AFR PID control is frozen and keep the value from PID until the sensor value is out of the adjusted range.			
Regulation is then again activated till the sensor value across again the sensor required value (0 deviation)			
During the deadband activation the Log Bout AFR DBA (PAGE 759) or Log Bout AFR DBB (PAGE 759) is activated.			



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MisfSensReduct

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	0	Force value	NO
Step	1		
Comm object	10084	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
When the LBI: MISFIRING (PAGE 728) is active the value AFRSensReqA (page 669) is reduced.			

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MisfLdRed del

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0 .. Misfiring del (page 552) [s]		
Default value	5	Force value	NO
Step	1		
Comm object	10085	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Engine power starts to be reduced after delay given by this setpoint when LBI MISFIRING (PAGE 728) is active.			

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Misfiring del

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	MisfLdRed del (page 552) .. 600 [s]		
Default value	30	Force value	NO
Step	1		
Comm object	10086	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Slow stop protection is activated after delay given by this setpoint when LBI MISFIRING (PAGE 728) is active.			

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Knocking del

Setpoint group	AFR Control	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	30	Force value	NO
Step	1		
Comm object	10087	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Shut down protection is activated after delay given by this setpoint when LBI DxLOADREDUCT (PAGE 678) is active.			

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Group: AFR MIX A

StartTimeAFRA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	14358	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
AFR control can be postponed by adjusting of this setpoint.			
Time starts to be counted when the IGNITION (PAGE 782) is activated.			

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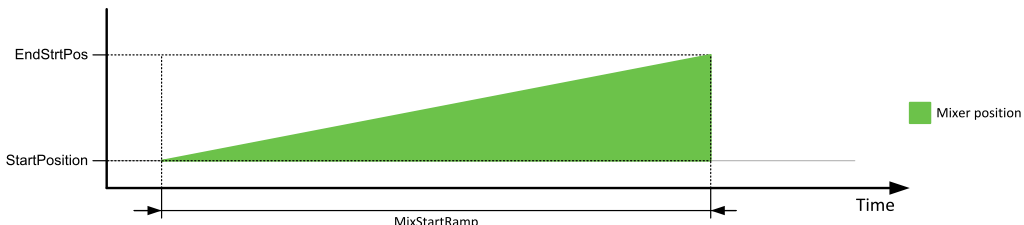
StartPositionA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	35.00	Force value	YES
Step	0.01		
Comm object	10063	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer fix position for Engine start.			

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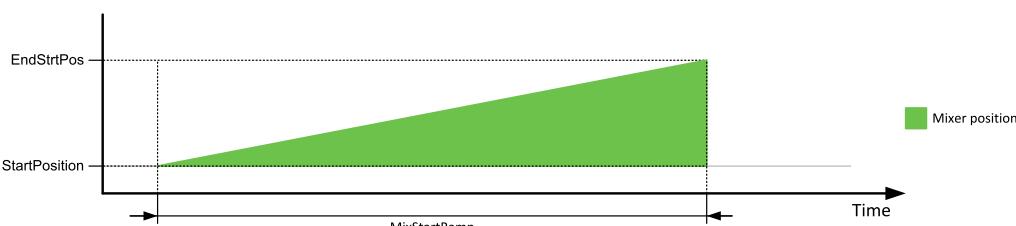
EndStrtPosA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.0 .. 100.00 [%]		
Default value	35.00	Force value	YES
Step	0.01		
Comm object	15026	Related applications	SPtM, SPI, MINT, COX,

			Combi
Description			
Mixer starts on the StartPositionA (page 553) and during the cranking phase starts to move. This setpoint defines the end position of the mixer during the cranking phase.			
			

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MixStartRampA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0 .. 240 [s]		
Default value	1	Force value	YES
Step	1		
Comm object	15028	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Setpoint defines the ramp for mixer moving from StartPositionA (page 553) during the cranking procedure to reach the EndStrtPosA (page 553).			
			

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RunPositionA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	30.00	Force value	YES
Step	0.01		
Comm object	10065	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer fixed position for reaching the Nominal RPM (page 355). Position is activated after Idle time (page 381) is counted down and stays active till the GCB is closed.			
During the unload phase is the RunPosition activated when the GCB is opened and till the engine stops.			

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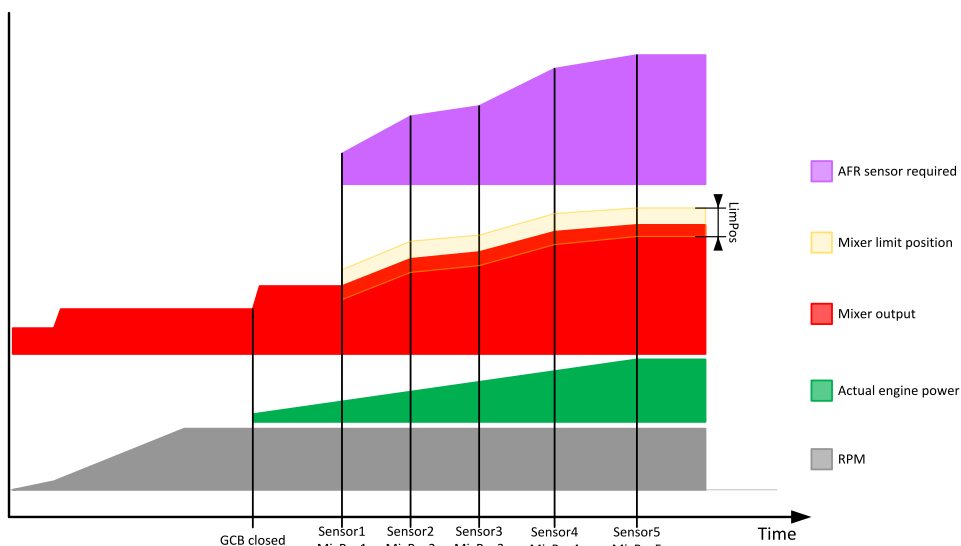
LoPwrPositionA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	25.00	Force value	YES
Step	0.01		
Comm object	10067	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer fixed position after the GCB is closed until the Gen-set reaches the first point of Sensor1A (page 555) and Power1A (page 555) value.			

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Power1A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.0 .. Power2A (page 556) [kW]		
Default value	10.0	Force value	NO
Step	0.1		
Comm object	8420	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The first Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.			



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Sensor1A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8432	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Range and dimension of the sensor is taken over from LAI **SENSOR A (PAGE 895)** settings.

First point of required sensor Value characteristic related to **Power1A (page 555)**.

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MixPos1A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	10.00	Force value	NO
Step	0.01		
Comm object	8408	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
First required mixer position for actual power and from that related Sensor value.			

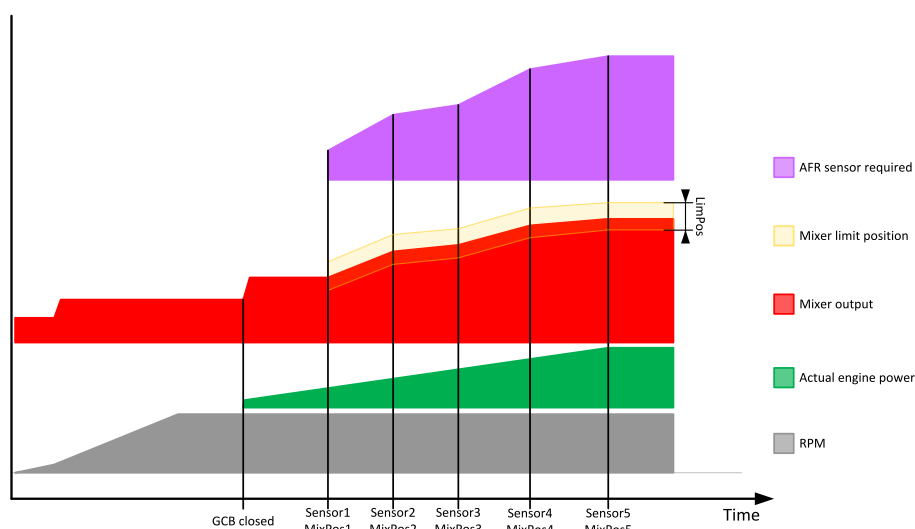
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Power2A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Power1A (page 555) .. Power3A (page 557) [kW]		
Default value	15.0	Force value	NO
Step	0.1		
Comm object	8421	Related applications	SPtM, SPI, MINT, COX, Combi

Description

The second Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.



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Sensor2A

Setpoint group	AFR MIX A	Related FW	2.2.0
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Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8433	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSOR A (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power2A (page 556) .			

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MixPos2A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	20.00	Force value	NO
Step	0.01		
Comm object	8409	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Second required mixer position for actual power and from that related Sensor value.			

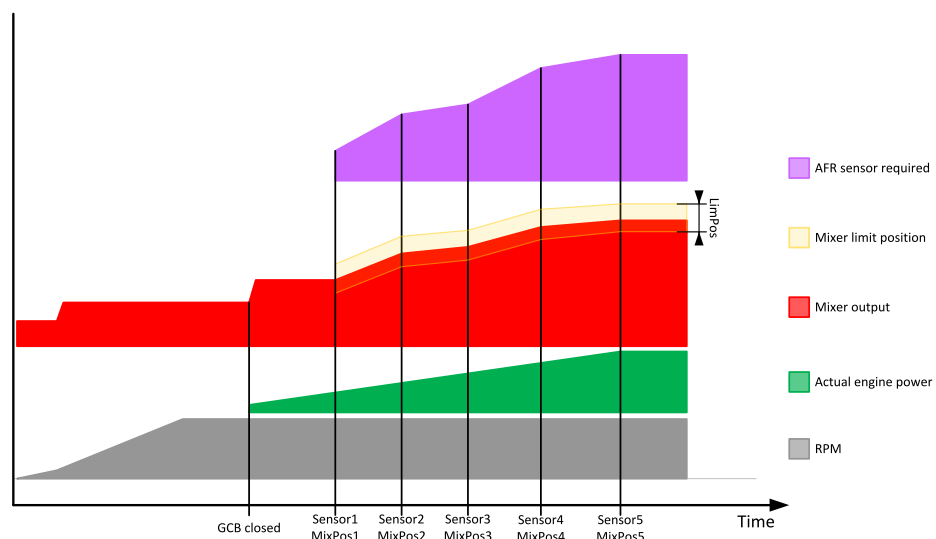
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Power3A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Power2A (page 556) .. Power4A (page 558) [kW]		
Default value	20.0	Force value	NO
Step	0.1		
Comm object	8422	Related applications	SPtM, SPI, MINT, COX, Combi

Description

The third Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.



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Sensor3A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8434	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSOR A (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power3A (page 557) .			

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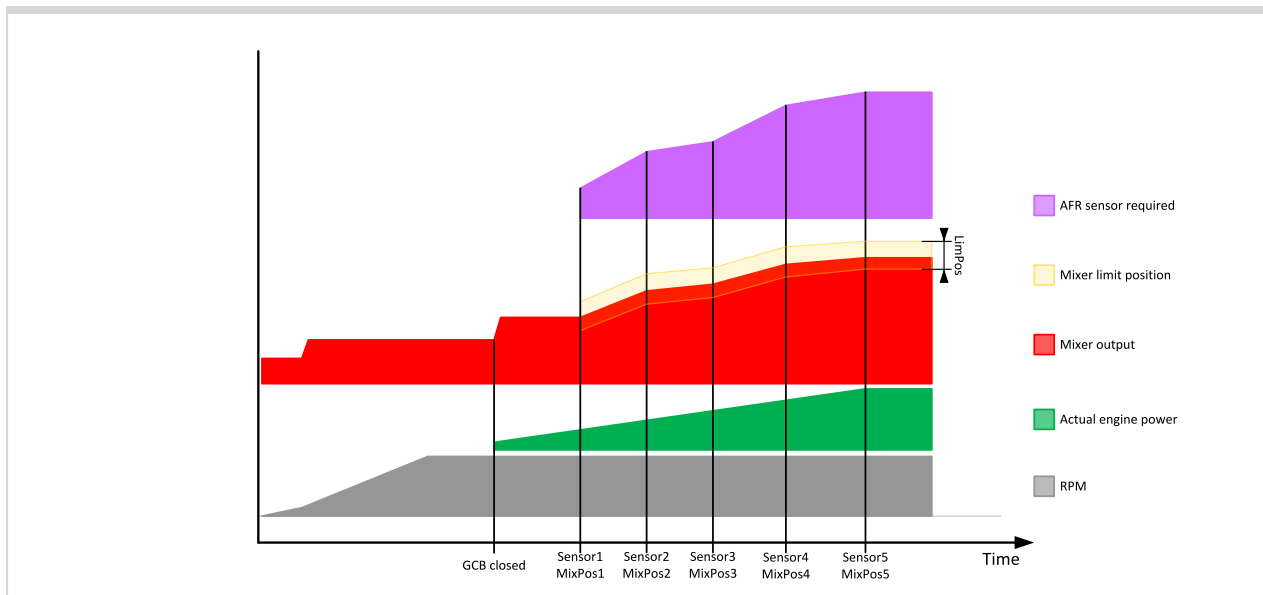
MixPos3A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	30.00	Force value	NO
Step	0.01		
Comm object	8410	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Third required mixer position for actual power and from that related Sensor value.			

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Power4A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Power3A (page 557) .. Power5A (page 559) [kW]		
Default value	25.0	Force value	NO
Step	0.1		
Comm object	8423	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The third Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.			



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Sensor4A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8435	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSOR A (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power4A (page 558).			

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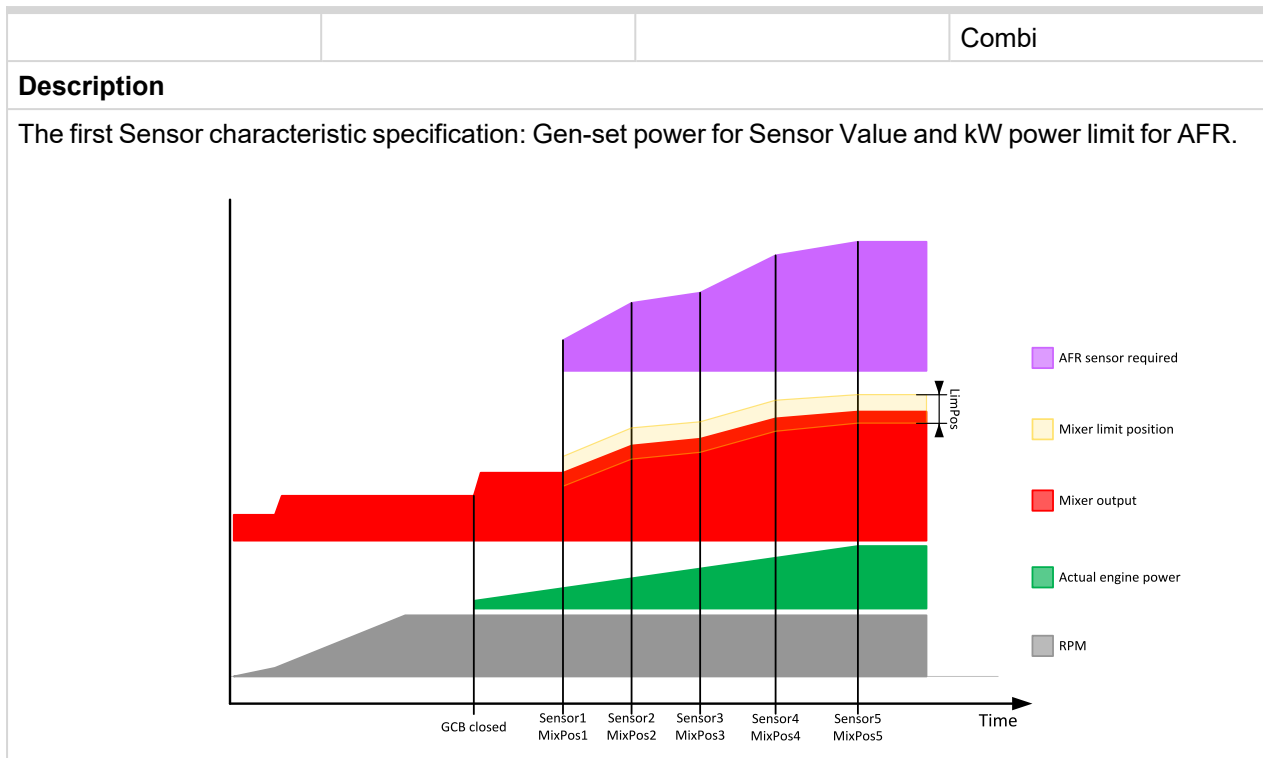
MixPos4A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	40.00	Force value	NO
Step	0.01		
Comm object	8411	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Fourth required mixer position for actual power and from that related Sensor value.			

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Power5A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Power4A (page 558) 3200.0 [kW]		
Default value	30.0	Force value	NO
Step	0.1		
Comm object	8424	Related applications	SPtM, SPI, MINT, COX,



🔍 back to List of setpoints

Sensor5A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8436	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSOR A (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power5A (page 559).			

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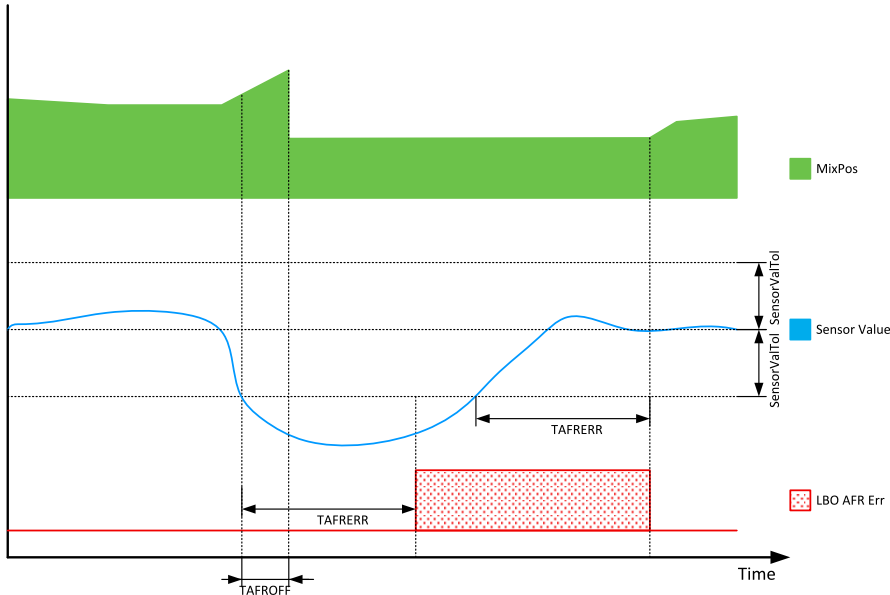
MixPos5A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	60.00	Force value	NO
Step	0.01		
Comm object	8412	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Fifth required mixer position for actual power and from that related Sensor value.			

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TAFROFFA

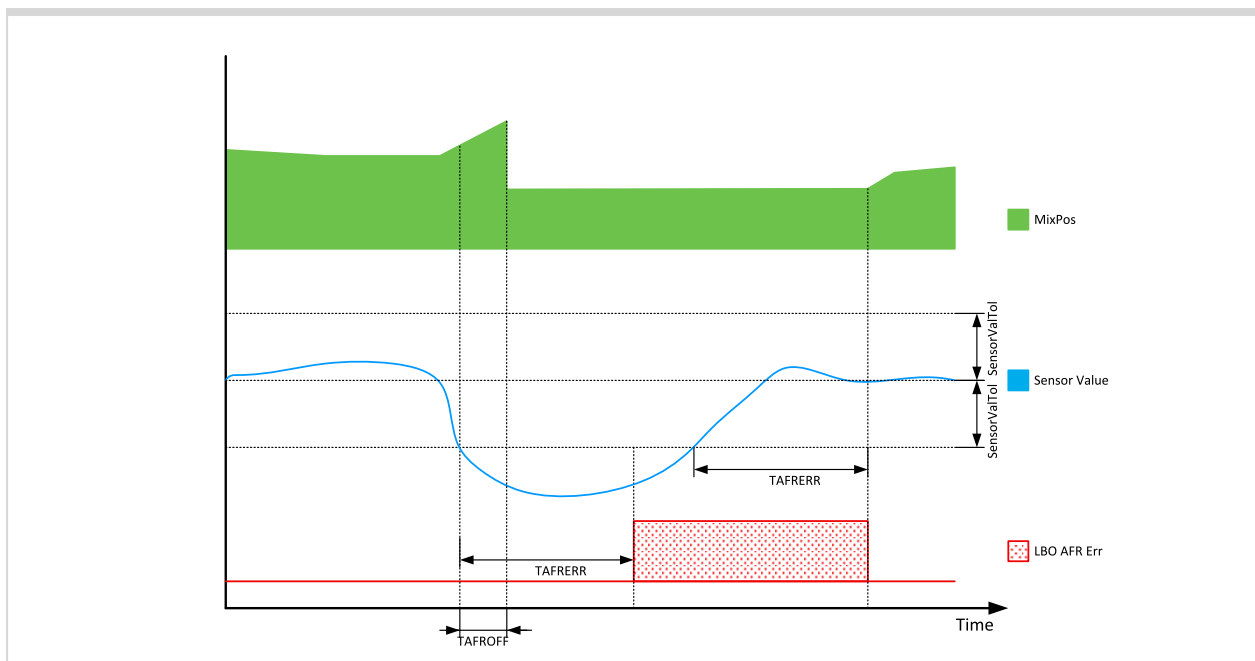
Setpoint group	AFR MIX A	Related FW	2.2.0
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Range [units]	0 .. 30 [s]		
Default value	1	Force value	NO
Step	1		
Comm object	14354	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>When the actual sensor value goes above the adjusted tolerance level SensorValToIA (page 562), then after this delay time is mixer position fixed to related level based on actual power.</p>			
 <p>The diagram shows three signals over time: MixPos (green area), Sensor Value (blue line), and LBO AFR Err (red hatched area). The Sensor Value fluctuates around a baseline. When it rises above the SensorValToIa threshold, a delay TAFRERR occurs before MixPos is fixed to a higher level. When it falls below the SensorValToL threshold, a delay TAFRERR occurs before MixPos is fixed to a lower level. The LBO AFR Err is active (hatched) during the TAFRERR delay periods. TAFROFF is indicated at the start of the first delay period.</p>			

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TAFRERRA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0 .. 300 [s]		
Default value	20	Force value	NO
Step	1		
Comm object	14356	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>Time for initialization of Sensor Fail.</p> <p>Error is initialized when the Sensor Value is for this adjusted time over the SensorValToIA (page 562). LBO is initialized.</p> <p>When the sensor Value is for this adjusted time under the SensorValToIA (page 562), the LBO is deactivated.</p>			



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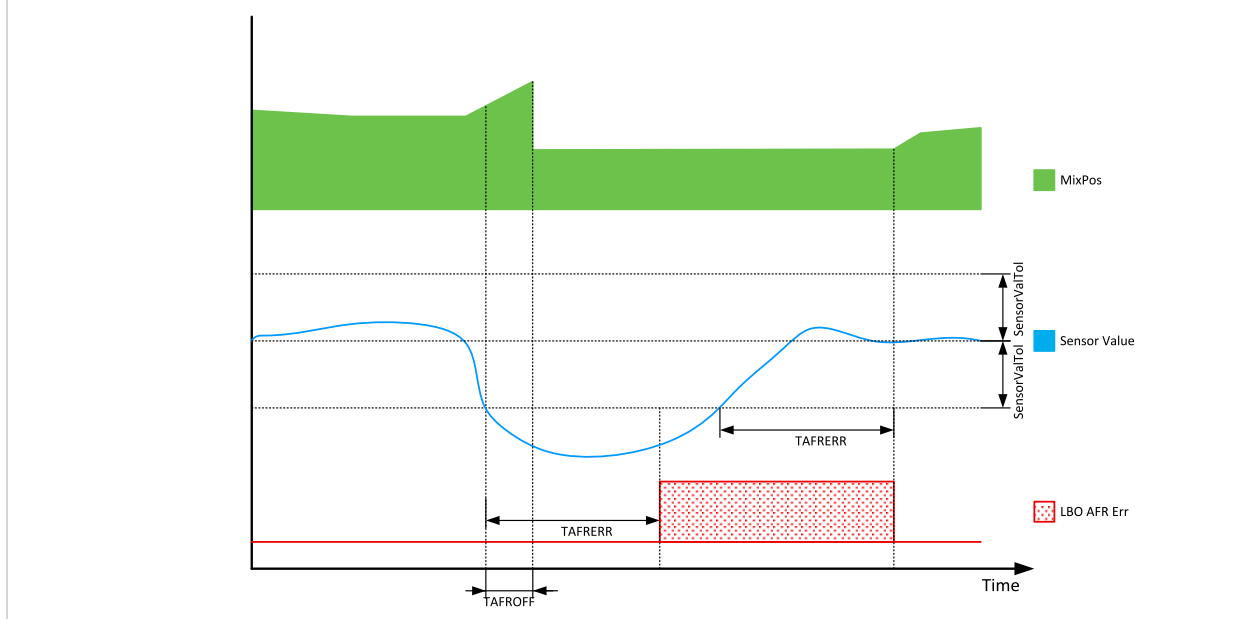
SensorValTolA

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	NO
Step	1		
Comm object	14352	Related applications	SPTM, SPI, MINT, COX, Combi

Description

Limit of sensor Value.

When is the actual sensor value over this limit, AFR control loop is deactivated and LBO **AFR ERR** (PAGE 760) is initiated.



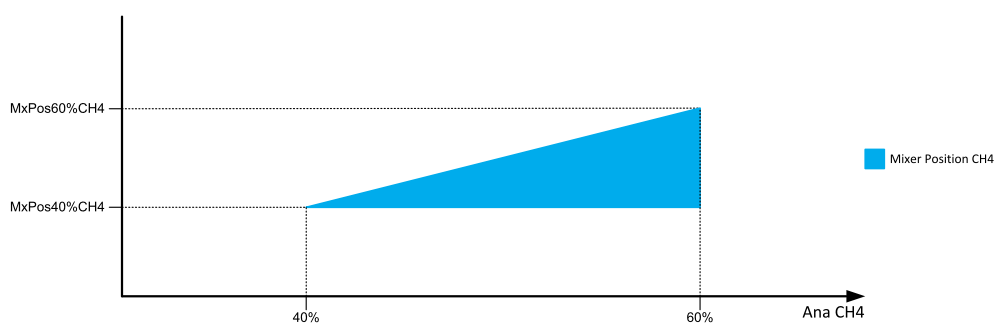
🔍 back to List of setpoints

MxPos40%CH4A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	40.00	Force value	NO
Step	0.01		
Comm object	10790	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Setpoint for transformation from CH4 content to Mixer position output.



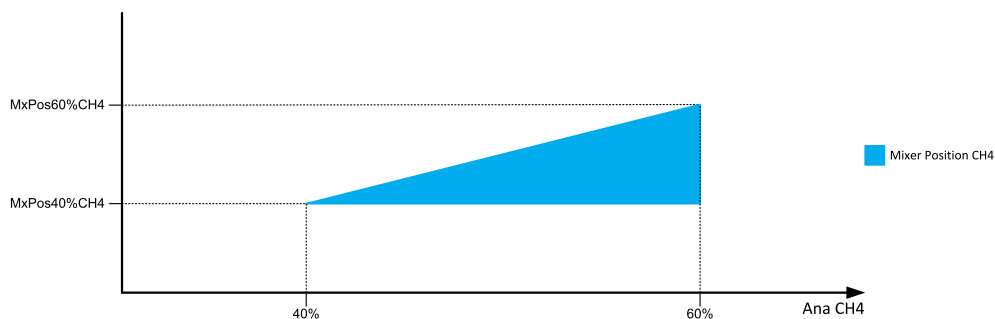
[back to List of setpoints](#)

MxPos60%CH4A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	60.00	Force value	NO
Step	0.01		
Comm object	10791	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Setpoint for transformation from CH4 content to Mixer position output.



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Ana CH4A

Setpoint group	AFR MIX A	Related FW	2.2.0
Range [units]	DISABLED / ENA-FIX / ENA-STEP [-]		

Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	10068	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
DISABLED – Mixer position for engine start and running is defined by Setpoints: StartPositionA (page 553), RunPositionA (page 554) and LoPwrPositionA (page 555).			
ENA-FIX – Mixer position for engine start and running is defined by LAI: ANA CH4A (PAGE 869) and by setting of MxPos40%CH4A (page 563), MxPos60%CH4A (page 563).			
ENA-STEP – Mixer output = ENA-FIX + corresponding difference between StartPositionA (page 553), RunPositionA (page 554) and LoPwrPositionA (page 555).			
Example: Differences calculation for ENA-STEP:			
LBI: GASAB (PAGE 706)	0	1	
Dif1	RunPositionA (page 554) – StartPositionA (page 553)	RunPositionB (page 566) – StartPositionB (page 565)	
Dif2	LoPwrPositionA (page 555) – StartPositionA (page 553)	LoPwrPositionB (page 566) – StartPositionB (page 565)	
Ana CH4	Start	Run	Low power
DISABLE	StartPositionA (page 553)	RunPositionA (page 554)	LoPwrPositionA (page 555)
ENA-FIX	ANA CH4A (PAGE 869) + MxPos40%CH4A (page 563), MxPos60%CH4A (page 563).	ANA CH4A (PAGE 869) + MxPos40%CH4A (page 563), MxPos60%CH4A (page 563).	ANA CH4A (PAGE 869) + MxPos40%CH4A (page 563), MxPos60%CH4A (page 563).
ENA-STEP	ENA-FIX	ENA-FIX+DIF1	ENA-STEP+DIF2

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Group: AFR MIX B

StartTimeAFRB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0 .. 600 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	14359	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
AFR control can be postponed by adjusting of this setpoint.			
Time starts to be counted when the IGNITION (PAGE 782) is activated.			

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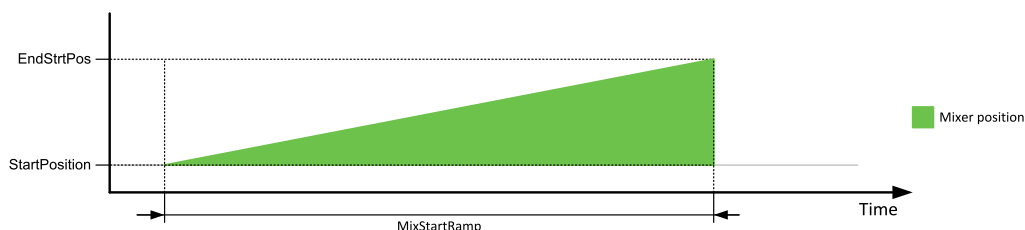
StartPositionB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	35.00	Force value	YES
Step	0.01		
Comm object	10064	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer fix position for Engine start.			

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EndStrtPosB

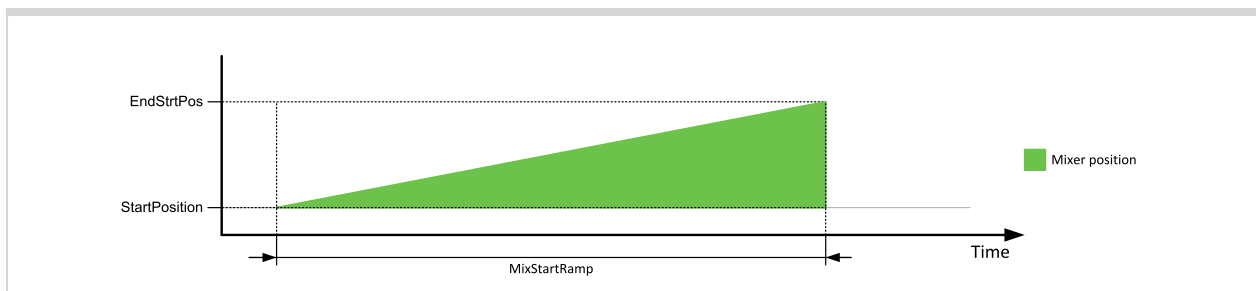
Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.0 .. 100.00 [%]		
Default value	35.00	Force value	YES
Step	0.01		
Comm object	15027	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer starts on the StartPositionB (page 565) and during the cranking phase starts to move. This setpoint defines the end position of the mixer during the cranking phase.			



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MixStartRampB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0 .. 240 [s]		
Default value	1	Force value	YES
Step	1		
Comm object	15029	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Setpoint defines the ramp for mixer moving from StartPositionB (page 565) during the cranking procedure to reach the EndStrtPosB (page 565).			



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RunPositionB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	10066	Force value	YES
Step	0.01		
Comm object	10066	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer fixed position for reaching the Nominal RPM (page 355) . Position is activated after Idle time (page 381) is counted down and stays active till the GCB is closed.			
During the unload phase is the RunPosition activated when the GCB is opened and till the engine stops.			

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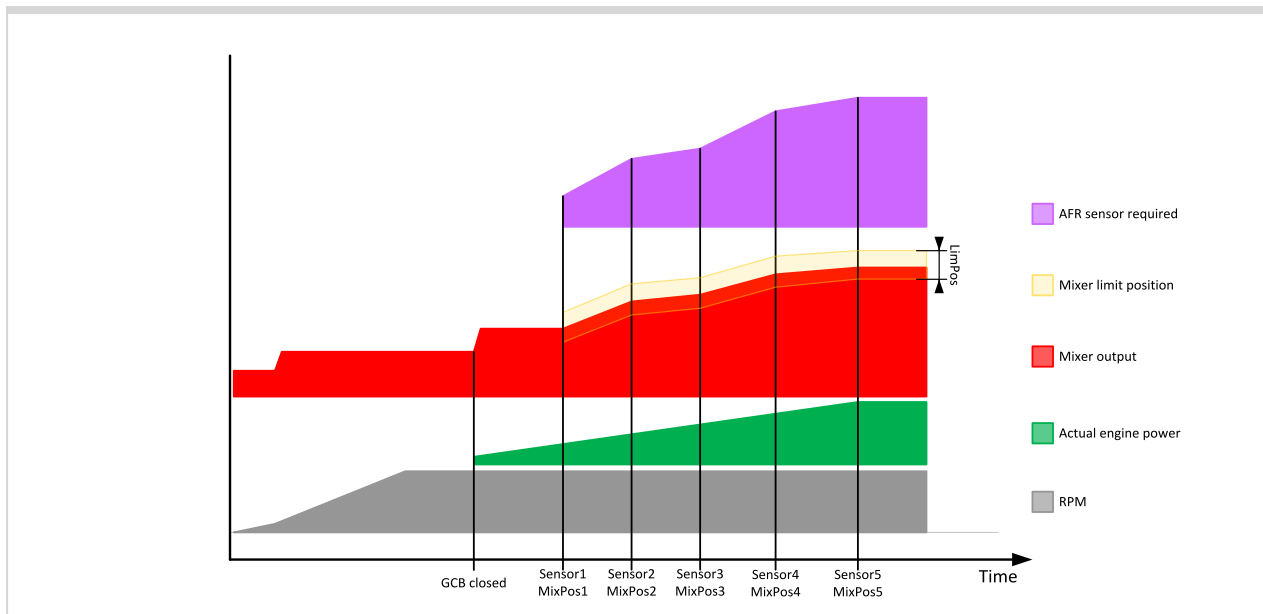
LoPwrPositionB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	25.00	Force value	YES
Step	0.01		
Comm object	11575	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer fixed position after the GCB is closed until the Gen-set reaches the first point of Sensor1B (page 567) and Power1B (page 566) value.			

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Power1B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.0 .. Power2B (page 567) [kW]		
Default value	10.0	Force value	NO
Step	0.1		
Comm object	8456	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The first Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.			



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Sensor1B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8468	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSORB (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power2B (page 567).			

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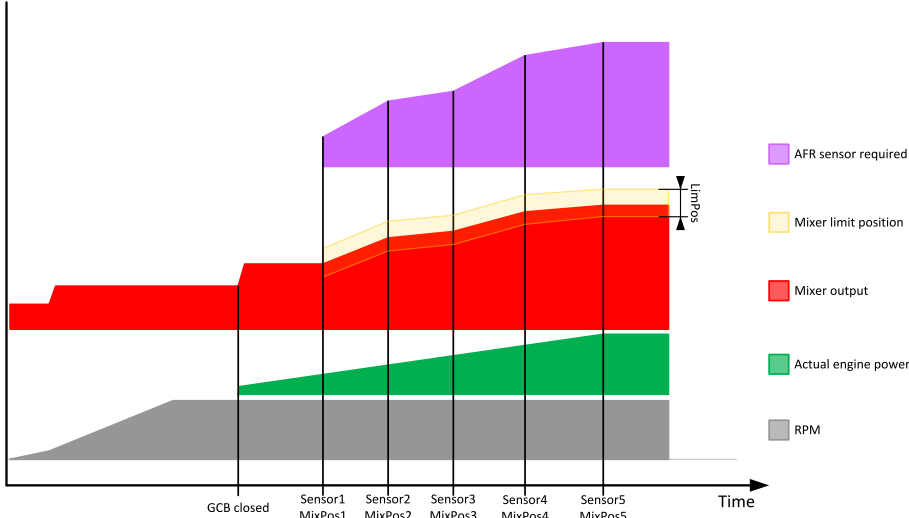
MixPos1B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	10.00	Force value	NO
Step	0.01		
Comm object	8742	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
First required mixer position for actual power and from that related Sensor value.			

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Power2B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Power1B (page 566) .. Power3B (page 569) [kW]		
Default value	15.0	Force value	NO
Step	0.1		

Comm object	8457	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The second Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.			
			

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Sensor2B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8469	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSORB (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power2B (page 567) .			

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MixPos2B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	20.00	Force value	NO
Step	0.01		
Comm object	8743	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Second required mixer position for actual power and from that related Sensor value.			

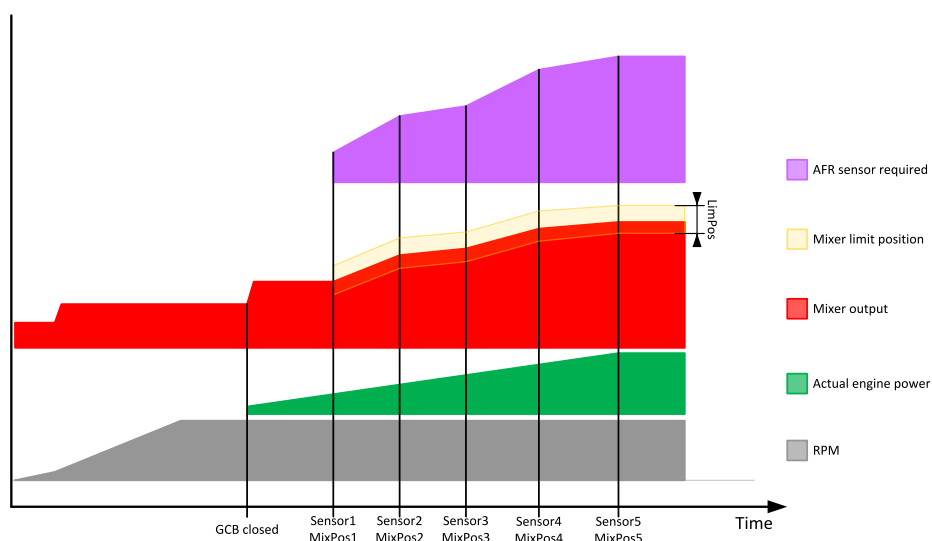
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Power3B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Power2B (page 567) .. Power4B (page 570) [kW]		
Default value	20.0	Force value	NO
Step	0.1		
Comm object	8458	Related applications	SPtM, SPI, MINT, COX, Combi

Description

The third Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.



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Sensor3B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8470	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Range and dimension of the sensor is taken over from LAI **SENSORB (PAGE 895)** settings.

First point of required sensor Value characteristic related to **Power3B (page 569)**.

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MixPos3B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	30.00	Force value	NO
Step	0.01		
Comm object	8744	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Third required mixer position for actual power and from that related Sensor value.

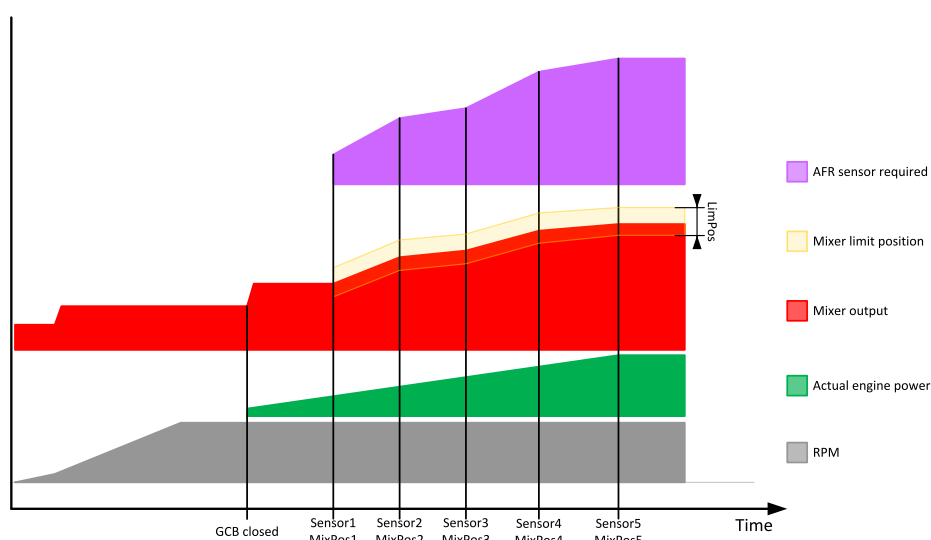
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Power4B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Power3B (page 569) .. Power5B (page 571) [kW]		
Default value	25.0	Force value	NO
Step	0.1		
Comm object	8459	Related applications	SPtM, SPI, MINT, COX, Combi

Description

The third Sensor characteristic specification: Gen-set power for Sensor Value and kW power limit for AFR.



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Sensor4B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8471	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Range and dimension of the sensor is taken over from LAI **SENSORB (PAGE 895)** settings.

First point of required sensor Value characteristic related to **Power4B (page 570)**.

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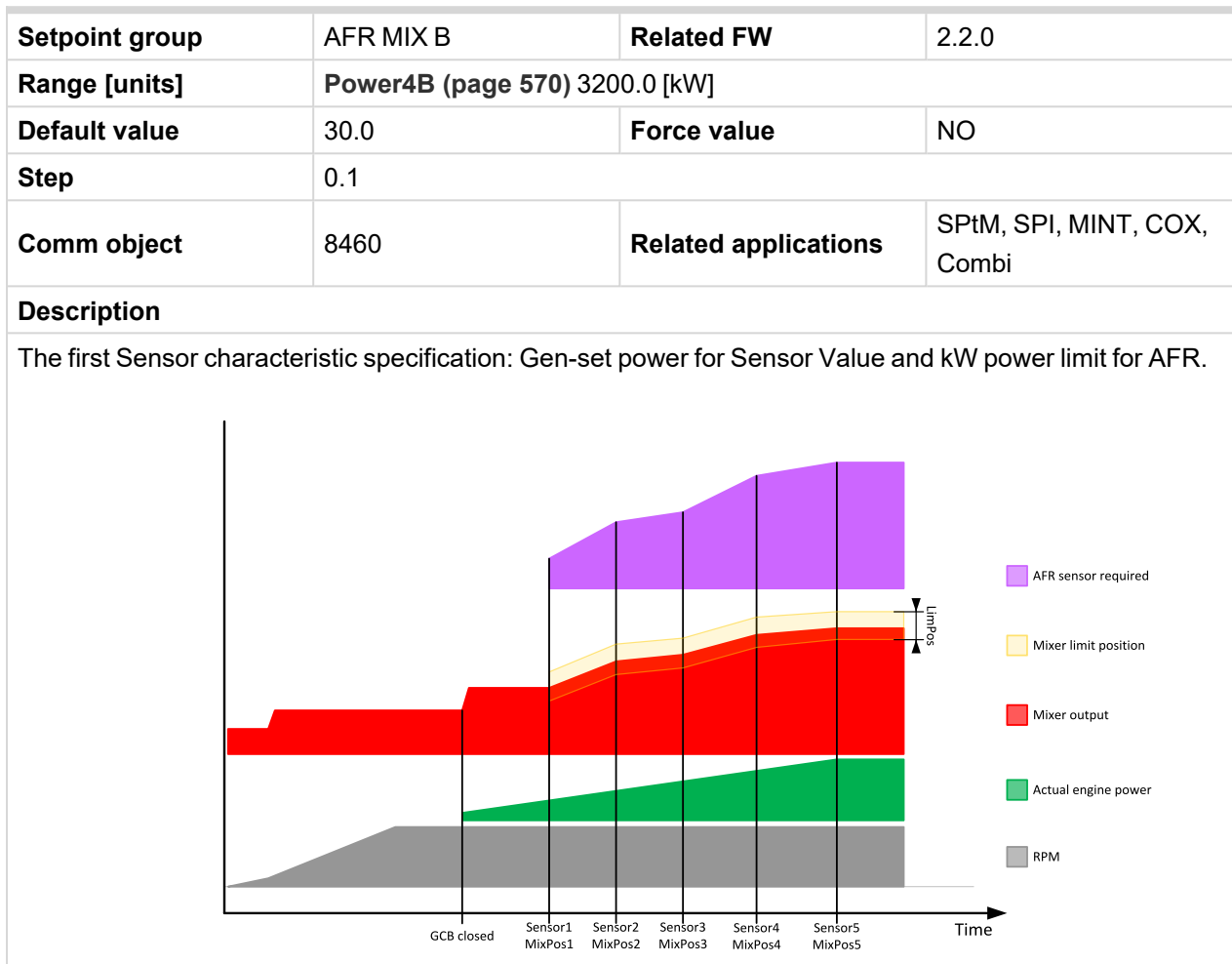
MixPos4B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		

Default value	40.00	Force value	NO
Step	0.01		
Comm object	8745	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Fourth required mixer position for actual power and from that related Sensor value.			

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Power5B



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Sensor5B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	YES
Step	1		
Comm object	8472	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Range and dimension of the sensor is taken over from LAI SENSORB (PAGE 895) settings.			
First point of required sensor Value characteristic related to Power5B (page 571) .			

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MixPos5B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	60.00	Force value	NO
Step	0.01		
Comm object	8746	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Fifth required mixer position for actual power and from that related Sensor value.			

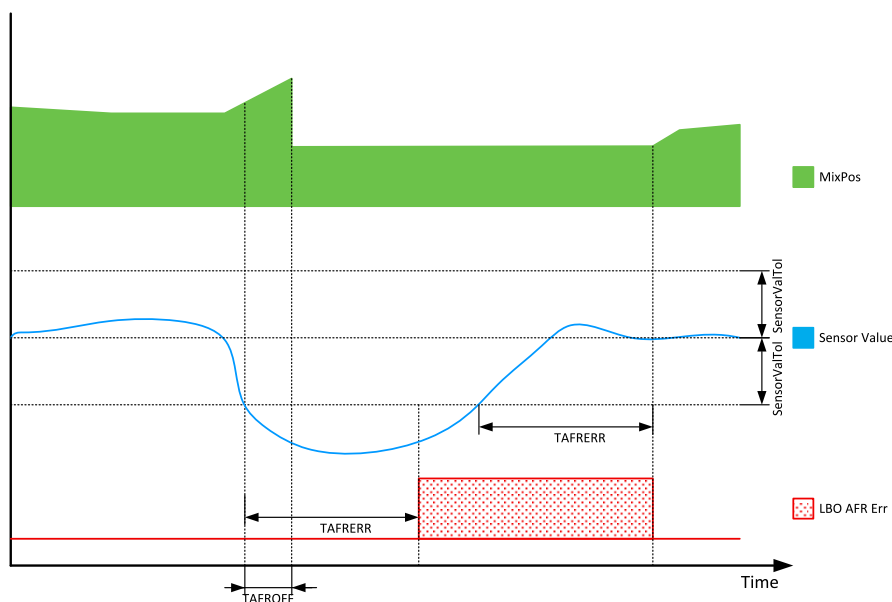
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TAFROFFB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0 .. 30 [s]		
Default value	1	Force value	NO
Step	1		
Comm object	14355	Related applications	SPtM, SPI, MINT, COX, Combi

Description

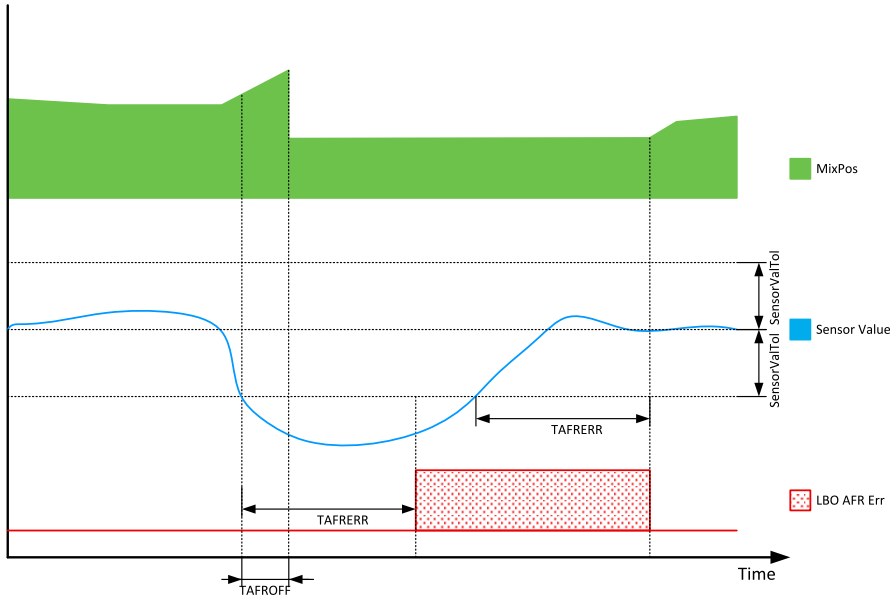
When the actual sensor value goes above the adjusted tolerance level **SensorValToIB (page 573)**, then after this delay time is mixer position fixed to related level based on actual power.



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TAFRERRB

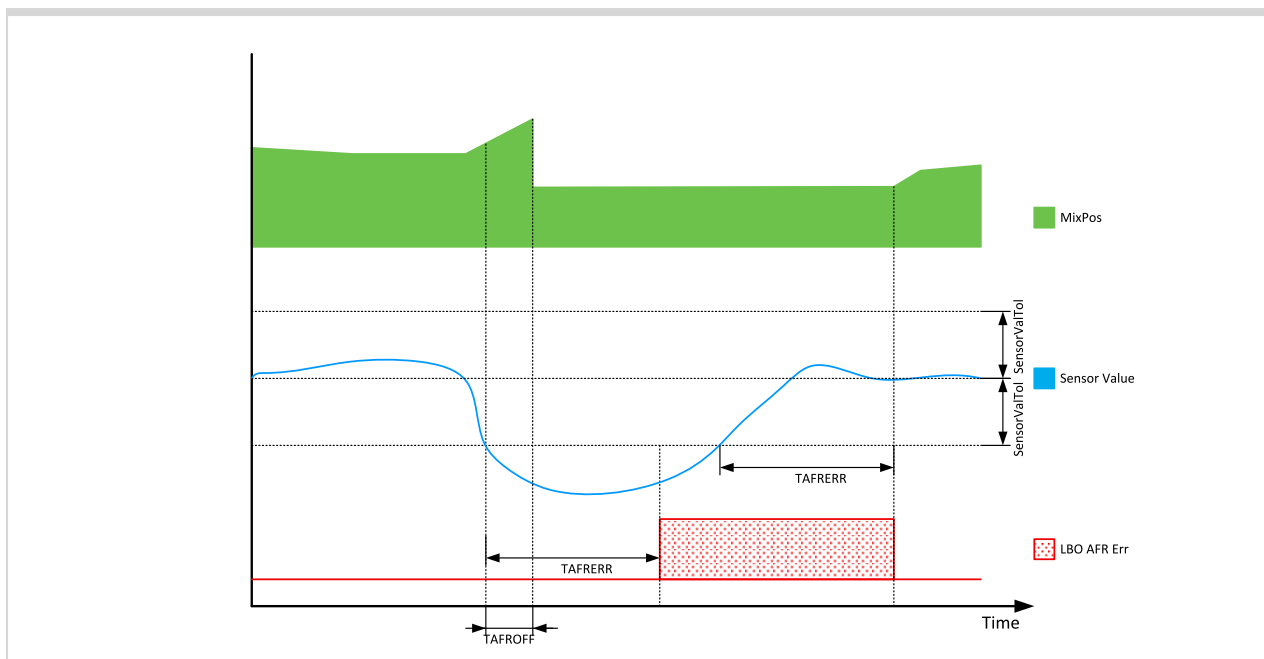
Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0 .. 300 [s]		
Default value	20	Force value	NO
Step	1		

Comm object	14357	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Time for initialization of Sensor Fail.			
Error is initialized when the Sensor Value is for this adjusted time over the SensorValToIB (page 573).			
LBO is initialized.			
When the sensor Value is for this adjusted time under the SensorValToIB (page 573), the LBO is deactivated.			
			

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SensorValToIB

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	Sensor range [Dim]		
Default value	1	Force value	NO
Step	1		
Comm object	14353	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Limit of sensor Value.			
When is the actual sensor value over this limit, AFR control loop is deactivated and LBO AFR ER RB (PAGE 761) is initiated.			



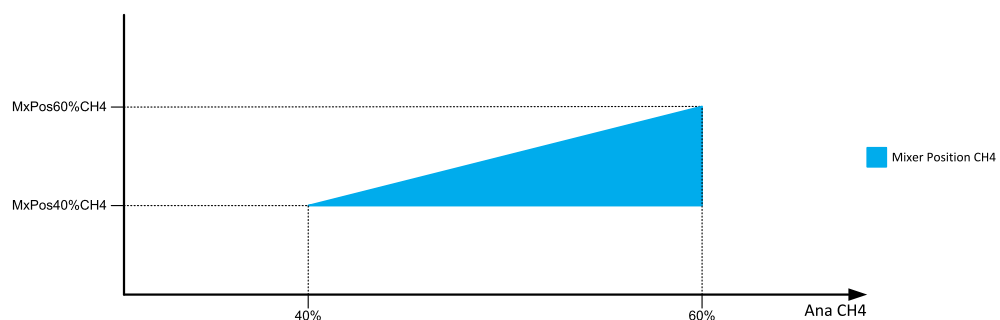
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MxPos40%CH4B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	40.00	Force value	NO
Step	0.01		
Comm object	14360	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Setpoint for transformation from CH4 content to Mixer position output.



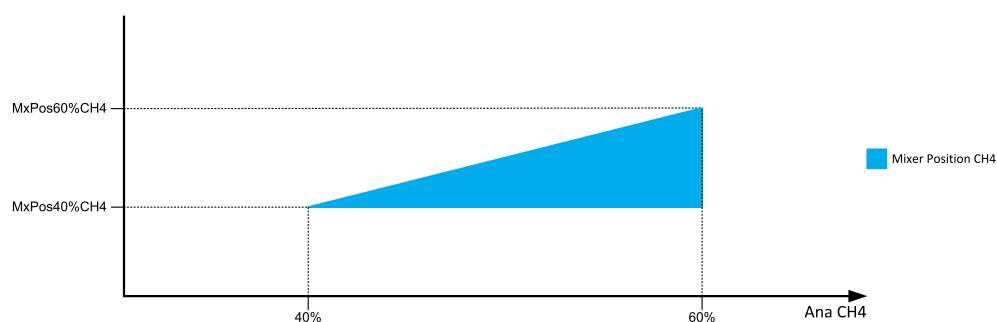
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MxPos60%CH4B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	0.00 .. 100.00 [%]		
Default value	60.00	Force value	NO
Step	0.01		
Comm object	14361	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Setpoint for transformation from CH4 content to Mixer position output.



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Ana CH4B

Setpoint group	AFR MIX B	Related FW	2.2.0
Range [units]	DISABLED / ENA-FIX / ENA-STEP [-]		
Default value	DISABLED	Force value	NO
Step	[-]		
Comm object	14362	Related applications	SPtM, SPI, MINT, COX, Combi

Description

DISABLED – Mixer position for engine start and running is defined by Setpoints: **StartPositionB** (page 565), **RunPositionB** (page 566) and **LoPwrPositionB** (page 566).

ENA-FIX – Mixer position for engine start and running is defined by LAI: **ANA CH4B** (PAGE 870) and by setting of **MxPos40%CH4B** (page 574), **MxPos60%CH4B** (page 574).

ENA-STEP – Mixer output = ENA-FIX + corresponding difference between **StartPositionB** (page 565), **RunPositionB** (page 566) and **LoPwrPositionB** (page 566).

Example: Differences calculation for ENA-STEP:

LBI: GASAB (PAGE 706)	0	1
Dif1	RunPositionA (page 554) – StartPositionA (page 553)	RunPositionB (page 566) – StartPositionB (page 565)
Dif2	LoPwrPositionA (page 555) – StartPositionA (page 553)	LoPwrPositionB (page 566) – StartPositionB (page 565)

Ana CH4	Start	Run	Low power
DISABLE	StartPositionB (page 565)	RunPositionB (page 566)	LoPwrPositionB (page 566)
ENA-FIX	ANA CH4B (PAGE 870) + MxPos40%CH4B (page 574), MxPos60%CH4B (page 574).	ANA CH4B (PAGE 870) + MxPos40%CH4B (page 574), MxPos60%CH4B (page 574).	ANA CH4B (PAGE 870) + MxPos40%CH4B (page 574), MxPos60%CH4B (page 574).
ENA-STEP	ENA-FIX	ENA-FIX+DIF1	ENA-STEP+DIF2

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Group: ECON4-EngRPM

Idle RPM

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	Starting RPM (page 378) .. Nominal RPM (page 355) [RPM]		
Default value	1000	Force value	NO
Step	1		
Comm object	7186	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Engine idle speed.			

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BI Speed ramp

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	1.0 .. 100.0 [s]		
Default value	50	Force value	NO
Step	1.0		
Comm object	7170	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Define how fast changes the requested engine speed if the binary inputs SPEED UP or SPEED DOWN are active. <i>BI Speed ramp</i> is actually time that the ramp needs to go from Nominal RPM (page 579) - 8% to Nominal RPM (page 579) + 8% and vice versa. The ramping speed is the same for both up and down			

directions.

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CB request

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	BIN / DATA		
Default value	DATA	Force value	NO
Step	[-]		
Comm object	14363	Related applications	SPtM, SPI, MINT, COX, Combi

Description

CB Request value	CB position information source
BIN	Terminal S4.1 and S4.2
DATA	CAN bus

Note: If possible, use binary control for CB request and wire terminal S4.1 and S4.2 to feedback signal. This will assure fastest reaction of ECON4 when breaker is closed or opened. This is crucial to avoid over speed in case of opening GCB under load for example.



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Gear teeth

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	32 .. 400 [-]		
Default value	256	Force value	NO
Step	1		
Comm object	7188	Related applications	SPtM, SPI, MINT, COX, Combi

Description

Number of teeth on the engine gear for the pick-up.

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Overspeed

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	0 .. 2500 [RPM]		
Default value	1800	Force value	NO
Step	1		

Comm object	7168	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Maximum acceptable speed of the engine. If the actual engine speed is higher, ECON-4 immediately closes the actuator. Normal function is restored after detection of zero engine speed.			

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Speed request

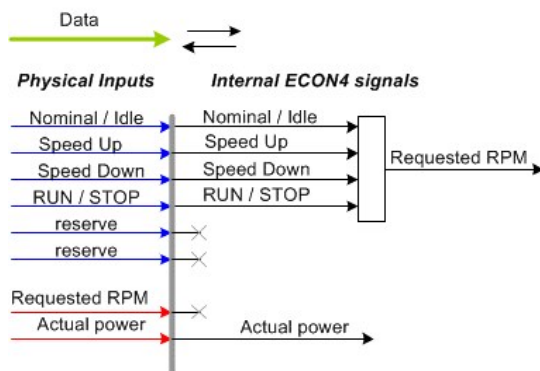
Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	BIN, ANA, DATA [-]		
Default value	DATA	Force value	NO
Step	[-]		
Comm object	7171	Related applications	SPtM, SPI, MINT, COX, Combi

Description

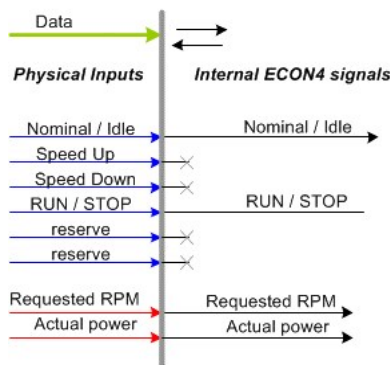
The setpoint defines source of the Speed reference of the engine.

Speed Request value	Speed reference source
BIN	SPEED UP, SPEED DOWN
ANA	SPEED REQUEST
DATA	CAN bus

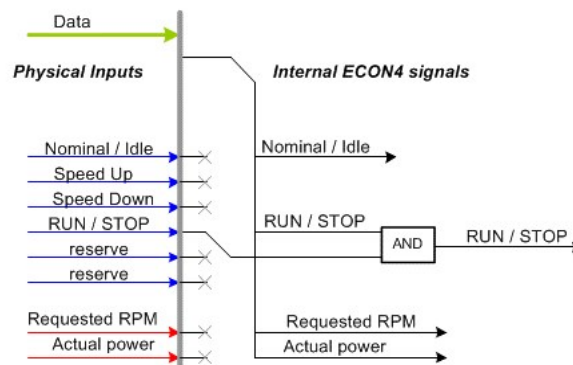
BIN mode



ANA



DATA



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PerChSpdNom

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	1 .. 20 [%]		
Default value	8	Force value	NO
Step	1		
Comm object	7193	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Percentage Change of Requested RPM from Nominal RPM. This setpoint defines the maximum allowable change of requested RPM from the Nominal RPM value in case the BIN or ANA control of RPM is used. Use this setpoint to enlarge maximum allowable swing of the required RPM. Setpoint is by default adjusted to 8% which should fulfill the most of installations.			

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Idle-Nom ramp

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	0 .. 100 [s]		
Default value	10	Force value	NO
Step	1		
Comm object	7169	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Define how fast changes the requested engine speed during transition from Idle RPM (page 576) to Nominal RPM (page 579) and vice versa. <i>Idle-Nom ramp</i> is directly time that the ramp needs to go from Idle RPM (page 576) to Nominal RPM (page 579) and vice versa. The ramping speed is the same for both up and down directions.			

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Nominal RPM

Setpoint group	ECON4-EngRPM	Related FW	2.2.0
Range [units]	0 .. 2500 [RPM]		
Default value	1500	Force value	NO
Step	1		
Comm object	7187	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Nominal engine speed.			

⬅ back to List of setpoints

Group: ECON4-EngStart

Fuel ramp time

Setpoint group	ECON4-EngStart	Related FW	2.2.0
Range [units]	Starting RPM (page 580) .. Nominal RPM (page 579) [s]		
Default value	10	Force value	NO

Step	1		
Comm object	7174	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Time the actuator needs to move from the InitStart dose to MaxStart dose.			

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InitStart dose

Setpoint group	ECON4-EngStart	Related FW	2.2.0
Range [units]	Starting RPM (page 580) .. Nominal RPM (page 579) [%]		
Default value	10	Force value	NO
Step	1		
Comm object	7172	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Initial position of the actuator during start.			

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MaxStart dose

Setpoint group	ECON4-EngStart	Related FW	2.2.0
Range [units]	Starting RPM (page 580) .. Nominal RPM (page 579) [%]		
Default value	50	Force value	NO
Step	1		
Comm object	7173	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Maximum position of the actuator during start.			

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RPM StartRamp

Setpoint group	ECON4-EngStart	Related FW	2.2.0
Range [units]	Starting RPM (page 580) .. Nominal RPM (page 579) [s]		
Default value	10	Force value	NO
Step	1		
Comm object	7175	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This setpoint defines speed of ramp from Starting RPM to Idle RPM. It is directly the time of ramp from.			

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Starting RPM

Setpoint group	ECON4-EngStart	Related FW	2.2.0
Range [units]	Starting RPM (page 580) .. Nominal RPM (page 579) [RPM]		
Default value	350	Force value	NO
Step	1		

Comm object	7189	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
If ECON-4 detects speed higher then Starting RPM, it terminates the starting sequence end starts normal speed regulation.			
Note: ECON-4 can work only if Starting RPM < Idle RPM < Nominal RPM. If this condition is not met, ECON-4 activates bit Invalid setpoints in Transmit PDO 1, see description of CAN protocol. It is not possible to run the engine if the bit Invalid setpoint is signalized.			

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Group: ECON4-MainPID

Act position

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	30	Force value	NO
Step	0.1		
Comm object	7191	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Adjusts the actuator position in the Econ-4 Mode = MAN.			

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Actuator type

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	-		
Default value	ActType1	Force value	NO
Step	[-]		
Comm object	7185	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
ECON-4 can be connected to various types of actuators. Setpoints of the internal actuator feedback loop are tuned for the common actuators and predefined from the factory. Normally there is no need to change them. The user must only choose the right Actuator type. By default the ActType 1 is chosen. Check the type of your actuator and compare with the predefined type.			
<ul style="list-style-type: none"> ➤ The actuator feedback position control is deactivated in the following situation: <ul style="list-style-type: none"> ➤ (parameter: ECON-4 mode is in AUTO) AND {10 seconds after detection of [(Engine RPM are 0 (<10RPM)) AND (BI:RUN is in log 0)]} ● This covers also the situation, when ECON-4 mode is switched from MAN to AUT, after the actuator feedback PID was tested. ➤ The actuator feedback control is activated again by any of the following conditions: <ul style="list-style-type: none"> ➤ BI: RUN is activated (in case the Run signal is being sent over DATA, then both the Physical BI and the BI over DATA has to be ON) ➤ Non-zero RPM are detected by ECON-4 ➤ Parameter ECON-4 mode is set to MAN 			

Note: In case there is chosen the ActuatorType 2-4, the function is still evaluated from the setting in ActuatorType1.

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Droop

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	0	Force value	NO
Step	0.1		
Comm object	7182	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Droop of speed governor. The governor lowers the speed reference by <i>Droop</i> percent of the Nominal RPM (page 579) over the range from zero to MaxFuel (page 584).			

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ECON-4 mode

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	-		
Default value	AUTO	Force value	NO
Step	[-]		
Comm object	7190	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
ECON-4 must be in AUTO for normal operation. Mode MAN can be used during installation to check the function of the actuator and linkage. If ECON-4 is in MAN mode, it sets the actuator to position Act position. It can be switched to MAN mode only any time even engine is running. This allows measurement of transition curve to calculate PID parameters.			
<p>Note: ECON-4 when engine is running set the same value to setpoint Act position as position where throttle is. It assure bump less transition.</p>			
<p>IMPORTANT: Even Overspeed protection is active in all modes, be careful when setting throttle position manually. Engine can accelerate when breaker opens or when throttle position is too high. Make sure ECON-4 mode is in Auto position before you leave installation.</p>			

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IdleFuel

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10	Force value	NO
Step	0.1		
Comm object	7192	Related applications	SPtM, SPI, MINT, COX, Combi
Description			

IdleFuel is a base (together with MaxFuel) for Droop function calculation..

Note: Set this setpoint after engine is running on Nominal speed (no load) according to the real position of Actuator lever

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Load anticip 1

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	0	Force value	NO
Step	0.1		
Comm object	7183	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Governor is equipped by load anticipation feedback, which helps to keep stable speed in case of fast load changes. In the case of load jump forces the ECON-4 governor output (Actuator lever) by jump according to Load anticip setting.			
Engine load value can be received via physical Analog input S3.2 ACTIVE POWER as 0 to 10V or 20 mA signal (if setpoint Speed request=BIN or ANA) or via CAN bus in the case of communication to IS-NT controller (if setpoint Speed request=DATA). In such case follow this configuration in GenConfig:			
➤ I/O – Analog outputs – ECON-4 – AOUT1 = Gener values – Act.power rel.			
➤ In the configuration choose option Normalize – YES and resolution adjust to 0,1			

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Load der

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	0	Force value	NO
Step	0.1		
Comm object	7181	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Derivative part of the PID speed regulation loop.			
There is 5 different setpoints <i>Load der</i> :			
➤ <i>Load der 1</i>			
➤ <i>Load der 2</i>			
➤ <i>Load der 3</i>			
➤ <i>Load der 4</i>			
For more information about <i>Load der</i> setting please see Load 1 in ECON-4 Global Guide .			

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Load gain

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		

Default value	10	Force value	NO
Step	0.1		
Comm object	7179	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Gain of the PID speed regulation loop. There is 5 different setpoints <i>Load gain</i> : <ul style="list-style-type: none"> > <i>Load gain 1</i> > <i>Load gain 2</i> > <i>Load gain 3</i> > <i>Load gain 4</i> 			
For more information about <i>Load der</i> setting please see Load 1 in ECON-4 Global Guide .			

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Load int

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10	Force value	NO
Step	0.1		
Comm object	7180	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Integration of the PID speed regulation loop. There is 5 different setpoints <i>Load Int</i> : <ul style="list-style-type: none"> > <i>Load Int 1</i> > <i>Load Int 2</i> > <i>Load Int 3</i> > <i>Load Int 4</i> 			
For more information about <i>Load der</i> setting please see Load 1 in ECON-4 Global Guide .			

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MaxFuel

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	100	Force value	NO
Step	0.1		
Comm object	7184	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Maximum output from the PID speed control loop + Load anticipation signal. It limits the maximum fuel delivered to the engine. Maximum output from the PID speed control loop + Load anticipation signal. It limits the maximum fuel delivered to the engine.			

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PWM rate

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	100 .. 10000 [Hz]		
Default value	6000	Force value	NO
Step	1		
Comm object	7194	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Frequency of the PWM signal sent to ACT+ and ACT- outputs.			
Note: For Heinzmann actuators adjust the PWM rate to 6000 Hz. For Woodward PWM and current, GAC actuators adjust the PWM rate to 2000 Hz.			

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SGO Bias

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	0.00	Force value	NO
Step	0.01		
Comm object	14375	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Together with Idle Fuel value creates coordinates for first point of Speed/Fuel line. For detailed description see Speed governor function in parallel mode in ECON-4 Global Guide .			
Note: Setpoint is active for unloaded engine.			

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SGO HiLim

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	10.00	Force value	NO
Step	0.01		
Comm object	14376	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Together with Max Fuel value creates coordinates for second point of Speed/Fuel line. For detailed description see Speed governor function in parallel mode in ECON-4 Global Guide .			
Note: Setpoint is active for unloaded engine.			

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SGOffsetRamp

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	10 .. 1800 [s]		
Default value	30	Force value	NO

Step	1		
Comm object	14375	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This defines ramp according SGOoffset is removed after parallel. For details see chapter Speed governor function in network parallel mode see Speed governor function in parallel mode in ECON-4 Global Guide .			
Note: Setpoint is active for unloaded engine.			

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Speed der

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	0	Force value	NO
Step	0.1		
Comm object	7178	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Derivative part of the PID speed regulation loop.			
Note: Setpoint is active for unloaded engine.			

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Speed gain

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10	Force value	NO
Step	0.1		
Comm object	7176	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Gain of the PID speed regulation loop.			
Note: Setpoint is active for unloaded engine.			

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Speed int

Setpoint group	ECON4-MainPID	Related FW	2.2.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10	Force value	NO
Step	0.1		
Comm object	7177	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Integration of the PID speed regulation loop..			
Note: Setpoint is active for unloaded engine.			

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9.1.3 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.


List of value groups

For full list of values go to the chapter **List of values (page 588)**.

List of values

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P Reduct C	622	PwrRed4MinActM	633	BIN	643
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Group: Engine

RPM

Value group	Engine	Related FW	2.2.0
Units	1/min		
Comm object	10123	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Current engine speed.			

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T Cyl aver

Value group	Engine	Related FW	2.2.0
Units	°C		
Comm object	9620	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The value contains average cylinder temperature, i.e. average of all configured logical analog inputs CYL TEMP 1 (PAGE 872) ... CYL TEMP 32 (PAGE 882) .			

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T Cyl max

Value group	Engine	Related FW	2.2.0
Units	°C		
Comm object	10526	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The value contains the maximum of all cylinder temperatures, i.e. maximum of all configured logical analog inputs CYL TEMP 1 (PAGE 872) ... CYL TEMP 32 (PAGE 882) .			
Note: The value is intended for creating the "high cylinder temperature" alarm using an universal analog protection. There is a special wizard at the I/O tab in GenConfig which makes the configuration of cylinder temperatures easy.			

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T Cyl min

Value group	Engine	Related FW	2.2.0
Units	°C		
Comm object	10527	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The value contains the minimum of all cylinder temperatures, i.e. minimal of all configured logical analog inputs CYL TEMP 1 (PAGE 872) ... CYL TEMP 32 (PAGE 882) .			
<i>Note: The value is intended for creating the "misfiring cylinder" alarm using an universal analog protection.</i>			

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Group: Generator

Act power

Value group	Generator	Related FW	2.2.0
Units	kW		
Comm object	8202	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator total active power.			

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Act power filt

Value group	Generator	Related FW	2.2.0
Units	kW		
Comm object	9678	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator total active power filtered value which is internaly used for AFR regulation to avoid the regulation instability.			

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ActPwr10minAvg

Value group	Generator	Related FW	2.2.0
Units	kW		
Comm object	16073	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
10-minutes average from gen P.			
When the GCB is opened, the value will be reseted to 0.			

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Act pwr L1

Value group	Generator	Related FW	2.2.0
Units	kW		
Comm object	8524	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator active power in phase L1.			

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Act pwr L2

Value group	Generator	Related FW	2.2.0
Units	kW		
Comm object	8525	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator active power in phase L2.			

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Act pwr L3

Value group	Generator	Related FW	2.2.0
Units	kW		
Comm object	8526	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator active power in phase L3.			

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Act pwr rel

Value group	Generator	Related FW	2.2.0
Units	%		
Comm object	10641	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Relative active power is used for control of speed governor ECON-4.			
Note: When Power derating function is active, this value is based on the actual value of the derated nominal power. See the chapter Power derating (page 127) for details.			

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React power

Value group	Generator	Related FW	2.2.0
Units	kVAr		
Comm object	8203	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator total reactive power.			

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RctPwr10minAvg

Value group	Generator	Related FW	2.2.0
Units	kVAr		
Comm object	16080	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
10-minutes average from gen. When the GCB is opened, the value will be reseted to 0			

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React pwr L1

Value group	Generator	Related FW	2.2.0
Units	kVAr		
Comm object	8527	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator reactive power in phase L1.			

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React pwr L2

Value group	Generator	Related FW	2.2.0
Units	kVAr		
Comm object	8528	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator reactive power in phase L2.			

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React pwr L3

Value group	Generator	Related FW	2.2.0
Units	kVAr		
Comm object	8529	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator reactive power in phase L3.			

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Appar pwr

Value group	Generator	Related FW	2.2.0
Units	kVA		
Comm object	8565	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator total apparent power.			

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AppPwr10minAvg

Value group	Generator	Related FW	2.2.0
Units	kVA		
Comm object	16081	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
10-minutes average from gen S.			
When the GCB is opened, the value will be reseted to 0			

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Appar pwr L1

Value group	Generator	Related FW	2.2.0
Units	kVA		
Comm object	8530	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator apparent power in phase L1.			

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Appar pwr L2

Value group	Generator	Related FW	2.2.0
Units	kVA		
Comm object	8531	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator apparent power in phase L2.			

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Appar pwr L3

Value group	Generator	Related FW	2.2.0
Units	kVA		
Comm object	8532	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator apparent power in phase L3.			

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Pwr factor

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	16156	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator cos-phi factor. Note: The "cos-phi" factor is widely used instead of power factor for pure harmonic waveforms, because a simplified method can be used for calculation of it's value. However, if this simplified method is used for significantly distorted waveforms, it may provide inaccurate results. This fact causes the controller "power factor" value may be different from a value measured by another true-rms measurement device if the waveform contains significant portion of higher harmonic frequencies.			

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Load char

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	8395	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Character of the generator load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Pwr factor L1

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	16160	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator power factor in phase L1.			

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Load char L1

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	8626	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Character of the generator load in the L1 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Pwr factor L2

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	16161	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator power factor in phase L2.			

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Load char L2

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	8627	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Character of the generator load in the L2 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Pwr factor L3

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	16162	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator power factor in phase L3.			

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Load char L3

Value group	Generator	Related FW	2.2.0
Units	-		
Comm object	8628	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Character of the generator load in the L3 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Gen freq

Value group	Generator	Related FW	2.2.0
Units	Hz		
Comm object	8210	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator frequency. The frequency is measured in the phase L3.			

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Gen V L1-N

Value group	Generator	Related FW	2.2.0
Units	V		
Comm object	8192	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator voltage in phase L1.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint VT ratio (page 349).			

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Gen V L2-N

Value group	Generator	Related FW	2.2.0
Units	V		
Comm object	8193	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator voltage in phase L2.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint VT ratio (page 349).			

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Gen V L3-N

Value group	Generator	Related FW	2.2.0
Units	V		
Comm object	8194	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator voltage in phase L3.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint VT ratio (page 349).			

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Gen V

Value group	Generator	Related FW	2.2.0
Units	V		
Comm object	10645	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator voltage. Average from all three phases.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint VT ratio (page 349).			

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Gen curr L1

Value group	Generator	Related FW	2.2.0
Units	A		
Comm object	8198	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator current in phase L1.			
Note: The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints <i>CT ratio prim</i> (page 348) and <i>CT ratio sec</i> (page 348).			

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Gen curr L2

Value group	Generator	Related FW	2.2.0
Units	A		
Comm object	8199	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator current in phase L2.			
Note: The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints <i>CT ratio prim</i> (page 348) and <i>CT ratio sec</i> (page 348).			

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Gen curr L3

Value group	Generator	Related FW	2.2.0
Units	A		
Comm object	8200	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator current in phase L3.			
Note: The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints <i>CT ratio prim</i> (page 348) and <i>CT ratio sec</i> (page 348).			

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Gen V unbal

Value group	Generator	Related FW	2.2.0
Units	%		
Comm object	10548	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the nominal voltage.			
Note: This value can be used for creating the generator voltage unbalance protection using the "universal analog protections".			

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Gen I unbal

Value group	Generator	Related FW	2.2.0
Units	V		
Comm object	10550	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Generator current unbalance. The value is calculated as maximal difference of two phase currents at one moment and expressed in % of the nominal current.			
Note: This value can be used for creating the generator current unbalance protection using the "universal analog protections".			

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Slip freq

Value group	Generator	Related FW	2.2.0
Units	Hz		
Comm object	8224	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Differential frequency between the generator and the mains/bus.			

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Angle

Value group	Generator	Related FW	2.2.0
Units	°		
Comm object	8225	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The angle between the phasors of the generator and mains/bus voltage.			

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Group: Mains/Bus values

Mains freq

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz		
Comm object	8211	Related applications	SPtM, SPI, Combi
Description			
Mains frequency. The frequency is measured in the phase L3.			

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Bus freq

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz		
Comm object	82111	Related applications	MINT, COX
Description			
Bus frequency. The frequency is measured in the phase L3.			

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MainsFreq2Dec/BusFreq2Dec

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz		
Comm object	10602	Related applications	SPtM, SPI, Combi
Description			
This value is used for fixed frequency protections.			

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MainsFreq2Filt/BusFreqFilt

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz		
Comm object	13024	Related applications	SPtM, SPI, Combi
Description			
Filtered mains frequency in 2 decimal points with 1s time stamp.			

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MainsFreq3Dec

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz		
Comm object	16101	Related applications	SPtM, SPI, Combi
Description			
This value is used for fixed frequency protections.			

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MainsFreq3Filt

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz		
Comm object	16102	Related applications	SPtM, SPI, Combi
Description			
Filtered mains frequency in 3 decimal points with 1s time stamp			

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Mains V L1-N

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	8195	Related applications	SPtM, SPI, Combi
Description			
Mains voltage in phase L1.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint <i>V_m VT ratio</i> (page 350).			

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Mains V L2-N

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	8196	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mains voltage in phase L2.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint <i>V_m VT ratio</i> (page 350).			

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Mains V L3-N

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	8197	Related applications	SPtM, SPI, Combi
Description			
Mains voltage in phase L3.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint Vm VT ratio (page 350).			

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Mains V

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	10666	Related applications	SPtM, SPI, Combi
Description			
Mains voltage. Average from all three phases.			
Note: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint Vm VT ratio (page 350).			

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Mains V L1-L2

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	9631	Related applications	SPtM, SPI, Combi
Description			
Mains voltage phase L1 to L2.			

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Mains V L2-L3

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	9632	Related applications	SPtM, SPI, Combi
Description			
Mains voltage phase L2 to L3.			

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Mains V L3-L1

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	9633	Related applications	SPtM, SPI, Combi
Description			
Mains voltage phase L3 to L1.			

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Mains V unbal

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	10549	Related applications	SPtM, SPI, Combi
Description			
Mains voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the mains nominal voltage.			

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Im3/EarthFC

Value group	Mains/Bus values	Related FW	2.2.0
Units	A		
Comm object	8208	Related applications	SPtM, SPI, Combi
Description			
This value contains the current measured at the current input labeled "IN". This input is used either for measurement of the mains current in phase L3 or for earth fault current. The function depends on the setpoint I/E-Pm meas (page 329).			
Note: The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints Im3/ErFICurCTp (page 348) and Im3/ErFICurCTs (page 349).			

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EarthFC

Value group	Mains/Bus values	Related FW	2.2.0
Units	A		
Comm object	8208	Related applications	MINT, COX
Description			
This value contains the current measured at the current input labeled "IN". This input is used for measurement of the earth fault current.			
Note: The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints Im3/ErFICurCTp (page 348) and Im3/ErFICurCTs (page 349).			

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P mains

Value group	Mains/Bus values	Related FW	2.2.0
Units	kW		
Comm object	8703	Related applications	SPtM, SPI, Combi
Description			
Actual active power imported from the mains. Method of the mains import measurement is adjusted by the setpoint I/E-Pm meas (page 329).			

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Q mains

Value group	Mains/Bus values	Related FW	2.2.0
Units	kVAr		
Comm object	8704	Related applications	SPtM, SPI, Combi
Description			
Actual reactive power imported from the mains. Method of the mains import measurement is adjusted by the setpoint I/E-Qm meas (page 330).			

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Mains PF

Value group	Mains/Bus values	Related FW	2.2.0
Units	-		
Comm object	16157	Related applications	SPtM, SPI, Combi
Description			
Cos-phi factor at the mains inlet.			

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Mains LChr

Value group	Mains/Bus values	Related FW	2.2.0
Units	-		
Comm object	8709	Related applications	SPtM, SPI, Combi
Description			
Character of the load as it is seen from the mains side at the mains inlet. "L" means inductive load, "C" is capacitive and "R" is resistive load.			

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Object P

Value group	Mains/Bus values	Related FW	2.2.0
Units	kW		
Comm object	10601	Related applications	SPtM, SPI, Combi
Description			
Actual active power consumed by the object. This value is calculated as sum of the Act power (page 592) and the P mains (page 606) .			
<i>Note: 4-bytes-objects are not supported by SHAOOUT modules. When the SHAOOUT module is configured with one of these values then on the controller with SHAIN module the values is shown as "#".</i>			

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Object Q

Value group	Mains/Bus values	Related FW	2.2.0
Units	kVAr		
Comm object	10644	Related applications	SPtM, SPI, Combi
Description			
Actual reactive power consumed by the object. This value is calculated as sum of the React power (page 594) and the Q mains (page 606) .			

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Object PF

Value group	Mains/Bus values	Related FW	2.2.0
Units	-		
Comm object	16158	Related applications	SPtM, SPI, Combi
Description			
Cos-phi factor at the load. This value is computed indirectly from the values Object P (page 607) and Object Q (page 607) .			
<i>Note: 4-bytes-objects are not supported by SHAOOUT modules. When the SHAOOUT module is configured with one of these values then on the controller with SHAIN module the values is shown as "#".</i>			

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Object LChr

Value group	Mains/Bus values	Related FW	2.2.0
Units	-		
Comm object	9026	Related applications	SPtM, SPI, Combi
Description			
Character of the object load. This value is computed indirectly from the values Object P (page 607) and Object Q (page 607) .			

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MaxVectorS

Value group	Mains/Bus values	Related FW	2.2.0
Units	°		
Comm object	9847	Related applications	SPtM, SPI, Combi
Description			
This is maximal measured value of vector shift of the generator voltage. The value is reset to 0 automatically in the moment of closing the GCB.			

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MainsV10L1-L2

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16082	Related applications	SPtM, SPI, Combi
Description			
This value shows average Mains Ph-Ph voltage in phase L1-L2.			

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Bus Avg V1

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	12792	Related applications	MINT, COX
Description			
This value shows average Bus voltage in phase L1.			

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MainsV10L2-L3

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16083	Related applications	SPtM, SPI, Combi
Description			
This value shows average Mains Ph-Ph voltage in phase L2-L3.			

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Bus Avg V2

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	12793	Related applications	MINT, COX
Description			
This value shows average Bus voltage in phase L2.			

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MainsV10L3-L1

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16084	Related applications	SPtM, SPI, Combi
Description			
This value shows average Mains Ph-Ph voltage in phase L3-L1.			

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Bus Avg V3

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	12794	Related applications	MINT, COX
Description			
This value shows average Bus voltage in phase L3.			

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MainsV10L1-N

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16611	Related applications	SPtM, SPI, Combi
Description			
This value shows average Mains phase-neutral voltage in phase L1-LN.			

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MainsV10L2-N

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16612	Related applications	SPtM, SPI, Combi
Description			
This value shows average Mains phase-neutral voltage in phase L2-LN.			

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MainsV10L3-N

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16613	Related applications	SPtM, SPI, Combi
Description			
This value shows average Mains phase-neutral voltage in phase L3-LN.			

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MainsV1L1-L2

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16085	Related applications	SPtM, SPI, Combi
Description			
This value shows 1min average Mains Ph-Ph voltage in phase L1-L2.			

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MainsV1L2-L3

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16086	Related applications	SPtM, SPI, Combi
Description			
This value shows 1min average Mains Ph-Ph voltage in phase L2-L3.			

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MainsV1L3-L1

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	16087	Related applications	SPtM, SPI, Combi
Description			
This value shows 1min average Mains Ph-Ph voltage in phase L3-L1.			

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Mains Mid V

Value group	Mains/Bus values	Related FW	2.2.0
Units	V		
Comm object	13137	Related applications	SPtM, SPI, Combi
Description			
Value is connected with LAI:MAINSMIDVOLT (PAGE 886) multiplied by value given by the setpoint VmMid VT ratio (page 350).			

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ROCOF1

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	9848	Related applications	SPtM, SPI, Combi
Description			
This value shows actual measured value of ROCOF1.			

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Max ROCOF1

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	10049	Related applications	SPtM, SPI, Combi
Description			
This value shows maximal measured value of ROCOF1.			

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ROCOF2

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	16153	Related applications	SPtM, SPI, Combi
Description			
This value shows actual measured value of ROCOF2.			

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Max ROCOF2

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	16163	Related applications	SPtM, SPI, Combi
Description			
This value shows maximal measured value of ROCOF2.			

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ROCOF3

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	16154	Related applications	SPtM, SPI, Combi
Description			
This value shows actual measured value of ROCOF3.			

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Max ROCOF3

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	16164	Related applications	SPtM, SPI, Combi
Description			
This value shows maximal measured value of ROCOF3.			

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ROCOF4

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	16155	Related applications	SPtM, SPI, Combi
Description			
This value shows actual measured value of ROCOF4.			

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Max ROCOF4

Value group	Mains/Bus values	Related FW	2.2.0
Units	Hz/s		
Comm object	16165	Related applications	SPtM, SPI, Combi
Description			
This value shows maximal measured value of ROCOF4.			

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Group: Power Management

EnginePriority

Value group	Power Management	Related FW	2.2.0
Units	-		
Comm object	8624	Related applications	MINT, Combi
Description			
This value shows current priority number. It corresponds to the setpoint Priority (page 431) except following situations:			
<ul style="list-style-type: none">➤ If at least one of binary inputs <i>Priority SW "X"</i> is configured on some source and is active then the actual gen-set priority is given by the combination of these inputs.➤ If a FORCEVALUEIN 1 (PAGE 695) is configured at the Priority (page 431) setpoint and the forcing binary input is active, the actual Gen-set priority is given by the alternative setting from the force value function.➤ If the Load demand swap is active then the actual priority is given by the optimization function.			
Note: To get more information on Power management please refer to the chapter Power Management (page 168) .			

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Act Reserve

Value group	Power Management	Related FW	2.2.0
Units	-		
Comm object	8625	Related applications	MINT, Combi
Description			
Actual absolute reserve.			
Note: To get more information on Power management please refer to the chapter Power Management (page 168) .			

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Reserve

Value group	Power Management	Related FW	2.2.0
Units	-		
Comm object	8622	Related applications	MINT, Combi
Description			
Actual absolute reserve for start. This value contains a copy of the setpoint #LoadResStrt from the currently selected reserve set.			
Note: To get more information on Power management please refer to the chapter Power Management (page 168) .			

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Reserve Stp

Value group	Power Management	Related FW	2.2.0
Units	kX		
Comm object	8623	Related applications	MINT, Combi
Description			
Actual absolute reserve – when the reserve is higher than this value the last started Gen-set (the Gen-set with the highest priority) is stopped. This value contains the following: #LoadResStop plus <i>Nominal power</i> of the Gen-set which is first to stop. #LoadResStop is used from the currently selected reserve set.			
Note: To get more information on Power management please refer to the chapter Power Management (page 168) .			

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DynSpinRes

Value group	Power Management	Related FW	2.2.0
Units	[kX]		
Comm object	15673	Related applications	MINT, Combi
Description			
DynSpinRes (Dynamic Spinning Reserve) - DSR is a value, which is used to influence standard power management operation by adding DSR to currently used starting and stopping thresholds given by parameters LoadResStrt 1 (page 434) , LoadResStrt 2 (page 435) , LoadResStrt 3 (page 436) , LoadResStrt 4 (page 437) and LoadResStop 1 (page 434) , LoadResStop 2 (page 435) , LoadResStop 3 (page 436) , LoadResStop 4 (page 437) .			
Actual thresholds used by power management are then values Reserve (page 614) and Reserve Stp (page 615) . DSR is used by power management, if Dynam Spin Res (page 433) is set to ENABLED and LAI:DYNSPINRESREQ (PAGE 883) is a valid value. DSR is 0, if Dynam Spin Res (page 433) is set to DISABLED or the LAI:DYNSPINRESREQ (PAGE 883) value is invalid (#####).			
Example: Power management operates with LoadResStrt 1 (page 434) = 100 kW and LoadResStop 1 (page 434) = 200 kW. DSR value coming from function LAI: DYNSPINRESREQ (PAGE 883) is 50kW. It means that actual starting threshold LoadRes Start (page 1) is 150 kW and actual stopping threshold LoadRes Stop (page 1) is 250 kW.			
Note: DSR is used by power management only when it operates in an absolute mode (Pwr mgmt mode (page 430) set to ABS (kW) or ABS (kVA)).			
Note: DSR is shared automatically with gen-set controllers via CAN2 bus. It is not shared, if EMERG. MANUAL (PAGE 679) is used.			
DSR received from the IS-NTC HYBRID controller is automatically used by a gen-set controller, if the gen-set controller firmware with the dynamic spinning reserves support is used and Dynam Spin Res (page 433) is set to ENABLED in the gen-set controller.			

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DynSpinResOffs

Value group	Power Management	Related FW	2.2.0
Units	[kX]		
Comm object	15674	Related applications	MINT, Combi
Description			
<p>DynSpinResOffs (Dynamic Spinning Reserve Offset) - DSRO is a value, which is used to influence standard power management operation by adding DSRO together with DynSpinRes (page 615) to currently used stopping threshold given by parameter LoadResStop 1 (page 434), LoadResStop 2 (page 435), LoadResStop 3 (page 436), LoadResStop 4 (page 437).</p> <p>Actual threshold used by power management is then value Reserve Stp (page 615).</p> <p>DSRO is used by power management, if Dynam Spin Res (page 433) is set to ENABLED and LAI: DYNSPINRESOFST (PAGE 1) is a valid value.</p> <p>DSRO is 0, if Dynam Spin Res (page 433) is set to DISABLED or the LAI: DYNSPINRESOFST (PAGE 883) value is invalid (#####) or the LAI: DYNSPINRESREQ (PAGE 883) value is invalid (#####).</p> <p>Example: Power management operates with LoadResStop 1 (page 434) = 200 kW. DSRO value coming from function LAI: DYNSPINRESOFST (PAGE 883) is 20kW and DSR value coming from function LAI: DYNSPINRESREQ (PAGE 883) is 50kW. It means that actual stopping threshold LoadRes Stop (page 1) is 270 kW (LoadResStop 1 (page 434) + DynSpinRes (page 615) + DynSpinResOffs = 200 + 50 + 20 = 270).</p> <p>Note: DSR is used by power management only when it operates in an absolute mode (Pwr mgmt mode (page 430) set to ABS (kW) or ABS (kVA)).</p> <p>Note: DSR is shared automatically with gen-set controllers via CAN2 bus. It is not shared, if EMERG. MANUAL (PAGE 679) is used.</p> <p>DSR received from the IS-NTC HYBRID controller is automatically used by a gen-set controller, if the gen-set controller firmware with the dynamic spinning reserves support is used and Dynam Spin Res (page 433) is set to ENABLED in the gen-set controller.</p>			

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ActRes rel

Value group	Power Management	Related FW	2.2.0
Units	%		
Comm object	10788	Related applications	MINT, Combi
Description			
<p>Actual relative reserve.</p> <p>Note: To get more information on Power management please refer to the chapter Power Management (page 168).</p>			

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Res rel

Value group	Power Management	Related FW	2.2.0
Units	%		
Comm object	10786	Related applications	MINT, Combi
Description			
Actual relative reserve for start. This value contains a copy of the setpoint <i>##LdResStrt</i> from the currently selected reserve set.			
Note: To get more information on Power management please refer to the chapter <i>Power Management (page 168)</i> .			

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ResStp rel

Value group	Power Management	Related FW	2.2.0
Units	%		
Comm object	10787	Related applications	MINT, Combi
Description			
Actual relative reserve – when the relative reserve is higher than this value the last started Gen-set (the Gen-set with the highest priority) is stopped. This value contains the following:			
$\text{ResStp rel} = \frac{P_n + \frac{\%LdResStop}{100} \sum_{i=1}^{n-1} P_i}{\sum_{i=1}^n P_n}$			
P _n is the nominal power of the Gen-set which is next to be stopped, the upper sum is the sum of the rest of the Gen-sets running in power management. The lower sum is the sum of all the Gen-sets currently running in power management.			
##LdResStop is used from the currently selected reserve set.			
Note: To get more information on Power management please refer to the chapter <i>Power Management (page 168)</i> .			

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MinR PWR

Value group	Power Management	Related FW	2.2.0
Units	kW		
Comm object	10012	Related applications	MINT, Combi
Description			
Currently active Minimum running power level. If the value contains 0 the minimal running power function is disabled.			
Note: To get more information on Power management please refer to the chapter <i>Power Management (page 168)</i> .			

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Act Pwr Band

Value group	Power Management	Related FW	2.2.0
Units	-		
Comm object	8974	Related applications	MINT, Combi
Description			
Bits of this value shows (if they are active = "1") that the Gen-set with particular address is active in actual powerband. This status is valid for power management with active Priority Auto Swap in EFFICIENT mode. The first bit from the left is assigned to address 1.			

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Next Pwr Band

Value group	Power Management	Related FW	2.2.0
Units	-		
Comm object	8975	Related applications	MINT, Combi
Description			
Bits of this value shows (if they are active = "1") the particular addresses of Gen-sets which will be active in next powerband. This status is valid for power management with active Priority Auto Swap in EFFICIENT mode. The first bit from the left is assigned to address 1.			

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Group: Sync/Load ctrl

ActPwrReq

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	8663	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains actual required load level, which is used as the input into the load regulation loop in the parallel to mains operation.			

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SpdRegOut

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	V		
Comm object	9052	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the actual voltage on the speed governor output of the controller. In case the output is switched to PWM mode, the relation is 10V ~ 100% PWM.			

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Speed request

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	%		
Comm object	10137	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This value contains the speed control signal expressed in %. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed in %. The relation between Speed request and SpdRegOut (page 618) is following:</p> <ul style="list-style-type: none">> 0% is sent for SpeedRegOut = -10V> 100% is sent for SpeedRegOut = 10V <p>Note: Most of ECU units use the J1939 TSC1 frame for speed control, where the requested speed is expressed directly in RPM. Use the value SpeedReq RPM (page 619) for this purpose.</p>			

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SpeedReq RPM

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	RPM		
Comm object	10006	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This value contains the speed which is currently requested by the controller from the attached ECU. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed directly in RPM. The relation between SpeedReq RPM and Speed request (page 619) is following:</p> <ul style="list-style-type: none">> $0.3 * \text{Nominal RPM}$ is sent for 0 %> $1.1 * \text{Nominal RPM}$ is sent for 100 %			

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ReqEngineSpeed

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	RPM		
Comm object	11833	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This value contains an exact copy of the required speed which is being sent to the ECU (e.g. in the TSC1 frame). It is intended for checking if the speed regulation chain is configured properly.</p>			

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SynchroSpeed

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	RPM		
Comm object	16896	Related applications	ASync SPI, ASync MINT
Description			
This value is the synchronous speed calculated from the actual mains frequency.			
<ul style="list-style-type: none"> ➤ ASync-SPI: It is calculated according to this formula: $\text{SynchroSpeed} = \text{Nominal RPM} * (\text{MainsFreq2Filt} / \text{SysNominFreq})$ ➤ ASync-MINT: It is calculated according to this formula: $\text{SynchroSpeed} = \text{Nominal RPM} * (\text{Bus freq2 filt} / \text{SysNominFreq})$ 			

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Slip

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	[%]		
Comm object	16897	Related applications	ASync SPI, ASync MINT
Description			
This value is the slip of asynchronous generator.			
It is calculated according to this formula:			
$\text{Slip (page 620)} = (\text{SynchroSpeed (page 620)} - \text{RPM (page 591)}) / \text{SynchroSpeed (page 620)} * 100$			
[%]			

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SystLoadCtrl

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	-		
Comm object	10792	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Code of the current load control mode. The description how to obtain the text representation of each code can be found at the value Engine state (page 652) .			

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TotRunPact Q

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kVAr		
Comm object	10656	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Sum of reactive power of all Gen-sets within the group that are connected to the bus.			

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TotRunPact P

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	10657	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Sum of active power of all Gen-sets within the group that are connected to the bus.			

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netPgnomPh

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	10658	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Sum of nominal power of all Gen-sets within the group that are connected to the bus.			

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SyncAllowTim

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	s		
Comm object	13018	Related applications	SPtM, SPI, Combi
Description			
<p>Timer value which is visualizing the time when the synchronization will start (delay MainsSyncDel (page 478) is counted) in case the mains values are in these limits:</p> <ul style="list-style-type: none">➤ MainsSyncVMax (page 477)➤ MainsSyncVMin (page 477)➤ MainsSyncFMax (page 478)➤ MainsSyncFMin (page 478) <p>After mains failure the delay MP SyncDel (page 480) is counted when the mains values are in these limits:</p> <ul style="list-style-type: none">➤ MP SyncVMax (page 479)➤ MP SyncVMin (page 479)➤ MP SyncFMax (page 479)➤ MP SyncFMin (page 479) <p>Note: The timer counts also when synchronization to mains is disabled (ParallelEnable (page 337) = NO), but it is hidden and the value is shown as ### (invalid value).</p>			

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P Reduct A

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	15135	Related applications	SPtM, SPI, Combi
Description			
This value shows actual value of power reduction according to adjusted power reduction curve based on settings of setpoints PwrReduction1A (page 480), PwrReduction2A (page 482), PwrReduction3A (page 483), InputValue1A (page 481), InputValue2A (page 483), InputValue3A (page 484), InputValueChA (page 485).			

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P Reduct B

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	15143	Related applications	SPtM, SPI, Combi
Description			
This value shows actual value of power reduction according to adjusted power reduction curve based on settings of setpoints PwrReduction1B (page 486), PwrReduction2B (page 487), PwrReduction3B (page 489), InputValue1B (page 487), InputValue2B (page 488), InputValue3B (page 490), InputValueChB (page 490).			

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P Reduct C

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	15151	Related applications	SPtM, SPI, Combi
Description			
This value shows actual value of power reduction according to adjusted power reduction curve based on settings of setpoints PwrReduction1C (page 491), PwrReduction2C (page 493), PwrReduction3C (page 494), InputValue1C (page 492), InputValue2C (page 494), InputValue3C (page 495), InputValueChC (page 496).			

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P RedMem A

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	15723	Related applications	SPtM, SPI, Combi
Description			
This value saves actual active power in case the power reduction function is activated.			
Example: LAI: PWRREDUCTIONA (PAGE 891) is higher than InputValue1A (page 481) if the setpoint InputValueChA (page 485) is set to RISING or LAI: PWRREDUCTIONA (PAGE 891) is lower than InputValue3A (page 484) if the setpoint InputValueChA (page 485) is set to FALLING.			

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P RedMem B

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	15724	Related applications	SPtM, SPI, Combi
Description			
This Value saves actual active power in case the power reduction function is activated.			
Example: LAI: PWRREDUCTIONB (PAGE 892) is higher than InputValue1B (page 487) if the setpoint InputValueChB (page 490) is set to RISING or LAI: PWRREDUCTIONB (PAGE 892) is lower than InputValue3B (page 490) if the setpoint InputValueChB (page 490) is set to FALLING.			

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P RedMem C

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	15725	Related applications	SPtM, SPI, Combi
Description			
This Value saves actual active power in case the power reduction function is activated.			
Example: LAI: PWRREDUCTIONC (PAGE 892) is higher than InputValue1C (page 492) if the setpoint InputValueChC (page 496) is set to RISING or LAI: PWRREDUCTIONC (PAGE 892) is lower than InputValue3C (page 495) if the setpoint InputValueChC (page 496) is set to FALLING.			

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SysNominFreq

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	Hz		
Comm object	15536	Related applications	SPtM, SPI, Combi
Description			
This value shows the sum of Nominal Freq (page 354) and Nom frq offset (page 354) .			

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Group: Grid Codes

Grid Codes ver

Value group	Grid Codes	Related FW	2.2.0
Units	%		
Comm object	16869	Related applications	SPtM, SPI, Combi
Description			
This value shows the Grid Codes module version.			

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Pm

Value group	Sync/Load ctrl	Related FW	2.2.0
Units	kW		
Comm object	13019	Related applications	SPtM, SPI, Combi
Description			
This value saves the value of actual active power when the mains frequency goes above the limit of initialization Power over frequency function adjusted by user curve in GenConfig: PWROVRF. It also saves the value of actual active power when the mains voltage goes above the limit of initialization P(Um) function when P(Um)Function (page 475) = Pact(Um).			

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Q(Um) Curve

Value group	Grid Codes	Related FW	2.2.0
Units	kVAr		
Comm object	13168	Related applications	SPtM, SPI, Combi
Description			
If there is used Q(Um) type of regulation chosen by setpoint: PF ctrl PtM value is active and shows calculated actual value of Q(Um) curve adjusted in GenConfig.			

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Q(P) Curve

Value group	Grid Codes	Related FW	2.2.0
Units	kVAr		
Comm object	16127	Related applications	SPtM, SPI, Combi
Description			
If there is used Q(P) type of regulation chosen by setpoint:PF ctrl PtM value is active and shows calculated actual value of Q(P) curve adjusted in GenConfig.			

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QrefUlim Curve

Value group	Grid Codes	Related FW	2.2.0
Units	kVAr		
Comm object	16149	Related applications	SPtM, SPI, Combi
Description			
If there is used Qref/Ulim type of regulation chosen by setpoint:PF ctrl PtM value is active and shows calculated actual value of Qref/Ulim curve adjusted in GenConfig.			

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PF(P) Curve

Value group	Grid Codes	Related FW	2.2.0
Units	-		
Comm object	13636	Related applications	SPtM, SPI, Combi
Description			
If there is used PF(Pm) type of regulation chosen by setpoint: PF ctrl PtM value is active and shows calculated actual value of PF(P) curve adjusted in GenConfig.			

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P(Um) Curve

Value group	Grid Codes	Related FW	2.2.0
Units	%		
Comm object	16568	Related applications	SPtM, SPI, Combi
Description			
If there is used P(Um) type of regulation chosen by Setpoint P(Um)Function (page 548) value is active and shows calculated actual value of App Curve P(Um) adjusted in GenConfig. The value shows the actual required relative reduction.			

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TestF

Value group	Grid Codes	Related FW	2.2.0
Units	Hz		
Comm object	14128	Related applications	SPtM, SPI, Combi
Description			
Value is connected with LAI: TESTF (PAGE 896).			

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PoF Curve

Value group	Grid Codes	Related FW	2.2.0
Units	%		
Comm object	16185	Related applications	SPtM, SPI, Combi
Description			
This value show actual ΔP calculated from curve PWROVERFREQ. The actual power will be reduced of this value and will be limited with Min Power PTM.			

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PuF Curve

Value group	Grid Codes	Related FW	2.2.0
Units	%		
Comm object	16184	Related applications	SPtM, SPI, Combi
Description			
This value show actual ΔP calculated from curve PWRUNDRFREQ. The actual power will be increased of this value and will be limited by value of setpoint InstalledPower (page 346).			

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#PowerReduct1

Value group	Grid Codes	Related FW	2.2.0
Units	-		
Comm object	16089	Related applications	SPtM, SPI, Combi
Description			
Number of request on LBI: LOADREDUCT 1 (PAGE 723). Value is adjustable via Set Statistic menu.			

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#PowerReduct2

Value group	Grid Codes	Related FW	2.2.0
Units	-		
Comm object	16090	Related applications	SPtM, SPI, Combi
Description			
Number of request on LBI: LOADREDUCT 2 (PAGE 723) . Value is adjustable via Set Statistic menu.			

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#PowerReduct3

Value group	Grid Codes	Related FW	2.2.0
Units	-		
Comm object	16091	Related applications	SPtM, SPI, Combi
Description			
Number of request on LBI: LOADREDUCT 3 (PAGE 724) . Value is adjustable via Set Statistic menu.			

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#PowerReduct4

Value group	Grid Codes	Related FW	2.2.0
Units	-		
Comm object	16092	Related applications	SPtM, SPI, Combi
Description			
Number of request on LBI: LOADREDUCT 4 (PAGE 724) . Value is adjustable via Set Statistic menu.			

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PwrRed1HrsActM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16103	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed1HrsActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed1HrsLstM (page 628) . There is possibility to reset this value with dedicated command.			

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PwrRed1MinActM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16107	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed1MinActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed1MinLstM (page 628) . There is possibility to reset this value with dedicated command.			

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PwrRed1HrsLstM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16111	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed1HrsLstM shows statistic value from last month accumulated in to the value PwrRed1HrsActM (page 627) . Every 1.day of new month is value from PwrRed1HrsActM (page 627) copied in to this value. The previous value is replaced with the new one.			

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PwrRed1MinLstM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16115	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed1MinLstM shows statistic value from last month accumulated in to the value PwrRed1MinActM (page 628) . Every 1.day of new month is value from PwrRed1MinActM (page 628) copied in to this value. The previous value is replaced with the new one.			

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PwrRed1HrsAcc

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16093	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated hours in power reduction 1. There is possibility to reset this value with dedicated command.			

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PwrRed1MinAcc

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16094	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated minutes in power reduction 1. There is possibility to reset this value with dedicated command.			

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PwrRed2HrsActM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16104	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed2HrsActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed2HrsLstM (page 630) . There is possibility to reset this value with dedicated command.			

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PwrRed2MinActM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16108	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed2MinActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed2MinLstM (page 630) . There is possibility to reset this value with dedicated command.			

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PwrRed2HrsLstM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16112	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed2HrsLstM shows statistic value from last month accumulated in to the value PwrRed2HrsActM (page 629) . Every 1.day of new month is value from PwrRed2HrsActM (page 629) copied in to this value. The previous value is replaced with the new one.			

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PwrRed2MinLstM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16116	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed2MinLstM shows statistic value from last month accumulated in to the value PwrRed2MinActM (page 629) . Every 1.day of new month is value from PwrRed2MinActM (page 629) copied in to this value. The previous value is replaced with the new one.			

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PwrRed2HrsAcc

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16095	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated hours in power reduction 2. There is possibility to reset this value with dedicated command.			

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PwrRed2MinAcc

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16096	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated minutes in power reduction 2. There is possibility to reset this value with dedicated command.			

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PwrRed3HrsActM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16105	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed3HrsActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed3HrsLstM (page 631) . There is possibility to reset this value with dedicated command.			

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PwrRed3MinActM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16109	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed3MinActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed3MinLstM (page 632) . There is possibility to reset this value with dedicated command.			

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PwrRed3HrsLstM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16113	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed3HrsLstM shows statistic value from last month accumulated in to the value PwrRed3HrsActM (page 631) . Every 1.day of new month is value from PwrRed3HrsActM (page 631) copied in to this value. The previous value is replaced with the new one.			

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PwrRed3MinLstM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16117	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed3MinLstM shows statistic value from last month accumulated in to the value PwrRed3MinActM (page 631) . Every 1.day of new month is value from PwrRed3MinActM (page 631) copied in to this value. The previous value is replaced with the new one.			

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PwrRed3HrsAcc

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16097	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated hours in power reduction 3. There is possibility to reset this value with dedicated command.			

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PwrRed3MinAcc

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16098	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated minutes in power reduction 3. There is possibility to reset this value with dedicated command.			

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PwrRed4HrsActM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16106	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed4HrsActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed4HrsLstM (page 633) . There is possibility to reset this value with dedicated command.			

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PwrRed4MinActM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16110	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed4MinActM is accumulated in to this statistic value for a one calendar month. Value is automatically reseted every 1.day of new month at 0:00 and value is moved in to the value PwrRed4MinLstM (page 633) . There is possibility to reset this value with dedicated command.			

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PwrRed4HrsLstM

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16114	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed4HrsLstM shows statistic value from last month accumulated in to the value PwrRed4HrsActM (page 632) . Every 1.day of new month is value from PwrRed4HrsActM (page 632) copied in to this value. The previous value is replaced with the new one.			

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PwrRed4MinLstM

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16118	Related applications	SPtM, SPI, Combi
Description			
Value PwrRed4MinLstM shows statistic value from last month accumulated in to the value PwrRed4MinActM (page 633) . Every 1.day of new month is value from PwrRed4MinActM (page 633) copied in to this value. The previous value is replaced with the new one.			

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PwrRed4HrsAcc

Value group	Grid Codes	Related FW	2.2.0
Units	h		
Comm object	16099	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated hours in power reduction 4. There is possibility to reset this value with dedicated command.			

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PwrRed4MinAcc

Value group	Grid Codes	Related FW	2.2.0
Units	min		
Comm object	16100	Related applications	SPtM, SPI, Combi
Description			
Value shows accumulated minutes in power reduction 4. There is possibility to reset this value with dedicated command.			

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Pmom/Pave

Value group	Grid Codes	Related FW	2.2.0
Units	0.001 [-]		
Comm object	16545	Related applications	SPtM, SPI, Combi
Description			
This value is the ratio between Pmom and Pave for calculation of tripping time when PAV, E monitoring (page 223) function is enabled. Note: This value is internally inverted because of ComAp export/import sign convention (export is negative). For example, Pave = +20 kW, Pmom = -10 kW, Pmom/Pave = +0.5 (not -0.5).			

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Group: Voltage/PF Control

VoltRegOut

Value group	Voltage/PF Control	Related FW	2.2.0
Units	%		
Comm object	9053	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the actual PWM percentage on the AVRi output of the controller.			

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VoltReq

Value group	Voltage/PF Control	Related FW	2.2.0
Units	%		
Comm object	14997	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value is calculated as: VoltReq (page 635) = 50 + VoltRegOut (page 634) / 2 [%]			

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SystPfCtrl

Value group	Voltage/PF Control	Related FW	2.2.0
Units	-		
Comm object	10793	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value shows actual PFctrlPTM mode. The value describes all possible functional modes adjusted by setpoints PF ctrl PtM,PF/Qctrl ANEXT,PF/Qctrl IM/EX.			

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Required Q

Value group	Voltage/PF Control	Related FW	2.2.0
Units	kVAr		
Comm object	16152	Related applications	SPtM, SPI, Combi
Description			
Value shows required reactive power from generator calculated after the Q ramp. In case the Q regulation is not active, value is not visible.			

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Required Qrel

Value group	Voltage/PF Control	Related FW	2.2.0
Units	%		
Comm object	13169	Related applications	SPtM, SPI, Combi
Description			
Value shows required relative reactive power from generator calculated after the Q ramp. In case the Q regulation is not active, value is not visible.			

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Required PF3dc

Value group	Voltage/PF Control	Related FW	2.2.0
Units	-		
Comm object	16159	Related applications	SPtM, SPI, Combi
Description			
Value shows required power factor from generator in 0.001 resolution. In case the PF regulation is not active, value is not visible.			

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Required PF ch

Value group	Voltage/PF Control	Related FW	2.2.0
Units	-		
Comm object	9033	Related applications	SPtM, SPI, Combi
Description			
Value shows required character of power factor from generator. Value is shown as L, C, R. In case the PF regulation is not active, value is not visible.			

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PF(P) Curve

Value group	Voltage/PF Control	Related FW	2.2.0
Units	-		
Comm object	13636	Related applications	SPtM, SPI, Combi
Description			
If there is used PF(Pm) or PF-IM/EX(Pm) type of regulation chosen by setpoint: PF/Qctrl PtM (page 328) value is active and shows calculated actual value of PF(P) curve adjusted in GenConfig.			

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Required PF

Value group	Voltage/PF Control	Related FW	2.2.0
Units	-		
Comm object	14518	Related applications	SPtM, SPI, Combi
Description			
Value shows required power factor from generator. In case the PF regulation is not active, value is not visible.			

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Group: Force value

ExValue1

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	11004	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. Below is a typical example of using this object.</p> <p>The Gen-set is required to be running in parallel-to-mains mode at constant load level (baseload), however the baseload level is adjusted from a supervisory PLC system via Modbus.</p> <p>The proper solution is following:</p> <ol style="list-style-type: none">1. Go to GenConfig, download the configuration from the controller, select the LAI tab and configure the logical analog input <i>LdCtrl:AnExBld</i> onto the ExValue1, which is located in the Force value group. If you do not see the LAI tab you have to switch the GenConfig to "advanced" mode. Then upload the configuration into the controller.2. Go to IntelliMonitor and change the setpoint Load ctrl PtM to ANEXT BASELOAD.3. Now you have to program your PLC to write requested Gen-set baseload into the Modbus register <i>ExValue1</i> (register number 40392 for IG/IS-NT-2.4).			

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ExValue2

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	11005	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue3

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	11006	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue4

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	11007	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue5

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16497	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue6

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16498	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue7

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16499	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue8

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16500	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue9

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16501	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue10

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16502	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue11

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16503	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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ExValue12

Value group	Force value	Related FW	2.2.0
Units	-		
Comm object	16504	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This data object is intended for remote control of the Gen-set via the communication if some kind of data is to be passed into the controller.</p> <p>This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object ExValue1 (page 637).</p>			

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Group: Load shedding

StatLdShed

Value group	Engine	Related FW	2.2.0
Units	-		
Comm object	9591	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>The value indicates the current load shedding stage. 0 indicates that the load shedding is not active. See the chapter Load shedding (page 145) for more details.</p>			

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Group: Analog CU

UBat

Value group	Analog CU	Related FW	2.2.0
Units	V		
Comm object	8213	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>Voltage at the controller power supply terminals.</p>			

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D+

Value group	Analog CU	Related FW	2.2.0
Units	V		
Comm object	10603	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Voltage measured at the D+ terminal. If this voltage is > 80% of the UBat (page 641) the D+ terminal is evaluated as active and the engine is evaluated as running. See also the chapter Start sequence (page 131).			

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AIN CU-1

Value group	Analog CU	Related FW	2.2.0
Units	configurable		
Comm object	9155	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of the analog input 1 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for oil pressure measurement.			

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AIN CU-2

Value group	Analog CU	Related FW	2.2.0
Units	configurable		
Comm object	9156	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of the analog input 2 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for water temperature measurement.			

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AIN CU-3

Value group	Analog CU	Related FW	2.2.0
Units	configurable		
Comm object	9157	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of the analog input 3 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for fuel level measurement.			

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AIN CU-4

Value group	Analog CU	Related FW	2.2.0
Units	configurable		
Comm object	9158	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of the analog input 4 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for fuel level measurement.			

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Group: Bin inputs CU

BIN

Value group	Bin inputs CU	Related FW	2.2.0
Units	-		
Comm object	8235	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of physical binary inputs of the controller. Bit0 represents BI1, bit1 represents BI2 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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Group: Bin outputs CU

BOUT

Value group	Bin outputs CU	Related FW	2.2.0
Units	-		
Comm object	8239	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of physical binary outputs of the controller. Bit0 represents BO1, bit1 represents BO2 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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Group: Log Bout

LogBout 1

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9143	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 1-16 of the controller. Bit0 represents LBO1, bit1 represents LBO2 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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LogBout 2

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9144	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 17-32 of the controller. Bit0 represents LBO17, bit1 represents LBO18 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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LogBout 3

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9145	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 33-48 of the controller. Bit0 represents LBO33, bit1 represents LBO34 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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LogBout 4

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9146	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 49-64 of the controller. Bit0 represents LBO49, bit1 represents LBO50 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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LogBout 5

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9147	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 65-80 of the controller. Bit0 represents LBO65, bit1 represents LBO66 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			
Note: Click on button with "..." to get a clear list of BI names with their corresponding values.			

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LogBout 6

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9148	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 81-96 of the controller. Bit0 represents LBO81, bit1 represents LBO82 etc..			
<i>Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.</i>			
<i>Note: Click on button with "..." to get a clear list of BI names with their corresponding values.</i>			

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LogBout 7

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9149	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 97-112 of the controller. Bit0 represents LBO97, bit1 represents LBO98 etc..			
<i>Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.</i>			

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LogBout 8

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	9150	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 113-128 of the controller. Bit0 represents LBO113, bit1 represents LBO114 etc..			
<i>Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.</i>			

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LogBout 9

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	11896	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 129-144 of the controller. Bit0 represents LBO129, bit1 represents LBO130 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			

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LogBout 10

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	11897	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 144-160 of the controller. Bit0 represents LBO144, bit1 represents LBO160 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			

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LogBout 11

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	11898	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs 161-176 of the controller. Bit0 represents LBO161, bit1 represents LBO176 etc..			
Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			

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RemoteControl

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	10627	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of the binary outputs REMOTECONTROL1 (PAGE 838) ... REMOTECONTROL8 (PAGE 840).			

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ModbusSw1

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	13267	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs which are controlled via direct writing to Modbus. For this is reserved register 46337. Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			

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ModbusSw2

Value group	Log Bout	Related FW	2.2.0
Units	-		
Comm object	13268	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is a bit array containing status of logical binary outputs which are controlled via direct writing to Modbus. For this is reserved register 46338. Note: All terminals display binary values in "human-readable" form – from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.			

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Group: Info

Controller mode

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	9574	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains actual controller mode. The controller mode is selected by the setpoint ControllerMode (page 356) but the setpoint position can be overridden by binary inputs REMOTE OFF (PAGE 738) , REMOTE MAN (PAGE 738) , REMOTE AUT/REMOTE SEM (PAGE 738) or REMOTE TEST (PAGE 739) .			

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Build date

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	24211	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value is the date when this firmware version was created.			

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SW Version

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	24339	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Major and minor firmware version number. E.g. value "2,4" means version 2.4. Release version number is not included.			

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Application

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	8480	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Code of the application type. E.g. 1 for SPtM, 2 for SPI, 3 for MINT etc. The value is intended for diagnostic purposes.			

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SW Branch

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	8707	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Firmware branch code. Contains 1 in case of standard branches.			

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PasswordDecode

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	9090	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains encrypted serial number of the controller and administrator password and is intended for retrieving of the lost password. Send this number together with controller serial number to your distributor if you need to retrieve your password.			

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CAN16

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	8546	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			
Note: The bit which corresponds to the own controller is always set to "1".			

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CAN32

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	8827	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32.			
Note: The bit which corresponds to the own controller is always set to "1".			

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Reg16

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	11081	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			

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Reg32

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	11082	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32.			

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GL16

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10196	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position has GCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			

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GL32

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10197	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position has GCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 17-32.			

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Combi select

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	11834	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value indicates which application is currently selected in Combi application.			

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Engine state

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	9244	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Code of the current state of the engine control. The text representation of each code can be obtained following way: <ol style="list-style-type: none">1. Open the archive in GenConfig and use the function File -> Generate Cfg Image -> Comm. objects to create a list of all communication objects.2. Open the file, find the row containing this value and look for the column "Type". The column "Type" contains reference to a list of codes and their representations located in the bottom part of the file.			

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Breaker state

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	9245	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Code of the current state of the breaker control. The text representation of each code can be obtained by the procedure described at the value Engine state (page 652).			

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Timer text

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10040	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Code of the currently running system process timer. The text representation of each code can be obtained by the procedure described at the value Engine state (page 652). Remaining time of the timer is available in the value Timer val (page 653).			

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Timer val

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	8955	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
The value contains remaining time of the currently running system process timer. The name of the timer is available in the value Timer text (page 652) .			

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ECU DiagSource

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10226	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value indicates from which source the ECU diagnostic messages are being received. The source depends on ECU type.			

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CANErrCountRx

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	23890	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value is used for CAN1 communication diagnostics. It's the Receive Error Counter.			

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CANErrCountTx

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	23889	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value is used for CAN1 communication diagnostics. It's the Transmit Error Counter.			

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CANBusOffCount

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	23888	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value is used for CAN1 communication diagnostics. It's the counter of Bus Off states.			

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NextTime1-4

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10927	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 1-4 (i.e. of the output TIMERACT 1-4 (PAGE 846)). The related date is available in the value NextDate1-4 (page 654) .			
Note: More information about timers is available in the chapter <i>Service timers (page 150)</i> .			

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NextDate1-4

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10931	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 1-4 (i.e. of the output TIMERACT 1-4 (PAGE 846)). The related date is available in the value NextTime1-4 (page 654) .			
Note: More information about timers is available in the chapter <i>Service timers (page 150)</i> .			

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NextTime5-8

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10928	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 5-8 (i.e. of the output TIMERACT 5-8 (PAGE 847)). The related date is available in the value NextDate5-8 (page 655) .			
Note: More information about timers is available in the chapter <i>Service timers (page 150)</i> .			

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NextDate5-8

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10932	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 5-8 (i.e. of the output TIMERACT 5-8 (PAGE 847)). The related date is available in the value NextTime5-8 (page 654) .			
Note: More information about timers is available in the chapter <i>Service timers (page 150)</i> .			

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NextTime9-12

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10929	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 9-12 (i.e. of the output TIMERACT 9-12 (PAGE 847)). The related date is available in the value NextDate9-12 (page 655) .			
Note: More information about timers is available in the chapter <i>Service timers (page 150)</i> .			

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NextDate9-12

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10933	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 9-12 (i.e. of the output TIMERACT 9-12 (PAGE 847)). The related date is available in the value NextTime9-12 (page 655) .			
Note: More information about timers is available in the chapter <i>Service timers (page 150)</i> .			

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NextTime13-16

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10930	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 13-16 (i.e. of the output TIMERACT 13-16 (PAGE 847)). The related date is available in the value NextDate13-16 (page 656).			
<i>Note: More information about timers is available in the chapter Service timers (page 150).</i>			

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NextDate13-16

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	10934	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains time of next activation of the timer block 13-16 (i.e. of the output TIMERACT 13-16 (PAGE 847)). The related date is available in the value NextTime13-16 (page 656).			
<i>Note: More information about timers is available in the chapter Service timers (page 150).</i>			

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AirGate ID

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	24345	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
If the controller is connected to the AirGate server this value displays the ID string assigned by the server. This ID string is to be used in ComAp PC tools (e.g. IntelliMonitor) to specify the respective controller when the connection is opened.			

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AirGate status

Value group	Info	Related FW	2.2.0												
Units	-														
Comm object	15573	Related applications	SPtM, SPI, MINT, COX, Combi												
Description															
This value displays actual status of the connection to the AirGate server.															
<table><tr><td>0</td><td>Not connected to AirGate.</td></tr><tr><td>1</td><td>Connected, registered, waiting for autorization.</td></tr><tr><td>2</td><td>Registration denied.</td></tr><tr><td>3</td><td>Can not register, no free capacity in the server.</td></tr><tr><td>4</td><td>Can not register, other reason.</td></tr><tr><td>5</td><td>Connected, registered, authorized.</td></tr></table>				0	Not connected to AirGate.	1	Connected, registered, waiting for autorization.	2	Registration denied.	3	Can not register, no free capacity in the server.	4	Can not register, other reason.	5	Connected, registered, authorized.
0	Not connected to AirGate.														
1	Connected, registered, waiting for autorization.														
2	Registration denied.														
3	Can not register, no free capacity in the server.														
4	Can not register, other reason.														
5	Connected, registered, authorized.														

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Latitude

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	11678	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains latitude of the controller. This value is obtained from connected IB-NT with active GPS. Time is automatically synchronized as well when successful GPS fix is established. If no valid value is available from InternetBridge-NT, value ##### is displayed.			

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Longitude

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	11679	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This value contains longitude of the controller. This value is obtained from connected IB-NT with active GPS. Time is automatically synchronized as well when successful GPS fix is established. If no valid value is available from InternetBridge-NT, value ##### is displayed.			

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SW Keys

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	24240	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Identifies the current state of the unlocked functions by the setpoint SW Key (page 360) .			
Note: <i>There are currently no functions which can be unlocked by SW Key. This value is intended for future use.</i>			

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SW Dongles

Value group	Info	Related FW	2.2.0
Units	-		
Comm object	23894	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Identifies the current state of the unlocked functions by the setpoint SW Dongle (page 1) .			

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Group: Statistics

kWHours

Value group	Statistics	Related FW	2.2.0
Units	kWh		
Comm object	8205	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Active energy counter.			
Note: <i>The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.</i>			

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Day kWHours

Value group	Statistics	Related FW	2.2.0
Units	kWh		
Comm object	8536	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Active energy counter for one day. It is always reset at 00:00:00.			
Note: <i>The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.</i>			

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kVAhours

Value group	Statistics	Related FW	2.2.0
Units	kVAh		
Comm object	8539	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Reactive energy counter.			
Note: The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.			

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Run Hours

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	8206	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Engine operation hours counter. If an ECU is configured and it provides engine hours value, the value is taken from ECU. If the value is not available from the ECU or ECU is not configured, the engine hours are incremented in the controller while the engine is running.			
Note: The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.			

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Run minutes

Value group	Statistics	Related FW	2.2.0
Units	min		
Comm object	15118	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Engine operation minutes counter. If an ECU is configured and it provides engine minutes value, the value is taken from ECU. If the value is not available from the ECU or ECU is not configured, the engine minutes are incremented in the controller while the engine is running.			
Note: The counter can't be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.			

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Num starts

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	8207	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Successful starts counter. The counter is increased by 1 even if the particular start command will take more than one attempt.			
Note: The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.			

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NumUnsc start

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	10149	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Unsuccessful starts counter. The counter is incremented always when a crank attempts fails.			
Note: The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.			

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Service time 1

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	14397	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is maintenance countdown timer #1. The timer is located in values (group Statistics). Initial Value is given by the setpoint Service time 1 (page 397) . Value is decremented while the Gen-set is running. The alarm <i>WrnServiceTime</i> is issued as soon as the timer counts down to zero. When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle by pressing the Reset button in the Service timer dialog window in IntelliMonitor or by configured display command. The counter will then count down again.			

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Service time 2

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	14398	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This is maintenance countdown timer #2. The timer is located in values (group Statistics).</p> <p>Initial Value is given by the setpoint Service time 2 (page 397).</p> <p>Value is decremented while the Gen-set is running.</p> <p>The alarm <i>WrmServiceTime</i> is issued as soon as the timer counts down to zero.</p> <p>When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle by pressing the Reset button in the Service timer dialog window in IntelliMonitor or by configured display command. The counter will then count down again.</p>			

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Service time 3

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	14399	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This is maintenance countdown timer #3. The timer is located in values (group Statistics).</p> <p>Initial Value is given by the setpoint Service time 3 (page 398).</p> <p>Value is decremented while the Gen-set is running.</p> <p>The alarm <i>WrmServiceTime</i> is issued as soon as the timer counts down to zero.</p> <p>When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle by pressing the Reset button in the Service timer dialog window in IntelliMonitor or by configured display command. The counter will then count down again.</p>			

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ServiceTimeStp

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	15802	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This is maintenance countdown timer #4. The timer is located in values (group Statistics).</p> <p>Initial Value is given by the setpoint ServiceTimeStp (page 398).</p> <p>Value is decremented while the gen-set is running.</p> <p>The alarm <i>StpServiceTime</i> is issued as soon as the timer counts down to zero.</p> <p>When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle by pressing the Reset button in the Service timer dialog window in IntelliMonitor or by configured display command. The counter will then count down again.</p>			

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TotalDownTime

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	10560	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This counter counts while the controller is in "not ready" state, i.e. it can not be started. The reason of the "not ready" state may be either some 2nd level alarm or the controller switched in OFF mode.</p> <p>Note: The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.</p>			

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DnTimeReqToRun

Value group	Statistics	Related FW	2.2.0
Units	h		
Comm object	10564	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This counter counts while the controller is in "not ready" state (see the value TotalDownTime (page 662)) and there is a request for the Gen-set to run.</p> <p>Note: The counter can be readjusted/reset from IntelliMonitor menu Monitor -> Set statistics.</p>			

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PulseCounter 1

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	10986	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #1</i> module. See the binary input PULSECOUNTER 1 (PAGE 732).			

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PulseCounter 2

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	10987	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #2</i> module. See the binary input PULSECOUNTER 2 (PAGE 733).			

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PulseCounter 3

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	10988	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #3</i> module. See the binary input PULSECOUNTER 3 (PAGE 733).			

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PulseCounter 4

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	10989	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #4</i> module. See the binary input PULSECOUNTER 4 (PAGE 734).			

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PulseCounter 5

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	15338	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #5</i> module. See the binary input PULSECOUNTER 5 (PAGE 734).			

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PulseCounter 6

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	15339	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #6</i> module. See the binary input PULSECOUNTER 6 (PAGE 735).			

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PulseCounter 7

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	15340	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #7</i> module. See the binary input PULSECOUNTER 7 (PAGE 735).			

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PulseCounter 8

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	15341	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
This is the value of <i>PulseCounter #8</i> module. See the binary input PULSECOUNTER 8 (PAGE 736).			

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LastAlarm1

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13380	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the alarm number code of the last five alarms that have occurred (the number code can be found e.g. in the exported comm objects table)			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm1Time

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13390	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These values contain the time of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm1Date

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13385	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the date of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurrence) the value contain invalid value (####)			

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LastAlarm2

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13381	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the alarm number code of the last five alarms that have occurred (the number code can be found e.g. in the exported comm objects table)			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm2Time

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13391	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These values contain the time of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm2Date

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13386	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the date of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm3

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13382	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the alarm number code of the last five alarms that have occurred (the number code can be found e.g. in the exported comm objects table)			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm3Time

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13392	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These values contain the time of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm3Date

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13387	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the date of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm4

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13383	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the alarm number code of the last five alarms that have occurred (the number code can be found e.g. in the exported comm objects table)			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm4Time

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13393	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These values contain the time of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm4Date

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13388	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the date of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm5

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13384	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the alarm number code of the last five alarms that have occurred (the number code can be found e.g. in the exported comm objects table)			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm5Time

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13394	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These values contain the time of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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LastAlarm5Date

Value group	Statistics	Related FW	2.2.0
Units	-		
Comm object	13389	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
These value contains the date of occurrence of corresponding alarm			
When there is no value available (no alarms yet occurred) the value contain invalid value (####)			

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Group: AFR Control

MIXPOSA

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	10090	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Mixer position.			
Value is sum of value AFRVlvOffsetA (page 669) and AFRVlvRegA (page 669).			

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AFRVlvOffsetA

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	13570	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Required mixer value calculated from characteristic adjusted by setpoints MixPos1A (page 556) , MixPos2A (page 557) , MixPos3A (page 558) , MixPos4A (page 559) , MixPos5A (page 560) .			

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AFRVlvRegA

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	13572	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Output value from PID regulation as part of general requested Value for MIXPOSB (page 670) . This Value is limited with setpoint LimPos (page 549) . Value is set to zero when the Sensor Value goes over the SensorValToIA (page 562) for longer time than TAFROFFA (page 560) .			

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AFRSensReqA

Value group	AFR Control	Related FW	2.2.0
Units	Bar/mV/°C		
Comm object	10091	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Required Sensor Value related to Sensor characteristic adjusted via setpoints Sensor1A (page 555) , Sensor2A (page 556) , Sensor3A (page 558) , Sensor4A (page 559) , Sensor5A (page 560) .			

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AFRSensActA

Value group	AFR Control	Related FW	2.2.0
Units	Bar/mV/°C		
Comm object	10093	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Actual Value of Sensor. Dimension and range depends on the settings of the LAI: SENSORA (PAGE 895) .			

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MIXFeedbackA

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	10092	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Actual feedback value of mixer.			

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CH4offsetA

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	15639	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This value can be useful in case of needs for extended PLC logic when ANA CH4A (PAGE 869) is set to ENA-FIX or ENA-STEP mode.</p> <p>ENA-FIX mode</p> <p>In this mode will value show the actual recalculated value which depends on the analog value LAI: ANA CH4A (PAGE 869) and setpoints: MxPos40%CH4A (page 563) and MxPos60%CH4A (page 563).</p> <p>Value is visible also when the Gen-set is running above the LowPwr values.</p> <p>ENA-STEP mode</p> <p>In this mode will value show the actual recalculated value.</p> <p>This means:</p> <ul style="list-style-type: none">➤ StartingPosition: LAI: ANA CH4A (PAGE 869) + MxPos40%CH4A (page 563) and MxPos60%CH4A (page 563)➤ RunningPosition: (RunPositionA (page 554) - StartPositionA (page 553)) + (LAI: ANA CH4A (PAGE 869) + MxPos40%CH4A (page 563) and MxPos60%CH4A (page 563))➤ LowPowerPosition: (LoPwrPositionA (page 555) - StartPositionA (page 553)) + (LAI: ANA CH4A (PAGE 869) + MxPos40%CH4A (page 563) and MxPos60%CH4A (page 563)) <p>LowPower value will be shown also when the Gen-set is running above the LowPwr values.</p>			

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MIXPOSB

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	13139	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>Mixer position.</p> <p>Value is sum of values AFRVlvOffsetB (page 671) and AFRVlvRegB (page 671).</p>			

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AFRVlvOffsetB

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	15022	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Required mixer value calculated from characteristic adjusted by setpoints MixPos1B (page 567) , MixPos2B (page 568) , MixPos3B (page 569) , MixPos4B (page 570) , MixPos5B (page 572) .			

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AFRVlvRegB

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	15023	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Output value from PID regulation as part of general requested value for MIXPOSB (page 670) . This Value is limited with setpoint LimPos (page 549) . Value is set to zero when the Sensor value goes over the SensorValToIB (page 573) for longer time than TAFROFFB (page 572) .			

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AFRSensReqB

Value group	AFR Control	Related FW	2.2.0
Units	Bar/mV/°C		
Comm object	15024	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Required Sensor Value related to Sensor characteristic adjusted via setpoints Sensor1B (page 567) , Sensor2B (page 568) , Sensor3B (page 569) , Sensor4B (page 570) , Sensor5B (page 571) .			

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AFRSensActB

Value group	AFR Control	Related FW	2.2.0
Units	Bar/mV/°C		
Comm object	13141	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Actual Value of Sensor. Dimension and range depends on the settings of the LAI: SENSORB (PAGE 895) .			

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MIXFeedbackB

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	13140	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
Actual feedback value of mixer.			

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CH4offsetB

Value group	AFR Control	Related FW	2.2.0
Units	%		
Comm object	15640	Related applications	SPtM, SPI, MINT, COX, Combi
Description			
<p>This value can be useful in case of needs for extended PLC logic when Ana CH4B (page 575) is set to ENA-FIX or ENA-STEP mode.</p> <p>ENA-FIX mode</p> <p>In this mode will value show the actual recalculated value which depends on the LAI: ANA CH4B (PAGE 870) and setpoints: MxPos40%CH4B (page 574) and MxPos60%CH4B (page 574).</p> <p>Value is visible also when the Gen-set is running above the LowPwr values.</p> <p>ENA-STEP mode</p> <p>In this mode will value show the actual recalculated value.</p> <p>This means:</p> <ul style="list-style-type: none">> StartingPosition: LAI: ANA CH4B (PAGE 870) + MxPos40%CH4B (page 574) and MxPos60%CH4B (page 574)> RunningPosition: (RunPositionB (page 566) - StartPositionB (page 565)) + (LAI: ANA CH4B (PAGE 870) + MxPos40%CH4B (page 574) and MxPos60%CH4B (page 574))> LowPowerPosition: (LoPwrPositionB (page 566) - StartPositionB (page 565)) + (LAI: ANA CH4B (PAGE 870) + MxPos40%CH4B (page 574) and MxPos60%CH4B (page 574)) <p>LowPower Value will be shown also when the Gen-set is running above the LowPwr values.</p>			

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9.1.4 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	676
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LBI: D	678
LBI: E	678
LBI: F	693
LBI: G	706
LBI: H	708
LBI: I	708
LBI: L	713
LBI: M	724
LBI: N	729
LBI: O	730
LBI: P	730
LBI: R	737
LBI: S	740
LBI: T	747
LBI: U	752
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For full list of Logical binary inputs go to the chapter **List of LBI (page 674)**.

List of LBI

AccessLock D#2	676	ExValue8 reset	689	ForceValueIn 21	702
AccessLock D#3	676	ExValue9 down	689	ForceValueIn 22	702
AccessLock ext	676	ExValue9 up	689	ForceValueIn 23	703
AccessLock int	677	ExValue9 reset	690	ForceValueIn 24	703
Cleaning	677	ExValue10 down	690	ForceValueIn 25	703
CtrlHBeat sens	677	ExValue10 up	690	ForceValueIn 26	704
CylDifEvalBlk	678	ExValue10 reset	691	ForceValueIn 27	704
DxLoadReduct	678	ExValue11 down	691	ForceValueIn 28	704
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ECUComFailBlk	679	ExValue11 reset	692	ForceValueIn 30	705
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Ext MP Trip	681	ExValue12 reset	693	GasAB	706
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ExValue1 down	681	Force block 1	693	GCB disable	706
ExValue1 up	681	Force block 2	693	GCB fdb neg	707
ExValue1 reset	682	Force block 3	694	GCB feedback S	707
ExValue2 down	682	ForceValueIn 1	695	GCB feedback	707
ExValue2 up	682	ForceValueIn 2	696	GCBButton	707
ExValue2 reset	683	ForceValueIn 3	696	GroupLink	708
ExValue3 down	683	ForceValueIn 4	696	HornResButton	708
ExValue3 up	683	ForceValueIn 5	697	ImpCountSet1	708
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ExValue4 up	684	ForceValueIn 8	698	ImpCountSet4	709
ExValue4 reset	685	ForceValueIn 9	698	ImpCountSet5	709
ExValue5 down	685	ForceValueIn 10	698	ImpCountSet6	709
ExValue5 up	685	ForceValueIn 11	699	ImpCountSet7	709
ExValue5 reset	686	ForceValueIn 12	699	ImpCountSet8	710
ExValue6 down	686	ForceValueIn 13	699	IssueActCallC1	710
ExValue6 up	686	ForceValueIn 14	700	IssueActCallC2	710
ExValue6 reset	687	ForceValueIn 15	700	IssueActCallC3	711
ExValue7 down	687	ForceValueIn 16	700	IssueActCallC4	711
ExValue7 up	687	ForceValueIn 17	701	IssueActCallC5	712
ExValue7 reset	688	ForceValueIn 18	701	Lang sel D#2 A	713
ExValue8 down	688	ForceValueIn 19	701	Lang sel D#2 B	714
ExValue8 up	688	ForceValueIn 20	702	Lang sel D#2 C	715

Lang sel D#3 A	716
Lang sel D#3 B	717
Lang sel D#3 C	718
Lang sel int A	719
Lang sel int B	720
Lang sel int C	721
Load reduction	721
Load res 2	722
Load res 3	722
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LoadReduct 1	723
LoadReduct 2	723
LoadReduct 3	724
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ManualLdRecon	724
MCB disable	725
MCB fdb neg	725
MCB feedback	725
MCBButton	726
MIC Fault Reset	726
MinRun power 1	726
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SafetyFunct2NO	742
SafetyFunct3NC	742
SafetyFunct3NO	743
SafetyFunct4NC	743
SafetyFunct4NO	744
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Timer block 6	749
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Timer block 11	750
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User mask 3	753
User mask 4	753
Watchdog Test	754

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LBI: A

AccessLock D#2

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	2		
Description			
This input forces the external local terminal or IntelliVision (display) #2 into monitoring mode.			
<i>Note: Local display means that it is connected to dedicated RS485. There is possibility to connect up to 3 external displays to IntelliSys Gas.</i>			
<div><div>></div> Setpoints changes are disabled.</div> <div><div>></div> Using control buttons on the panel is disabled even if the controller is in MAN mode.</div> <div><div>></div> Change of controller mode is disabled.</div>			

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AccessLock D#3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	3		
Description			
This input forces the external local terminal or IntelliVision (display) #3 into monitoring mode.			
<i>Note: Local display means that it is connected to dedicated RS485. There is possibility to connect up to external displays via dedicated RS485 terminal to IntelliSys Gas.</i>			
<div><div>></div> Setpoints changes are disabled.</div> <div><div>></div> Using control buttons on the panel is disabled even if the controller is in MAN mode.</div> <div><div>></div> Change of controller mode is disabled.</div>			

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AccessLock ext

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	4		
Description			
<p>This input forces all external remote terminals into monitoring mode.</p> <ul style="list-style-type: none">> Setpoints changes are disabled.> Executing commands is disabled.> Change of controller mode is disabled. <p>An external remote terminal is any device, which reads and/or writes data from/into the controller and is connected to the controller via any other communication bus than the dedicated terminal RS485 bus.</p> <p>Note: An example of such terminal is a PC with IntelliMonitor, any kind of remote display connected via CAN2 or a PLC connected to the RS485 and communicating via Modbus.</p>			

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AccessLock int

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1		
Description			
This input forces the IntelliVision terminal 1 into monitoring mode. <ul style="list-style-type: none">> Setpoints changes are disabled.> Using control buttons on the panel is disabled even if the controller is in MAN mode.> Change of controller mode is disabled.			

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LBI: C

Cleaning

Related FW	2.2.0	Related applications	Combi
Comm object	553		
Description			
This binary input is intended for activation of cleaning mode of generator (cleaning and drying). During the cleaning (when the Cleaning is active) <ul style="list-style-type: none">> Informative message is shown: "Cleaning" (this is not an alarm and it cannot be fault reset, it will disappear automatically once Cleaning gets inactive)> Generator excitation is deactivated.> Under and overfrequency and under and overvoltage protections are inactive. (Gener protect: Gen >V BOC (page 402), Gen <V BOC (page 403), Gen >f (page 404), Gen <f (page 404))> Voltage and frequency regulation is inactive. <div>IMPORTANT: Be aware that activation LBI Cleaning ensures only that the under voltage and under frequency protection is not active and allows Gen-set to run with frequency and voltage out of limits of protections. Activating of this input does not ensure that the voltage excitation is really switched off. The excitation of the generator has to be unconditionally switch off directly on the AVR of generator while the cleaning function is in use!</div>			

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CtrlHBeat sens

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	74		
Description			
This input is used at a redundant controller to sense the "heart beat" from the main controller. The input is to be connected to the output CTRLHEARTBEAT (PAGE 771) of the main controller. If the redundant controller does not sense the heart beat from the main one, it will activate the binary output CTRLHBEAT FD (PAGE 771) , which has to be wired such a way, that it disconnects the dead main controller from the Gen-set, connects the redundant controller instead and activates it. <div>Note: Learn more about redundancy in separate chapter Controller redundancy (page 146).</div>			

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CyIDifEvalBlk

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	73		
Description			
This input is used to disable temporarily evaluation of the alarms caused by cylinder temperatures deviations.			

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LBI: D

DxLoadReduct

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	118		
Description			
Input activates engine knocking protection. Knocking is detected from external unit. Protection is active only when Gen-set power is above value Power1A (page 555) . When is closed: <ul style="list-style-type: none">➤ Immediately starts engine unloading with rate given by Load Ramp (page 458) to value Min Power PtM (page 401).➤ Activates Engine shut down after delay given by setpoint Knocking del (page 553). The engine shut down is activated when binary input DxLoadReduct is activated 5 times in one hour (Alarm list and History record Sd Knocking). The internal counter is reset after one hour without Knocking activation or after engine Stop.			

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LBI: E

ECU StoppedEng

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	69		
Description			
When this input is activated, the Gen-set will be stopped immediately without unloading and cooling phase, however no alarm will be issued. This input is intended for situations, where the Gen-set is controller by an ECU or other device which also includes engine protections and can stop the engine itself. In such case the controller would issue an <i>Underspeed</i> alarm. Connecting this input to an appropriate ECU output, which provides information, that the engine has been stopped by the ECU, prevents the controller from issuing the underspeed alarm.			

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ECUComFailBlck

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	141		
Description			
The input disables issuing of the ECU communication failure alarm and all other alarms related to values that are being read from the ECU.			

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Emerg. manual

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	45		
Description			
<p>This input is designed to allow the Gen-set to be controlled externally, not by the controller.</p> <p>This feature is especially designed for marine Gen-sets, which are supposed to be started manually as the controller has no power supply before the Gen-set is started. It may be also useful in case of testing the Gen-set or in case of a failure, which does not allow the Gen-set to be controlled by the controller, but the Gen-set itself is stays operational. This function is also used in case of Controller redundancy (page 146) to disable redundant controller.</p> <p>The controller behaves following way:</p> <ul style="list-style-type: none"> ➤ Shows the text <i>EmergMan</i> in the engine status on the main screen. ➤ Stops all functions regarding the Gen-set control, deactivates all outputs related to it. The complete list of effected logical binary outputs is at the bottom. ➤ LBO WRN STOP FAIL (PAGE 866) is not being evaluated and stop solenoid is not activated if nonzero speed is detected. ➤ Voltage, current, power and other electric measurements are active. ➤ When the input is deactivated, the controller takes control over the Gen-set according to the situation in which the Gen-set was in the moment of deactivation. I.e. the Gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated. <p>Note: For successful recovery from a running state when the input is deactivated it is recommended to use pulse-type control outputs instead of continuous – type. E.g. STOP SOLENOID (PAGE 845) for fuel supply control and GCB ON COIL (PAGE 777), GCB OFF COIL (PAGE 776) for breaker control.</p> <p>Logical Binary Outputs that are deactivated (directly or indirectly) when <i>Emerg. manual</i> is active:</p> <ul style="list-style-type: none"> Starter Fuel solenoid Prestart Cooling pump CB close/open (GCB and MCB) CB ON coil (GCB and MCB) CB OFF coil (GCB and MCB) CB UV coil (GCB and MCB) Stop solenoid Stop pulse Speed up 			

Speed dn
 AVR up
 AVR dn
 Ignition
 Ventilation
 Idle/Nominal
 Prelubr pump
 In synchronism
 ECU PwrRelay
 Ready for load
 Stand-by ready
 Operational
 Ready
 Not Ready
 CranckProcedure
 Starting
 Idle run
 Running
 ForwardSynchro
 ReverseSynchro
 Warming
 Soft load
 Loaded
 Soft unld
 Cooling
 Stopping
 Crancking
 PeakShaveAct

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Emergency Stop

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	40		
Description			
<p>If the input is activated, engine shutdown is immediately performed. However, the controller behavior is slightly different compared to other shutdown alarms:</p> <ul style="list-style-type: none">➤ Outputs IGNITION (PAGE 782), VENTILATION (PAGE 865), COOLING PUMP (PAGE 768) and PRELUBR PUMP (PAGE 832) are deactivated as well.➤ This input cannot be overridden with the input Sd override (page 744). <p><i>Note: Because of safety reasons it is recommended to configure this input as Normally closed and use a NC switch.</i></p> <p>IMPORTANT: This is a software function only. It can be extended by a "hard-wired" emergency stop function, which means disconnecting power supply from the controller outputs.</p>			

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Ext MP Trip

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	363		
Description			
External mains protection with fast resolution of 20 ms.			

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Ext WD Fdb

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	594		
Description			
If this input is configured, then 5 s after controller initialization will be watched this input with period of 100 ms.			
In case the input is not activated or the input drops to 0, than "SD Ext WD Trip" activates			

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ExValue1 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	79		
Description			
While this input is active the value of <i>ExValue 1</i> is continuously being decreased at the rate of ExValue1 rate (page 527) until it reaches ExValue1LoLim (page 518).			
Note: If this input is used (configured), the <i>ExValue 1</i> can't be written remotely from a remote terminal using the command <i>ExValue 1</i> .			

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ExValue1 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	75		
Description			
While this input is active the value of <i>ExValue 1</i> is continuously being increased at the rate of ExValue1 rate (page 527) until it reaches ExValue1HiLim (page 522).			
Note: While this input is active the value of <i>ExValue 1</i> is continuously being increased at the rate of <i>ExValue1 rate</i> (page 527) until it reaches ExValue1HiLim (page 522).			

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ExValue1 reset

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	83		
Description			
<p>The <i>ExValue 1</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue1deflt (page 515).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue2 down

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	80		
Description			
While this input is active the value of <i>ExValue 2</i> is continuously being decreased at the rate of ExValue2 rate (page 527) until it reaches ExValue2LoLim (page 518) .			
<i>Note: IS-NT specific function</i>			
<i>Note: If this input is used (configured), the ExValue 2 can't be written remotely from a remote terminal using the command ExValue 2.</i>			

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ExValue2 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	76		
Description			
While this input is active the value of <i>ExValue 2</i> is continuously being increased at the rate of ExValue2 rate (page 527) until it reaches ExValue2HiLim (page 522) .			
<i>Note: If this input is used (configured), the ExValue 2 can't be written remotely from a remote terminal using the command ExValue 2.</i>			

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ExValue2 reset

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	84		
Description			
<p>The <i>ExValue 2</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue2deflt (page 515).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue3 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	81		
Description			
While this input is active the value of <i>ExValue 3</i> is continuously being decreased at the rate of ExValue3 rate (page 527) until it reaches ExValue3LoLim (page 519).			
<i>Note: If this input is used (configured), the ExValue 3 can't be written remotely from a remote terminal using the command ExValue 3.</i>			

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ExValue3 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	77		
Description			
While this input is active the value of <i>ExValue 3</i> is continuously being increased at the rate of ExValue3 rate (page 527) until it reaches ExValue3HiLim (page 523) .			
<i>Note: If this input is used (configured), the ExValue 3 can't be written remotely from a remote terminal using the command ExValue 3.</i>			

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ExValue3 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	85		
Description			
<p>The <i>ExValue 3</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue3deflt (page 515).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue4 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	82		
Description			
<p>While this input is active the value of <i>ExValue 4</i> is continuously being decreased at the rate of ExValue4 rate (page 527) until it reaches ExValue4LoLim (page 519).</p> <p>Note: If this input is used (configured), the <i>ExValue 4</i> can't be written remotely from a remote terminal using the command <i>ExValue 4</i>.</p>			

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ExValue4 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	78		
Description			
<p>While this input is active the value of <i>ExValue 4</i> is continuously being increased at the rate of ExValue4 rate (page 527) until it reaches ExValue4HiLim (page 523).</p> <p>Note: If this input is used (configured), the <i>ExValue 4</i> can't be written remotely from a remote terminal using the command <i>ExValue 4</i>.</p>			

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ExValue4 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	86		
Description			
<p>The <i>ExValue 4</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue4deflt (page 515).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue5 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	959		
Description			
<p>While this input is active the value of <i>ExValue 5</i> is continuously being decreased at the rate of ExValue5 rate (page 528) until it reaches ExValue5LoLim (page 519).</p> <p>Note: If this input is used (configured), the <i>ExValue 5</i> can't be written remotely from a remote terminal using the command <i>ExValue 5</i>.</p>			

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ExValue5 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	958		
Description			
<p>While this input is active the value of <i>ExValue 5</i> is continuously being increased at the rate of ExValue5 rate (page 528) until it reaches ExValue5HiLim (page 524).</p> <p>Note: If this input is used (configured), the <i>ExValue 5</i> can't be written remotely from a remote terminal using the command <i>ExValue 5</i>.</p>			

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ExValue5 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	974		
Description			
<p>The <i>ExValue 5</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue5deflt (page 516).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue6 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	961		
Description			
<p>While this input is active the value of <i>ExValue 6</i> is continuously being decreased at the rate of ExValue6 rate (page 528) until it reaches ExValue6LoLim (page 520).</p> <p>Note: If this input is used (configured), the <i>ExValue 6</i> can't be written remotely from a remote terminal using the command <i>ExValue 6</i>.</p>			

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ExValue6 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	960		
Description			
<p>While this input is active the value of <i>ExValue 6</i> is continuously being increased at the rate of ExValue6 rate (page 528) until it reaches ExValue6HiLim (page 524).</p> <p>Note: If this input is used (configured), the <i>ExValue 6</i> can't be written remotely from a remote terminal using the command <i>ExValue 6</i>.</p>			

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ExValue6 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	975		
Description			
<p>The <i>ExValue 6</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue6deflt (page 516).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue7 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	963		
Description			
<p>While this input is active the value of <i>ExValue 7</i> is continuously being decreased at the rate of ExValue7 rate (page 528) until it reaches ExValue7LoLim (page 520).</p> <p>Note: If this input is used (configured), the <i>ExValue 7</i> can't be written remotely from a remote terminal using the command <i>ExValue 7</i>.</p>			

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ExValue7 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	962		
Description			
<p>While this input is active the value of <i>ExValue 7</i> is continuously being increased at the rate of ExValue7 rate (page 528) until it reaches ExValue7HiLim (page 524).</p> <p>Note: If this input is used (configured), the <i>ExValue 7</i> can't be written remotely from a remote terminal using the command <i>ExValue 7</i>.</p>			

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ExValue7 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	976		
Description			
<p>The <i>ExValue 7</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue7deflt (page 516).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue8 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	965		
Description			
<p>While this input is active the value of <i>ExValue 8</i> is continuously being decreased at the rate of ExValue8 rate (page 528) until it reaches ExValue8LoLim (page 520).</p> <p>Note: If this input is used (configured), the <i>ExValue 8</i> can't be written remotely from a remote terminal using the command <i>ExValue 8</i>.</p>			

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ExValue8 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	964		
Description			
<p>While this input is active the value of <i>ExValue 8</i> is continuously being increased at the rate of ExValue9 rate (page 529) until it reaches ExValue8HiLim (page 525).</p> <p>Note: If this input is used (configured), the <i>ExValue 8</i> can't be written remotely from a remote terminal using the command <i>ExValue 8</i>.</p>			

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ExValue8 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	977		
Description			
<p>The <i>ExValue 8</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue8deflt (page 517).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue9 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	967		
Description			
<p>While this input is active the value of <i>ExValue 9</i> is continuously being decreased at the rate of ExValue9 rate (page 529) until it reaches ExValue9LoLim (page 521).</p> <p>Note: If this input is used (configured), the <i>ExValue 9</i> can't be written remotely from a remote terminal using the command <i>ExValue 9</i>.</p>			

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ExValue9 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	966		
Description			
<p>While this input is active the value of <i>ExValue 9</i> is continuously being increased at the rate of ExValue9 rate (page 529) until it reaches ExValue9HiLim (page 525).</p> <p>Note: If this input is used (configured), the <i>ExValue 9</i> can't be written remotely from a remote terminal using the command <i>ExValue 9</i>.</p>			

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ExValue9 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	978		
Description			
<p>The <i>ExValue 9</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue10deflt (page 517).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue10 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	969		
Description			
While this input is active the value of <i>ExValue 10</i> is continuously being decreased at the rate of ExValue10 rate (page 529) until it reaches ExValue10LoLim (page 521) .			
<i>Note: If this input is used (configured), the ExValue 10 can't be written remotely from a remote terminal using the command ExValue 10.</i>			

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ExValue10 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	968		
Description			
While this input is active the value of <i>ExValue 10</i> is continuously being increased at the rate of ExValue10 rate (page 529) until it reaches ExValue10HiLim (page 525).			
<i>Note: If this input is used (configured), the <i>ExValue 10</i> can't be written remotely from a remote terminal using the command <i>ExValue 10</i>.</i>			

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ExValue10 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	979		
Description			
<p>The <i>ExValue 10</i> is reset to its default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue10deflt (page 517).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue11 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	971		
Description			
<p>While this input is active the value of <i>ExValue 11</i> is continuously being decreased at the rate of ExValue11 rate (page 529) until it reaches ExValue11LoLim (page 521).</p> <p>Note: If this input is used (configured), the <i>ExValue 11</i> can't be written remotely from a remote terminal using the command <i>ExValue 11</i>.</p>			

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ExValue11 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	970		
Description			
<p>While this input is active the value of <i>ExValue 11</i> is continuously being increased at the rate of ExValue11deflt (page 517) until it reaches ExValue11HiLim (page 526).</p> <p>Note: If this input is used (configured), the <i>ExValue 11</i> can't be written remotely from a remote terminal using the command <i>ExValue 11</i>.</p>			

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ExValue11 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	980		
Description			
<p>The <i>ExValue 11</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue11deflt (page 517).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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ExValue12 down

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	973		
Description			
<p>While this input is active the value of <i>ExValue 12</i> is continuously being decreased at the rate of ExValue12 rate (page 529) until it reaches ExValue12LoLim (page 522).</p> <p>Note: If this input is used (configured), the <i>ExValue 12</i> can't be written remotely from a remote terminal using the command <i>ExValue 12</i>.</p>			

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ExValue12 up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	972		
Description			
<p>While this input is active the value of <i>ExValue 12</i> is continuously being increased at the rate of ExValue12 rate (page 529) until it reaches ExValue12HiLim (page 526).</p> <p>Note: If this input is used (configured), the <i>ExValue 12</i> can't be written remotely from a remote terminal using the command <i>ExValue 12</i>.</p>			

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ExValue12 reset

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	981		
Description			
<p>The <i>ExValue 12</i> is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint ExValue12deflt (page 518).</p> <p>While the reset input is active:</p> <ul style="list-style-type: none">➤ The value does not respond to up and down inputs.➤ The value does not accept new data that are written remotely from a remote terminal using the <i>ExValue</i> command. <p>Note: Configuring of the reset input does not block writing the <i>ExValue</i> remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.</p>			

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LBI: F

FaultResButton

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	6		
Description			
<p>This input is used for an external FAULT RESET button mounted on the switchboard. The function of the input is identical as function of the fault reset button on the controller front panel.</p> <p>The input is enabled only if the setpoint Local buttons (page 357)!!! not specified !!! is set to position EXTBUTTONS or BOTH.</p>			

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Force block 1

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	16		
Description			
This is one of three binary inputs used for user-defined blocking of protections. If the input is active, all the protections that have <i>Protection block type</i> configured as <i>Force block 1</i> block type are blocked (i.e. temporarily disabled).			

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Force block 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	17		
Description			
This is one of three binary inputs used for user-defined blocking of protections. If the input is active, all the protections that have <i>Protection block type</i> configured as <i>Force block 2</i> block type are blocked (i.e. temporarily disabled).			

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Force block 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	18		
Description			
This is one of three binary inputs used for user-defined blocking of protections. If the input is active, all the protections that have <i>Protection block type</i> configured as <i>Force block 3</i> block type are blocked (i.e. temporarily disabled).			

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ForceValueIn 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	19		

Description

This input activates the *Force value #1* block. If the input is active, the value of the setpoint, to which the Force value #1 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #1 block.

Note: If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).

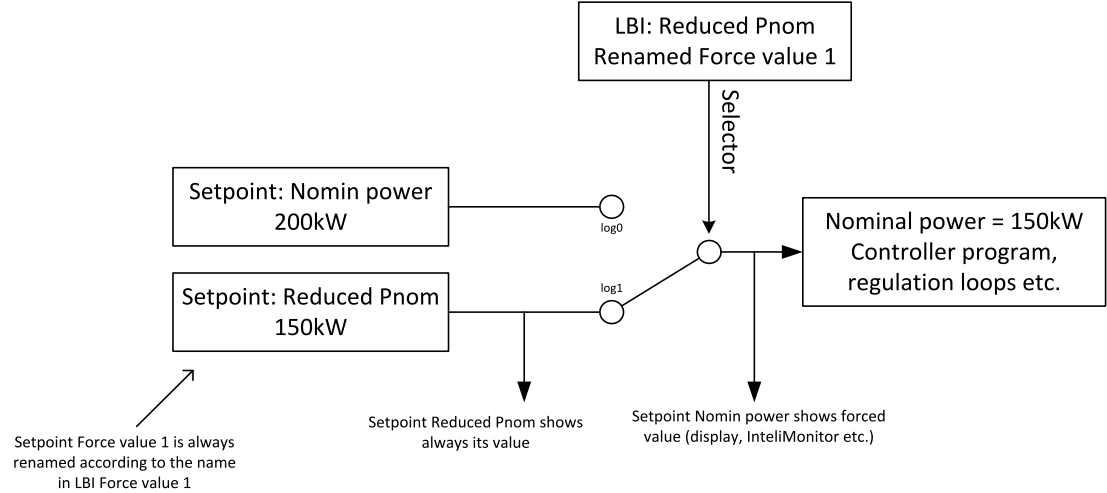


Image 9.13 Force value activated

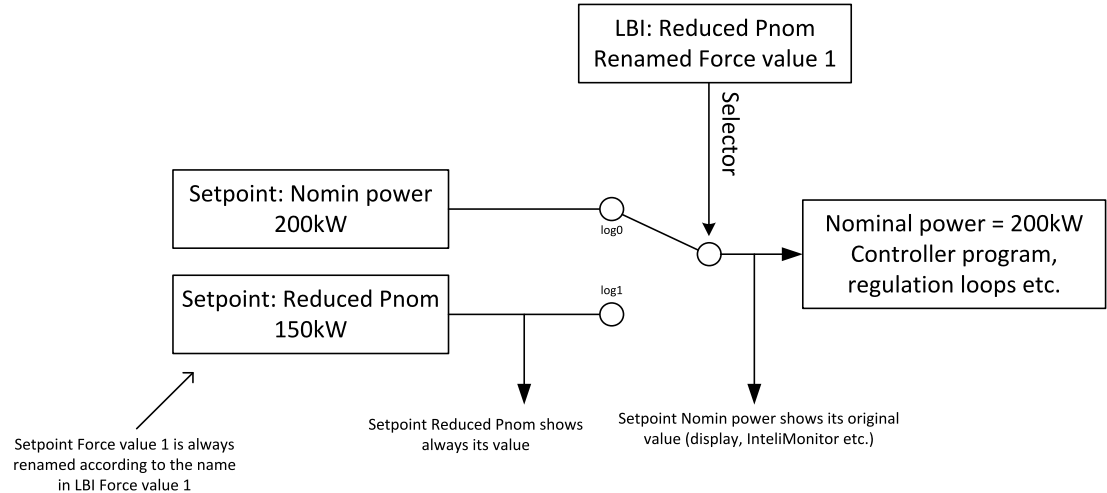


Image 9.14 Force value deactivated

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ForceValueIn 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	20		
Description			
<p>This input activates the <i>Force value #2</i> block. If the input is active, the value of the setpoint, to which the Force value #2 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #2 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	21		
Description			
<p>This input activates the <i>Force value #3</i> block. If the input is active, the value of the setpoint, to which the Force value #3 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #3 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 4

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	22		
Description			
<p>This input activates the <i>Force value #4</i> block. If the input is active, the value of the setpoint, to which the Force value #4 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #4 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	23		
Description			
<p>This input activates the <i>Force value #5</i> block. If the input is active, the value of the setpoint, to which the Force value #5 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #5 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	24		
Description			
<p>This input activates the <i>Force value #6</i> block. If the input is active, the value of the setpoint, to which the Force value #6 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #6 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 7

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	25		
Description			
<p>This input activates the <i>Force value #7</i> block. If the input is active, the value of the setpoint, to which the Force value #7 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #7 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	26		
Description			
<p>This input activates the <i>Force value #8</i> block. If the input is active, the value of the setpoint, to which the Force value #8 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #8 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 9

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	27		
Description			
<p>This input activates the <i>Force value #9</i> block. If the input is active, the value of the setpoint, to which the Force value #9 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #9 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 10

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	28		
Description			
<p>This input activates the <i>Force value #10</i> block. If the input is active, the value of the setpoint, to which the Force value #10 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #10 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 11

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	29		
Description			
<p>This input activates the <i>Force value #11</i> block. If the input is active, the value of the setpoint, to which the Force value #11 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #11 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 12

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	30		
Description			
<p>This input activates the <i>Force value #12</i> block. If the input is active, the value of the setpoint, to which the Force value #12 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #12 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 13

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	31		
Description			
<p>This input activates the <i>Force value #13</i> block. If the input is active, the value of the setpoint, to which the Force value #13 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #13 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 14

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	32		
Description			
<p>This input activates the <i>Force value #14</i> block. If the input is active, the value of the setpoint, to which the Force value #14 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #14 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 15

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	33		
Description			
<p>This input activates the <i>Force value #15</i> block. If the input is active, the value of the setpoint, to which the Force value #15 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #15 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 16

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	34		
Description			
<p>This input activates the <i>Force value #16</i> block. If the input is active, the value of the setpoint, to which the Force value #16 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #16 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 17

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	839		
Description			
<p>This input activates the <i>Force value #17</i> block. If the input is active, the value of the setpoint, to which the Force value #17 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #17 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 18

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	840		
Description			
<p>This input activates the <i>Force value #18</i> block. If the input is active, the value of the setpoint, to which the Force value #18 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #18 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 19

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	841		
Description			
<p>This input activates the <i>Force value #19</i> block. If the input is active, the value of the setpoint, to which the Force value #19 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #19 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 20

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	842		
Description			
<p>This input activates the <i>Force value #20</i> block. If the input is active, the value of the setpoint, to which the Force value #20 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #20 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 21

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	843		
Description			
<p>This input activates the <i>Force value #21</i> block. If the input is active, the value of the setpoint, to which the Force value #21 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #21 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 22

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	844		
Description			
<p>This input activates the <i>Force value #22</i> block. If the input is active, the value of the setpoint, to which the Force value #22 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #22 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 23

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	845		
Description			
<p>This input activates the <i>Force value #23</i> block. If the input is active, the value of the setpoint, to which the Force value #23 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #23 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 24

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	846		
Description			
<p>This input activates the <i>Force value #24</i> block. If the input is active, the value of the setpoint, to which the Force value #24 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #24 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 25

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	847		
Description			
<p>This input activates the <i>Force value #25</i> block. If the input is active, the value of the setpoint, to which the Force value #25 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #25 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 26

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	848		
Description			
<p>This input activates the <i>Force value #26</i> block. If the input is active, the value of the setpoint, to which the Force value #26 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #26 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 27

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	849		
Description			
<p>This input activates the <i>Force value #27</i> block. If the input is active, the value of the setpoint, to which the Force value #27 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #27 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 28

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	850		
Description			
<p>This input activates the <i>Force value #28</i> block. If the input is active, the value of the setpoint, to which the Force value #28 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #28 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 29

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	851		
Description			
<p>This input activates the <i>Force value #29</i> block. If the input is active, the value of the setpoint, to which the Force value #29 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #29 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 30

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	852		
Description			
<p>This input activates the <i>Force value #30</i> block. If the input is active, the value of the setpoint, to which the Force value #30 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #30 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 31

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	853		
Description			
<p>This input activates the <i>Force value #31</i> block. If the input is active, the value of the setpoint, to which the Force value #31 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #31 block.</p>			
<p>Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i></p>			
<p>Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i></p>			

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ForceValueIn 32

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	854		
Description			
This input activates the <i>Force value</i> #32 block. If the input is active, the value of the setpoint, to which the Force value #32 block is configured, will be overridden by value of the alternative setpoint assigned to the Force value #32 block.			
Note: <i>If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).</i>			
Note: <i>See an example in the description of the binary input FORCEVALUEIN 1 (PAGE 695).</i>			

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LBI: G

GasAB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	678		
Description			
Input is used for selection of gas types. With activation of this input controller will work with setpoints from AFR MIX B group.			

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GasVTestOK

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	119		
Description			
Binary input from Gas Valve test unit that indicates OK result of Gas valve test.			

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GCB disable

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	62		
Description			
The input is used to disable issuing the GCB closing command.			
<ul style="list-style-type: none">➤ If the input is active during synchronizing, the controller will keep the Gen-set synchronized without issuing the GCB closing command until the input is deactivated or Sync timeout / RPM match TOut (page 452) is elapsed.➤ If the input is active and the GCB button is pressed in MAN mode to close the GCB to dead bus, the GCB will not be closed until the input is deactivated and the GCB button pressed again.➤ If the input is active and the GCB is to be closed to dead bus automatically, the GCB will not be closed until the input is deactivated.			

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GCB fdb neg

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	64		
Description			
<p>This input is used for connection of the normally closed feedback contact from the generator circuit breaker or contactor. This input is optional and if it is configured, it must be always in inverse position to the normally open input GCB FEEDBACK (PAGE 707). Maximal allowed time the both inputs are in the same position is 500 ms, after this time the alarm <i>GCB Fail</i> is issued.</p>			

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GCB feedback S

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	548		
Description			
<p>This LBI is used for sensing of the status of the secondary GCB</p> <p>If there is fail on one of the breakers the second one is consequently opened (result of the protection of GCB fail)</p> <p>If this secondary GCB feedback is not configured the function of the secondary GCB is disabled (i.e. the controller uses only GCB feedback of the primary GCB, secondary GCB control LBOs will remain deactivated)</p> <p>Both breakers are controlled using the same buttons, commands etc.</p>			

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GCB feedback

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	63		
Description			
<p>This input is used for connection of the normally open feedback contact from the generator circuit breaker or contactor. If the input is active, the controller will consider the GCB as closed and vice versa.</p> <ul style="list-style-type: none">➤ If the feedback does not respond to a change of the control output GCB CLOSE/OPEN (PAGE 775) within 2 s, the alarm <i>GCB Fail</i> will be issued.➤ If the feedback changes it's position unexpectedly without any command given by the control output, the alarm <i>GCB Fail</i> will be issued immediately. <p>Note: This input is obligatory.</p>			

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GCBButton

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	11		
Description			
<p>This input is used for an external GCB button mounted on the switchboard. The function of the input is identical as function of the GCB button on the controller front panel.</p> <p>The input is enabled only if the setpoint Local buttons (page 357) is set to position EXTBUTTONS or BOTH.</p>			

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GroupLink

Related FW	2.2.0	Related applications	MINT, COX, Combi
Comm object	59		
Description			
<p>This input is used for logical connection and disconnection of the two gen-set groups selected by setpoints GroupLinkLeft (page 444) and GroupLinkRight (page 444). If the input is active, then the two selected groups will perform power management, kW-sharing and kVAr-sharing together as one large group.</p> <p>For linking of one couple of groups use this input only at one controller, e.g. the nearest to the bus tie breaker which physically disconnects the groups, and connect the input to the BTB feedback contact.</p> <p>Note: This function is independent on the group which the particular controller belongs to, i.e. the controller can provide linking function e.g. for groups 3,4 although it self belongs to group 2.</p>			

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LBI: H

HornResButton

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	7		
Description			
<p>This input is used for an external HORN RESET button mounted on the switchboard. The function of the input is identical as function of the horn reset button on the controller front panel.</p> <p>The input is enabled only if the setpoint Local buttons (page 357) is set to position EXTBUTTONS or BOTH.</p>			

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LBI: I

ImpCountSet1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	684		
Description			
This input sets the actual value of PulseCounter 1 (page 663) to the value given by setpoint ImpCountDef1 (page 363) .			

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ImpCountSet2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	685		
Description			
This input sets the actual value of PulseCounter 2 (page 663) to the value given by setpoint ImpCountDef2 (page 363) .			

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ImpCountSet3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	686		
Description			
This input sets the actual value of PulseCounter 3 (page 663) to the value given by setpoint ImpCountDef3 (page 364) .			

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ImpCountSet4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	687		
Description			
This input sets the actual value of PulseCounter 4 (page 663) to the value given by setpoint ImpCountDef4 (page 364) .			

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ImpCountSet5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	922		
Description			
This input sets the actual value of PulseCounter 5 (page 664) to the value given by setpoint ImpCountDef5 (page 364) .			

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ImpCountSet6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	923		
Description			
This input sets the actual value of PulseCounter 6 (page 664) to the value given by setpoint ImpCountDef6 (page 364) .			

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ImpCountSet7

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	924		
Description			
This input sets the actual value of PulseCounter 7 (page 664) to the value given by setpoint ImpCountDef7 (page 365) .			

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ImpCountSet8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	925		
Description			
This input sets the actual value of PulseCounter 8 (page 664) to the value given by setpoint ImpCountDef8 (page 365).			

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IssueActCallC1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	35		
Description			
This input forces the controller to issue an active call/e-mail/SMS via the channel #1. Type of the channel is to be adjusted by the setpoint AcallCH1-Type (page 539).			
This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return:			
<ol style="list-style-type: none">1. Select a binary signal in the controller, which indicates, that the particular situation occurred, about which you want to be informed remotely. There are many predefined binary information provided directly by the controller or use PLC functions to create the desired binary signal.2. Configure an universal protection block to the binary signal mentioned above and select protection type <i>AL indication</i>.3. Configure the binary signal mentioned above onto the logical binary input <i>IssueActCallC1</i>.			

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IssueActCallC2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	36		
Description			
This input forces the controller to issue an active call/e-mail/SMS via the channel #2. Type of the channel is to be adjusted by the setpoint AcallCH2-Type (page 540).			
This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return:			
<ol style="list-style-type: none">1. Select a binary signal in the controller, which indicates, that the particular situation occurred, about which you want to be informed remotely. There are many predefined binary information provided directly by the controller or use PLC functions to create the desired binary signal.2. Configure an universal protection block to the binary signal mentioned above and select protection type <i>AL indication</i>.3. Configure the binary signal mentioned above onto the logical binary input <i>IssueActCallC2</i>.			

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IssueActCallC3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	37		
Description			
<p>This input forces the controller to issue an active call/e-mail/SMS via the channel #3. Type of the channel is to be adjusted by the setpoint AcallCH3-Type (page 541).</p> <p>This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return:</p> <ol style="list-style-type: none">1. Select a binary signal in the controller, which indicates, that the particular situation occurred, about which you want to be informed remotely. There are many predefined binary information provided directly by the controller or use PLC functions to create the desired binary signal.2. Configure an universal protection block to the binary signal mentioned above and select protection type <i>AL indication</i>.3. Configure the binary signal mentioned above onto the logical binary input <i>IssueActCallC3</i>.			

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IssueActCallC4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	572		
Description			
<p>This input forces the controller to issue an active call/e-mail/SMS via the channel #4. Type of the channel is to be adjusted by the setpoint AcallCH4-Type (page 541).</p> <p>This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return:</p> <ol style="list-style-type: none">1. Select a binary signal in the controller, which indicates, that the particular situation occurred, about which you want to be informed remotely. There are many predefined binary information provided directly by the controller or use PLC functions to create the desired binary signal.2. Configure an universal protection block to the binary signal mentioned above and select protection type <i>AL indication</i>.3. Configure the binary signal mentioned above onto the logical binary input <i>IssueActCallC4</i>.			

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IssueActCallC5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	573		
Description			
<p>This input forces the controller to issue an active call/e-mail/SMS via the channel #5. Type of the channel is to be adjusted by the setpoint AcallCH5-Type (page 542).</p> <p>This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return:</p> <ol style="list-style-type: none">1. Select a binary signal in the controller, which indicates, that the particular situation occurred, about which you want to be informed remotely. There are many predefined binary information provided directly by the controller or use PLC functions to create the desired binary signal.2. Configure an universal protection block to the binary signal mentioned above and select protection type <i>AL indication</i>.3. Configure the binary signal mentioned above onto the logical binary input <i>IssueActCallC5</i>.			

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LBI: L

Lang sel D#2 A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	110																																						
Description																																							
This is one of three binary inputs Lang sel D#2 A, LANG SEL D#2 B (PAGE 714) , LANG SEL D#2 C (PAGE 715) , used for selecting language of the external local terminal #2.																																							
<i>Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
<i>Note: "0" in the table means the input is not active or not configured.</i>																																							
<i>Note: Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
<i>Note: The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel D#2 B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	111																																						
Description																																							
This is one of three binary inputs LANG SEL D#2 B (PAGE 714) , Lang sel D#2 B, LANG SEL D#2 C (PAGE 715) , used for selecting language of the external local terminal #2.																																							
<i>Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
<i>Note: "0" in the table means the input is not active or not configured.</i>																																							
<i>Note: Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
<i>Note: The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel D#2 C

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	112																																						
Description																																							
This is one of three binary inputs LANG SEL D#2 C (PAGE 715) , LANG SEL D#2 B (PAGE 714) , Lang sel D#2 C, used for selecting language of the external local terminal #2.																																							
<i>Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
<i>Note: "0" in the table means the input is not active or not configured.</i>																																							
<i>Note: Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
<i>Note: The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel D#3 A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	113																																						
Description																																							
This is one of three binary inputs Lang sel D#3 A, LANG SEL D#3 B (PAGE 717) , LANG SEL D#3 C (PAGE 718) , used for selecting language of the external local terminal #3. The terminal #3 is available in IS-NT only.																																							
<i>Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
<i>Note: "0" in the table means the input is not active or not configured.</i>																																							
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IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel D#3 B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	114																																						
Description																																							
This is one of three binary inputs LANG SEL D#3 B (PAGE 717) , Lang sel D#3 B, LANG SEL D#3 C (PAGE 718) , used for selecting language of the external local terminal #3. The terminal #3 is available in IS-NT only.																																							
Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
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Note: Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.																																							
Note: The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel D#3 C

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	115																																						
Description																																							
This is one of three binary inputs LANG SEL D#3 C (PAGE 718) , LANG SEL D#3 B (PAGE 717) , Lang sel D#3 C, used for selecting language of the external local terminal #3. The terminal #3 is available in IS-NT only.																																							
<i>Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
<i>Note: "0" in the table means the input is not active or not configured.</i>																																							
<i>Note: Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
<i>Note: The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel int A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	107																																						
Description																																							
This is one of three binary inputs Lang sel int A, LANG SEL INT B (PAGE 720) , LANG SEL INT C (PAGE 721) , used for selecting language of the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it.																																							
Note: <i>Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
Note: <i>"0" in the table means the input is not active or not configured.</i>																																							
Note: <i>Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
Note: <i>The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel int B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	108																																						
Description																																							
This is one of three binary inputs LANG SEL INT A (PAGE 719) , Lang sel int B, LANG SEL INT C (PAGE 721) , used for selecting language of the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it.																																							
Note: <i>Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
7	1	1	1																																				
Note: <i>"0" in the table means the input is not active or not configured.</i>																																							
Note: <i>Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
Note: <i>The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

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Lang sel int C

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi																																				
Comm object	109																																						
Description																																							
This is one of three binary inputs LANG SEL INT A (PAGE 719) , LANG SEL INT B (PAGE 720) , Lang sel int C, used for selecting language of the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it.																																							
<i>Note: Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.</i>																																							
<table><tr><th>Language index</th><th>Input A</th><th>Input B</th><th>Input C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table>				Language index	Input A	Input B	Input C	0	0	0	0	1	1	0	0	2	0	1	0	3	1	1	0	4	0	0	1	5	1	0	1	6	0	1	1	7	1	1	1
Language index	Input A	Input B	Input C																																				
0	0	0	0																																				
1	1	0	0																																				
2	0	1	0																																				
3	1	1	0																																				
4	0	0	1																																				
5	1	0	1																																				
6	0	1	1																																				
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<i>Note: "0" in the table means the input is not active or not configured.</i>																																							
<i>Note: Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.</i>																																							
<i>Note: The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).</i>																																							
IMPORTANT: Each language change causes the reinitialization of the display. Function of the controller is not influenced.																																							

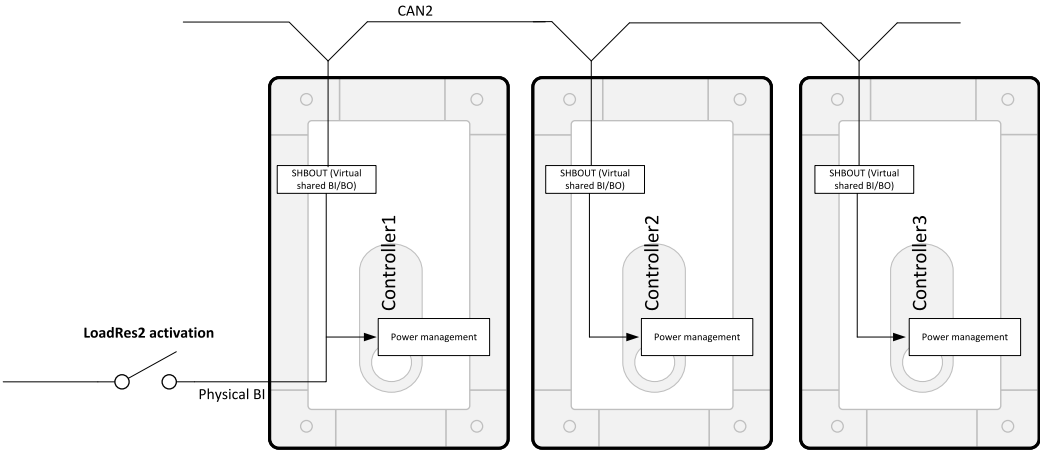
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Load reduction

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Comm object	615		
Description			
If this input is configured, than is possible to reduce the power of generator either via LBI: LOADREDUCT 1 (PAGE 723) , LOADREDUCT 2 (PAGE 723) , LOADREDUCT 3 (PAGE 724) , LOADREDUCT 4 (PAGE 724) or via LAI: LOAD REDUCTION (PAGE 885) .			

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Load res 2

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	49		
Description <p>This input is used to activate the load reserve set #2 (learn more about load reserve in the chapter Power Management (page 168)) instead of the set #1, which is active by default. The set #2 is adjusted by setpoints:</p> <ul style="list-style-type: none"> > LoadResStrt 2 (page 435) and LoadResStop 2 (page 435) if the power management is switched to absolute mode > %LdResStrt 2 and %LdResStop 2 if the power management is switched to relative mode. <p>IMPORTANT: All controllers cooperating together in Power management must have the same load reserve set selected.</p> <p><i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus.</i></p> 			

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Load res 3

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	50		
Description <p>This input is used to activate the load reserve set #3 (learn more about load reserve in the chapter Power Management (page 168)) instead of the set #1, which is active by default. The set #3 is adjusted by setpoints:</p> <ul style="list-style-type: none"> > LoadResStrt 3 (page 436) and LoadResStop 3 (page 436) if the power management is switched to absolute mode > %LdResStrt 3 and %LdResStop 3 if the power management is switched to relative mode. <p>IMPORTANT: All controllers cooperating together in Power management must have the same load reserve set selected.</p> <p><i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See example in the description of the input LOAD RES 2 (PAGE 722).</i></p>			

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Load res 4

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	51		
Description			
<p>This input is used to activate the load reserve set #4 (learn more about load reserve in the chapter Power Management (page 168)) instead of the set #1, which is active by default. The set #4 is adjusted by setpoints:</p> <ul style="list-style-type: none">➤ LoadResStrt 4 (page 437) and LoadResStop 4 (page 437) if the power management is switched to absolute mode➤ %LdResStrt 4 and %LdResStop 4 if the power management is switched to relative mode. <p>IMPORTANT: All controllers cooperating together in Power management must have the same load reserve set selected.</p> <p><i>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See example in the description of the input LOAD RES 2 (PAGE 722).</i></p>			

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LoadReduct 1

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	544		
Description			
<p>This LBI activates nominal power reduction defined in the setpoint LoadReduct1 (page 467). Simultaneously LBI: LOAD REDUCTION (PAGE 721) must be activated.</p> <p>Note: <i>When more than one LBI: LoadReduct1-4 is activated all the limitations are activated but only the lowest is used.</i></p>			

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LoadReduct 2

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	545		
Description			
<p>This LBI activates nominal power reduction defined in the setpoint LoadReduct2 (page 467). Simultaneously LBI: LOAD REDUCTION (PAGE 721) must be activated.</p> <p>Note: <i>When more than one LBI: LoadReduct1-4 is activated all the limitations are activated but only the lowest is used.</i></p>			

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LoadReduct 3

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	546		
Description			
This LBI activates nominal power reduction defined in the setpoint LoadReduct3 (page 468) . Simultaneously LBI: LOAD REDUCTION (PAGE 721) must be activated.			
Note: When more than one LBI: LoadReduct1-4 is activated all the limitations are activated but only the lowest is used.			

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LoadReduct 4

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	547		
Description			
This LBI activates nominal power reduction defined in the setpoint LoadReduct4 (page 468) . Simultaneously LBI: LOAD REDUCTION (PAGE 721) must be activated.			
Note: When more than one LBI: LoadReduct1-4 is activated all the limitations are activated but only the lowest is used.			

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LBI: M

ManualLdRecon

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	60		
Description			
This input is used for manual reconnection of the last disconnected part of the load, if the load has dropped below the setpoint Ld recon level (page 531) . This input works only if automatic reconnection is disabled, i.e. the setpoint AutoLd recon (page 532) is set to DISABLED.			

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MCB disable

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	124		
Description			
<p>The input is used to disable issuing the MCB closing command.</p> <ul style="list-style-type: none">➤ If the input is active during synchronizing, the controller will keep the loaded Gen-set synchronized with the mains without issuing the MCB closing command until the input is deactivated or Sync timeout / RPM match TOut (page 452) 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 the input is deactivated and the MCB button 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 the input is deactivated.			

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MCB fdb neg

Related FW	2.2.0	Related applications	SPtM, Combi
Comm object	66		
Description			
<p>This input is used for connection of the normally closed feedback contact from the mains circuit breaker or contactor. This input is optional and if it is configured, it must be always in inverse position to the normally open input MCB FEEDBACK (PAGE 725). Maximal allowed time the both inputs are in the same position is 500 ms, after this time the alarm <i>MCB Fail</i> is issued.</p>			

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MCB feedback

Related FW	2.2.0	Related applications	SPtM, Combi
Comm object	65		
Description			
<p>This input is used for connection of the normally open feedback contact from the mains circuit breaker or contactor. If the input is active, the controller will consider the MCB as closed and vice versa.</p> <ul style="list-style-type: none">➤ If the feedback does not respond to a change of the control output MCB CLOSE/OPEN (PAGE 789) within 2 s, the alarm <i>MCB Fail</i> will be issued.➤ If the feedback indicates the MCB has unexpectedly closed without any command given by the control output, the alarm <i>MCB Fail</i> will be issued immediately.➤ If the feedback indicates the MCB has unexpectedly opened without any command given by the control output, the controller will accept this situation and the following behavior will depend on mains conditions (healthy or failure).			

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MCBButton

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	10		
Description			
<p>This input is used for an external MCB button mounted on the switchboard. The function of the input is identical as function of the MCB button on the controller front panel.</p> <p>The input is enabled only if the setpoint Local buttons (page 357) is set to position EXTBUTTONS or BOTH.</p>			

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MIC Fault Reset

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	903		
Description			
<p>This LBI sends fault reset after pressing fault reset button.</p>			

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MinRun power 1

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	52		
Description			
<p>This input is used to activate the function Minimal running power #1, which is adjusted by setpoint MinRunPower 1 (page 439).</p> <p>Note: The default value of minimal running power, which takes place while none of the inputs MinRun power x, is 0 kW.</p> <p>Note: If more then one binary input for MinRunPower is activated, the one with the highest number is used (i.e. its corresponding value).</p> <p>IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.</p> <p>Note: It is possible to use virtual peripherals for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the principal diagram of such distribution in the description of the input LOAD RES 2 (PAGE 722).</p>			

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MinRun power 2

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	53		
Description			
This input is used to activate the function Minimal running power #1, which is adjusted by setpoint MinRunPower 2 (page 440) .			
Note: The default value of minimal running power, which takes place while none of the inputs MinRun power x, is 0 kW.			
Note: If more then one binary input for MinRunPower is activated, the one with the highest number is used (i.e. its corresponding value).			
IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.			
Note: It is possible to use virtual peripheries for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the principal diagram of such distribution in the description of the input LOAD RES 2 (PAGE 722) .			

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MinRun power 3

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	54		
Description			
This input is used to activate the function Minimal running power #1, which is adjusted by setpoint MinRunPower 3 (page 440) .			
Note: The default value of minimal running power, which takes place while none of the inputs MinRun power x, is 0 kW.			
Note: If more then one binary input for MinRunPower is activated, the one with the highest number is used (i.e. its corresponding value).			
IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.			
Note: It is possible to use virtual peripheries for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the principal diagram of such distribution in the description of the input LOAD RES 2 (PAGE 722) .			

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Misfiring

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	117		

Description

Misfiring binary input activates engine misfiring protection.

Misfiring is detected from external misfiring unit.

Protection is active only when Gen-set power is above the value **Power1A** (page 555).

When is Misfiring input active:

- Immediately reduces required sensor value (**AFRSensReqA** (page 669)) by setpoint **MisfSensReduct** (page 552)

Note: *Wrn Misfire is activated.*

- Start engine unloading after **MisfLdRed del** (page 552) with rate given by **Load Ramp** (page 458) to value **Min Power PtM** (page 401).

Note: *Wrn Misfire and LOP MisfLdRed is activated*

- Activates engine slow stop after delay given by setpoint **Misfiring del** (page 552).

Note: *Stp Misfire TO is activated*

Engine shut down is activated in case the Misfiring unload protection is activated 5 times in one hour. The internal counter is reset after one hour without any Misfiring activation or after engine Stop.

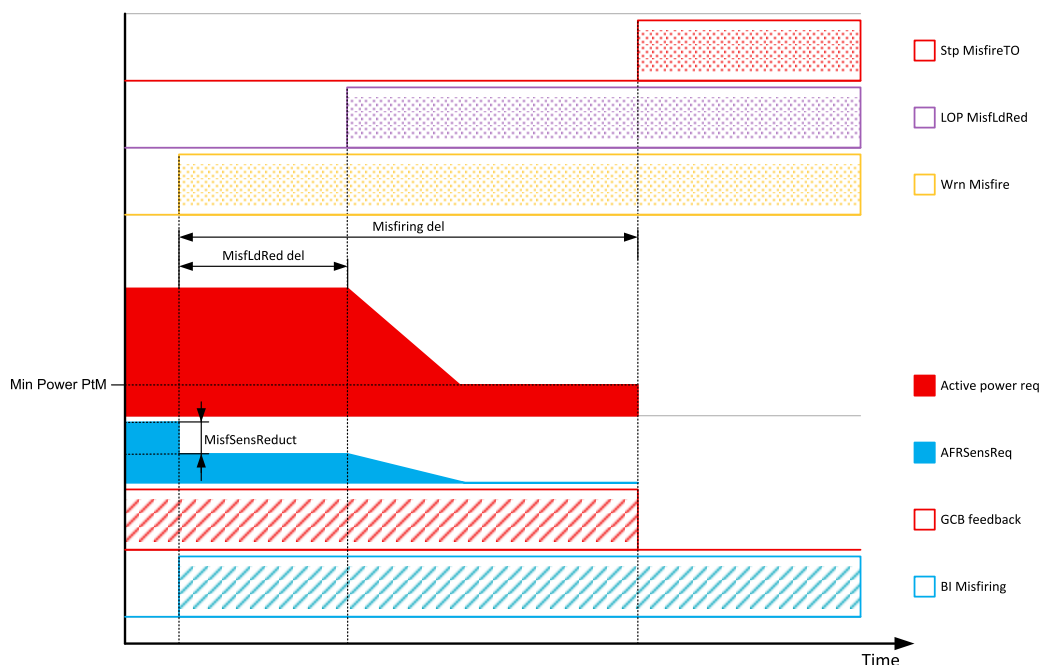


Image 9.15 Misfiring

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MultipleEnable

Related FW	2.2.0	Related applications	Combi
Comm object	72		
Description			
This binary input, together with the input SPI ENABLE (PAGE 745) are used to select the application mode.			
	SPI enable	MultipleEnable	
SPtM	Open	Open	
SPI	Closed	Open	
MINT	x	Closed	
<p>Note: A change of the application mode is accepted when the controller is powered-on or while it is in emergency manual mode. If you need to change the application mode without switching the controller off switch the controller to EMERG. MANUAL (PAGE 679), then change the application and finally switch the emergency manual off.</p>			

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LBI: N

NeutralCB fdb

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	67		
Description			
This input is used for connection of the normally open feedback contact from the Neutral contactor. If the input is active, the controller will consider the neutral contactor as closed and vice versa. See also description of the setpoint #Neutral cont (page 339) .			

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Nominal speed

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	41		
Description			
Use this input to bypass the idle phase of the start-up procedure.			
Note: <i>The input is especially designed for shortening of the start-up procedure when the Gen-set is starting to an AMF operation.</i>			

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LBI: O

Oil press

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	43		
Description			
<p>This input is to be configured to the physical binary input where engine oil pressure binary sensor is connected. It provides following alarms:</p> <ul style="list-style-type: none">➤ The input must not be active at stopped engine. If it is active, the controller issues <i>Sd Oil press B</i> alarm.➤ The input must be active at running engine at latest in the moment when the alarm blocking delay rRunOnlyBlkDel1 (page 390) has elapsed. If it is not active, the controller issues <i>Sd Oil press B</i> alarm. <p>Note: If you use this logical binary input you do not need to configure any other protection onto the respective physical binary input.</p>			

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LBI: P

PrestartBypass

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	42		
Description			
Use this input to bypass the prestart phase of the start-up procedure and activate the PRESTART (PAGE 833) output immediately after start command has been issued.			
This input is typically used to skip preglowing of the engine when the engine is already warm. A built-in PLC module <i>Comparator with hysteresis</i> attached to the engine temperature value can be used to provide the "engine warm" binary signal, which is then internally configured onto this logical binary input.			

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Priority sw A

Related FW	2.2.0	Related applications	MINT, Combi	
Comm object	55			
Description				
This is one of four inputs PRIORITY SW A (PAGE 731) , PRIORITY SW B (PAGE 731) , PRIORITY SW C (PAGE 732) and PRIORITY SW D (PAGE 732) that can be used for selection of the power management priority externally. These inputs are optional and if not configured, the priority is then adjusted by the setpoint Priority (page 431) .				
Priority	Input A	Input B	Input C	Input D
Default	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

Note: "0" in the table means the input is not active or not configured.

Note: "Default" is the priority adjusted by the setpoint **Priority (page 431)**.

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Priority sw B

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	56		
Description			
<p>This is one of four inputs PRIORITY SW A (PAGE 731), PRIORITY SW B (PAGE 731), PRIORITY SW C (PAGE 732) and PRIORITY SW D (PAGE 732) that can be used for selection of the power management priority externally. These inputs are optional and if not configured, the priority is then adjusted by the setpoint Priority (page 431).</p>			
<p>Note: See encoding table in the description of the input PRIORITY SW A (PAGE 731).</p>			

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Priority sw C

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	57		
Description			
<p>This is one of four inputs PRIORITY SW A (PAGE 731), PRIORITY SW B (PAGE 731), PRIORITY SW C (PAGE 732) and PRIORITY SW D (PAGE 732) that can be used for selection of the power management priority externally. These inputs are optional and if not configured, the priority is then adjusted by the setpoint Priority (page 431).</p>			
Note: See encoding table in the description of the input PRIORITY SW A (PAGE 731) .			

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Priority sw D

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	58		
Description			
<p>This is one of four inputs PRIORITY SW A (PAGE 731), PRIORITY SW B (PAGE 731), PRIORITY SW C (PAGE 732) and PRIORITY SW D (PAGE 732) that can be used for selection of the power management priority externally. These inputs are optional and if not configured, the priority is then adjusted by the setpoint Priority (page 431).</p>			
Note: See encoding table in the description of the input PRIORITY SW A (PAGE 731) .			

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PulseCounter 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	87		
Description			
<p>This is the input of the <i>PulseCounter #1</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse1 (page 361), the counter value PulseCounter 1 (page 663) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p>			
Note: Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.			
Note: The counter value can be reset in the <i>InteliMonitor statistics</i> window or it can be set using <i>ImpCountSetX</i> .			

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PulseCounter 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	88		
Description			
<p>This is the input of the <i>PulseCounter #2</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse2 (page 361), the counter value PulseCounter 2 (page 663) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p>			
Note: <i>Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</i>			
Note: <i>The counter value can be reset in the IntelliMonitor statistics window or it can be set using ImpCountSetX.</i>			

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PulseCounter 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	89		
Description			
<p>This is the input of the <i>PulseCounter #3</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse3 (page 361), the counter value PulseCounter 3 (page 663) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p> <p>Note: Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</p> <p>Note: The counter value can be reset in the <i>InteliMonitor</i> statistics window or it can be set using <i>ImpCountSetX</i>.</p>			

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PulseCounter 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	90		
Description			
<p>This is the input of the <i>PulseCounter #4</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse4 (page 362), the counter value PulseCounter 4 (page 663) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p>			
Note: <i>Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</i>			
Note: <i>The counter value can be reset in the IntelliMonitor statistics window or it can be set using ImpCountSetX.</i>			

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PulseCounter 5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	802		
Description			
<p>This is the input of the <i>PulseCounter #5</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse5 (page 362), the counter value PulseCounter 5 (page 664) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p>			
Note: <i>Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</i>			
Note: <i>The counter value can be reset in the IntelliMonitor statistics window or it can be set using ImpCountSetX.</i>			

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PulseCounter 6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	803		
Description			
<p>This is the input of the <i>PulseCounter #6</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse6 (page 362), the counter value PulseCounter 6 (page 664) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p>			
Note: <i>Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</i>			
Note: <i>The counter value can be reset in the IntelliMonitor statistics window or it can be set using ImpCountSetX.</i>			

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PulseCounter 7

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	804		
Description			
<p>This is the input of the <i>PulseCounter #7</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse7 (page 362), the counter value PulseCounter 7 (page 664) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p>			
Note: <i>Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</i>			
Note: <i>The counter value can be reset in the IntelliMonitor statistics window or it can be set using ImpCountSetX.</i>			

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PulseCounter 8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	805		
Description			
<p>This is the input of the <i>PulseCounter #8</i> module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint ConvCoefPulse8 (page 363), the counter value PulseCounter 8 (page 664) (in the group <i>Statistic</i>) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.</p> <p>The <i>PulseCounter</i> modules are intended e.g. for connecting external energy or fuel meters with pulse outputs.</p> <p>Note: Minimal pulse width as well as minimal pause between two successive pulses is 100 ms.</p> <p>Note: The counter value can be reset in the <i>InteliMonitor statistics</i> window or it can be set using <i>ImpCountSetX</i>.</p>			

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PwrReductDisA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	917		
Description			
<p>This input disables the Power Reduction function (only the channel A).</p>			

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PwrReductDisB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	918		
Description			
<p>This input disables the Power Reduction function (only the channel B).</p>			

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PwrReductDisC

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	919		
Description			
<p>This input disables the Power Reduction function (only the channel C).</p>			

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LBi: R
RegCurrByPwr

Related FW	2.2.0	Related applications	MINT
Comm object	955		

Description

By activation of this LBi, the controller switches its internal state to the mode, when its LocalBaseload starts to be influenced according to Nominal current of the Gen-set. In this mode is as first signed the actual power as a default value for LocalBaseload, then is this LocalBaseload internally forced according to LoadRamp so far, until the actual Gen-set current is \leq Nominal current.

Note: This function is mostly used in cooperation with IntelliMains controller during the VRT behavior. This event is in IntelliMains controller described as PostVRT event.

After VRT must be the nominal current controlled on each gen-sets, this is able only due to „forcing“ the LocalBaseload

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Rem Start/Stop

Related FW	2.2.0	Related applications	SPtM, SPI, COX, Combi
Comm object	38		
Description			
Use this input to turn the Gen-set on and off in AUT mode. The Gen-set will perform the complete start-up procedure up to taking the load automatically when the input is activated and then the complete stop procedure when the input is deactivated.			
Note: <i>The Gen-set may stay running even if the input is deactivated. This will occur if there is another condition for the Gen-set to be running like AMF condition etc.</i>			

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Remote AUT/Remote SEM

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	14		
Description			
The controller is forced into AUT mode while this input is active. This input can be used, among others, for following purposes:			
➤ In combination with a timer module for periodic testing of the engine.			

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Remote MAN

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	13		
Description			
The controller is forced into MAN mode while this input is active. This input can be used, among others, for following purposes:			
➤ In combination with a timer module for periodic testing of the engine.			

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Remote OFF

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	12		
Description			
The controller is forced into OFF mode while this input is active. This input can be used, among others, for following purposes:			
➤ In combination with a timer module for periodic testing of the engine.			

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Remote TEST

Related FW	2.2.0	Related applications	SPtM
Comm object	15		
Description			
The controller is forced into TEST mode while this input is active. This input can be used, among others, for following purposes:			
<ul style="list-style-type: none">➤ In combination with a timer module for periodic testing of the engine.➤ In combination with the input TEST ON LOAD (PAGE 747) for forcing the Gen-set to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)			

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ReversePwrBkck

Related FW	2.2.0	Related applications	ASYNc SPI, ASYNc MINT
Comm object	1085		
Description			
When this LBI is active, the Reverse power protection is disabled.			

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RunIndication 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	46		
Description			
This input is one of three inputs used for indication, that the engine is running, and has following functions:			
<ul style="list-style-type: none">➤ If the input is active when the engine is expected to be stopped, then the LBO WRN STOP FAIL (PAGE 866) is activated and start is blocked.➤ If the input becomes active while cranking, the engine is considered as started and the start-up procedure continues to the next phase (idle).			
Note: Learn more in the separate chapter <i>Start sequence (page 131)</i> .			

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RunIndication 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	47		
Description			
This input is one of three inputs used for indication, that the engine is running, and has following functions:			
<ul style="list-style-type: none">➤ If the input is active when the engine is expected to be stopped, then the LBO WRN STOP FAIL (PAGE 866) is activated and start is blocked.➤ If the input becomes active while cranking, the engine is considered as started and the start-up procedure continues to the next phase (idle).			
Note: Learn more in the separate chapter <i>Start sequence (page 131)</i> .			

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RunIndication 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	48		
Description			
This input is one of three inputs used for indication, that the engine is running, and has following functions:			
<ul style="list-style-type: none">> If the input is active when the engine is expected to be stopped, then the LBO WRN STOP FAIL (PAGE 866) is activated and start is blocked.> If the input becomes active while cranking, the engine is considered as started and the start-up procedure continues to the next phase (idle).			
Note: Learn more in the separate chapter <i>Start sequence (page 131)</i> .			

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LBI: S

SafetyFunct1NC

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	825		
Description			
The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).			
This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.			
Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)			
Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)			
The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.			
If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).			
If none of the LBIs from one pair is configured the function is not evaluated at all.			
IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)			

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SafetyFunct1NO

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	824		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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SafetyFunct2NC

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	827		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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SafetyFunct2NO

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	826		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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SafetyFunct3NC

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	829		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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SafetyFunct3NO

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	828		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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SafetyFunct4NC

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	831		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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SafetyFunct4NO

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	830		
Description			
<p>The function will allow users to configure any pair of binary inputs to serve as a safety monitoring of a binary state (e.g. excess heat, gas leakage).</p> <p>This safety monitoring ensures that the protection reacts even if there is mismatch on the indicating BIs.</p> <p>Note: LBI NO = Normally open LBI (i.e. the protection is active when this LBI is Closed, LBI=1)</p> <p>Note: LBI NC = Normally closed LBI (i.e. the protection is active when this LBI is Opened, LBI=0)</p> <p>The mismatch alarm is issued when there are both LBIs from one pair in the same state (both = 0 or both = 1) for a time longer than the delay.</p> <p>If only one of LBIs from the pair is configured the function automatically issues alarm SafetyFnXMism (where X is an integer according to the pair with invalid configuration).</p> <p>If none of the LBIs from one pair is configured the function is not evaluated at all.</p> <p>IMPORTANT: This function is not suitable for inputs from sources with longer refresh delay (e.g. extension modules)</p>			

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Sd override

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	44		
Description			
<p>If the input is closed, all 2nd level protections are overridden to allow engine run in an emergency situation, e.g. when the Gen-set works as a power supply for fire extinguishing equipment.</p> <p>All protections are displayed in Alarmlist and recorded into history, however the controller leaves the Gen-set in operation. If there are any protections still active or not reset in the moment when the input is deactivated, the controller will react to them in a standard way.</p> <p>Following protections are not overridden by this input:</p> <ul style="list-style-type: none">➤ Emergency stop➤ Overspeed➤ Underspeed➤ Binary and analog protections configured as <i>Sd override</i> type. In fact this protection type means "Unoverridable shutdown", i.e. it works the same way as standard shutdown protection, however it can not be overridden (blocked) by the Sd override input.			

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SPI enable

Related FW	2.2.0	Related applications	Combi
Comm object	71		
Description			
This binary input, together with the input MULTIPLEENABLE (PAGE 729) are used to select the application mode.			
	SPI enable	MultipleEnable	
SPtM	Open	Open	
SPI	Closed	Open	
MINT	x	Closed	
<p>Note: A change of the application mode is accepted when the controller is powered-on or while it is in emergency manual mode. If you need to change the application mode without switching the controller off switch the controller to EMERG. MANUAL (PAGE 679), then change the application and finally switch the emergency manual off.</p>			

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Startblocking

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	68		
Description			
Engine start is disabled while this input is active. <i>NotReady</i> state is displayed on the controller main screen and the message <i>Start blocking</i> is displayed in the Alarmlist.			
Use this input to disable temporarily the Gen-set to be started e.g. from an higher-level automation device such as PLC.			
<p>Note: The Gen-set will not be stopped if the input is activated while the Gen-set is running.</p>			

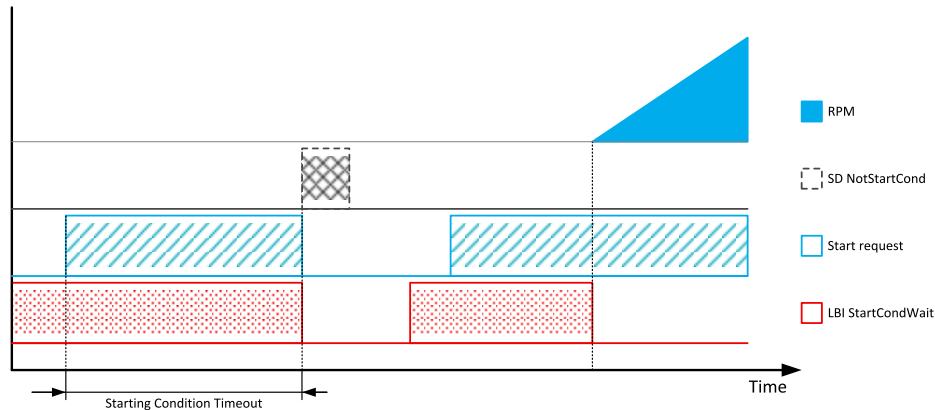
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StartButton

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	9		
Description			
This input is used for an external START button mounted on the switchboard. The function of the input is identical as function of the start button on the controller front panel.			
The input is enabled only if the setpoint Local buttons (page 357) is set to position EXTBUTTONS or BOTH.			

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StartCondWait

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	785		
Description			
<p>While the input is activated (before start procedure) then is the starting procedure postponed until the LBI is set to 0.</p> <p>During the postponed start procedure will be visible display status message "<i>StartCndWait</i>" and starts to run countdown timer of 1200 s (20 min).</p> <p>When is this timer counted down to zero without any change of status of LBI or if is not the starting procedure interrupted (Stop button, Rem start/stop=0, SD, ...) then alarm message "<i>SD NotStartCond</i>" occurs.</p>			
			
Image 9.16 Starting condition			

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StopButton

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	8		
Description			
<p>This input is used for an external STOP button mounted on the switchboard. The function of the input is identical as function of the stop button on the controller front panel.</p> <p>The input is enabled only if the setpoint Local buttons (page 357) is set to position EXTBUTTONS or BOTH.</p>			

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SUS excit blk

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	140		
Description			
The LBI SUS excit blk is used for blocking of the excitation of the alternator while the setpoint ExcitationCtrl (page 345) is set to EXTERNAL mode.			

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Sys start/stop

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	39		
Description			
<p>This input is used to activate and deactivate the particular Gen-set within the group. Reaction of the controller to a change of this input is delayed by setpoints #SysAMFstrtDel (page 433) and #SysAMFstopDel (page 433).</p> <ul style="list-style-type: none">➤ If the input is active, the Gen-set in AUT mode takes active part in the power management of the group, i.e. starts and stops automatically according to the load. <p>Note: If the power management is disabled by the Pwr Management (page 430) setpoint, the Gen-set excluded from the power management and starts and stops only according to position of this input.</p> <ul style="list-style-type: none">➤ If the input is not active, the Gen-set is always stopped in AUT mode. <p>Note: This input is usually wired parallel into all controllers within the group to activate and deactivate all the Gen-sets in the group by one switch (signal). If you want to deactivate one particular Gen-set, switch it out from AUT mode.</p>			

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LBI: T

Test on load

Related FW	2.2.0	Related applications	SPtM, Combi
Comm object	61		
Description			
<p>This input is used to force the Gen-set to take over the load in TEST mode.</p> <p>Note: This logical input can be configured together with the input REMOTE TEST (PAGE 739) onto one controller terminal and then the "test with load" function can be activated by one signal. That means e.g. if a mains supply interruption is expected, the controller can be forced to start, take the load over and disconnect the mains prior to the interruption occurs. Then, after the mains has been restored, the signal is removed and the controller transfers the load back to the mains.</p>			

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Timer block 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	91		
Description			
<p>This input is used to disable temporarily the output from the <i>Timer channel #1</i>.</p> <p>Note: See also the setpoint Timer channel 1 (page 532) and output TIMERACT 1-4 (PAGE 846).</p> <p>Note: See the chapter General purpose timers (page 154) for more details about timers.</p>			

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Timer block 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	92		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #2</i> .			
Note: See also the setpoint <i>Timer channel 2</i> (page 532) and output <i>TIMERACT 1-4</i> (PAGE 846).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	93		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #3</i> .			
Note: See also the setpoint <i>Timer channel 3</i> (page 532) and output <i>TIMERACT 1-4</i> (PAGE 846).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	94		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #4</i> .			
Note: See also the setpoint <i>Timer channel 4</i> (page 533) and output <i>TIMERACT 1-4</i> (PAGE 846).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	95		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #5</i> .			
Note: See also the setpoint <i>Timer channel 5</i> (page 533) and output <i>TIMERACT 5-8</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	96		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #6</i> .			
Note: See also the setpoint <i>Timer channel 6</i> (page 533) and output <i>TIMERACT 5-8</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 7

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	97		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #7</i> .			
Note: See also the setpoint <i>Timer channel 7</i> (page 534) and output <i>TIMERACT 5-8</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	98		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #8</i> .			
Note: See also the setpoint <i>Timer channel 8</i> (page 534) and output <i>TIMERACT 5-8</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 9

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	99		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #9</i> .			
Note: See also the setpoint <i>Timer channel 9</i> (page 534) and output <i>TIMERACT 9-12</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 10

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	100		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #10</i> .			
Note: See also the setpoint <i>Timer channel 10</i> (page 535) and output <i>TIMERACT 9-12</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 11

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	101		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #11</i> .			
Note: See also the setpoint <i>Timer channel 11</i> (page 535) and output <i>TIMERACT 9-12</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 12

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	102		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #12</i> .			
Note: See also the setpoint <i>Timer channel 12</i> (page 535) and output <i>TIMERACT 9-12</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 13

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	103		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #13</i> .			
Note: See also the setpoint <i>Timer channel 13</i> (page 535) and output <i>TIMERACT 13-16</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 14

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	104		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #14</i> .			
Note: See also the setpoint <i>Timer channel 14</i> (page 536) and output <i>TIMERACT 13-16</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 15

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	105		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #15</i> .			
Note: See also the setpoint <i>Timer channel 15</i> (page 536) and output <i>TIMERACT 13-16</i> (PAGE 847).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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Timer block 16

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	106		
Description			
This input is used to disable temporarily the output from the <i>Timer channel #16</i> .			
Note: See also the setpoint <i>Timer channel 16</i> (page 536) and output <i>TIMERACT 1-4</i> (PAGE 846).			
Note: See the chapter <i>General purpose timers</i> (page 154) for more details about timers.			

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LBI: U

User mask 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	567		
Description			
This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions:			
None	Show	Hide	
No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 1 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 1 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.	

Example: This function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..8 can be used to define any custom condition for this "swapping" function.

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User mask 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi						
Comm object	568								
Description									
This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions:									
<table><tr><th>None</th><th>Show</th><th>Hide</th></tr><tr><td>No action regarding this screen instrument is taken.</td><td>By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752), USER MASK 2 (PAGE 752), USER MASK 3 (PAGE 753), USER MASK 2 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.</td><td>By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752), USER MASK 2 (PAGE 752), USER MASK 3 (PAGE 753), USER MASK 2 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.</td></tr></table>				None	Show	Hide	No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 2 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 2 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.
None	Show	Hide							
No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 2 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 2 (PAGE 752) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.							
Example: This function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..8 can be used to define any custom condition for this "swapping" function.									

🔍 back to List of LBI

User mask 3

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi						
Comm object	569								
Description									
This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions:									
<table><tr><th>None</th><th>Show</th><th>Hide</th></tr><tr><td>No action regarding this screen instrument is taken.</td><td>By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752), USER MASK 2 (PAGE 752), USER MASK 3 (PAGE 753), USER MASK 3 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.</td><td>By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752), USER MASK 2 (PAGE 752), USER MASK 3 (PAGE 753), USER MASK 3 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.</td></tr></table>				None	Show	Hide	No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 3 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 3 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.
None	Show	Hide							
No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 3 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 3 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.							
Example: This function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..8 can be used to define any custom condition for this "swapping" function.									

◀ back to List of LBI

User mask 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	570		
Description			
This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions:			
None	Show	Hide	
No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 4 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (USER MASK 1 (PAGE 752) , USER MASK 2 (PAGE 752) , USER MASK 3 (PAGE 753) , USER MASK 4 (PAGE 753) or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.	

Example: This function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..8 can be used to define any custom condition for this "swapping" function.

◀ back to List of LBI

LBI: W

Watchdog Test

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	722		
Description			
Rising edge of this input will provide reset of controller processor.			

 [back to List of LBI](#)

9.1.5 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	759
LBO: B	764
LBO: C	765
LBO: D	772
LBO: E	773
LBO: F	774
LBO: G	775
LBO: H	780
LBO: I	781
LBO: K	784
LBO: L	784
LBO: M	787
LBO: N	826
LBO: O	827
LBO: P	828
LBO: Q	836
LBO: R	837
LBO: S	841
LBO: T	846
LBO: U	848
LBO: V	864
LBO: W	866
LBO: Y	866

For full list of Logical binary outputs go to the chapter **List of LBO (page 756)**.

List of LBO

AFR DBA	759	CtrlHeartBeatF	772	LdShed stage 3	785
AFR DBB	759	Derating 1 act	772	LoadReduct	785
AFR ErrA	760	Derating 2 act	772	Load reduct ON	785
AFR ErrB	761	ECU Comm Error	773	Loaded	786
AFR limA	761	ECU PwrRelay	773	LoadReduct	786
AFR limB	761	FltResButnEcho	774	Logical 0	786
Alarm flashing	762	ForwardSynchro / RPM		Logical 1	786
Alarm	762	matching	774	LVRT Active	787
AnyGCBclosed	762	Fuel Solenoid	774	LVRT CurveTrip	787
AnyOthGCBclose	763	GasVTest run	775	MainsAllowsSyn	787
AVR dn	763	GCB Close/Open	775	MainsFrqFall	787
AVR up	763	GCB OFF coil S	776	MainsFrqRise	788
Bin selector 1	764	GCB OFF Coil	776	MainsParams OK	788
Bin selector 2	764	GCB ON coil S	776	MainsProtState	788
Bin selector 3	764	GCB ON Coil	777	MainsTripPer	788
Bin selector 4	764	GCB status	777	MCB Close/Open	789
Common AI	765	GCB UV coil S	777	MCB OFF Coil	789
Common BOC	765	GCB UV Coil	778	MCB ON Coil	789
Common Fls	765	GCBButnEcho	779	MCB status	790
Common Hst	765	GCBclose/openS	779	MCB UV Coil	790
Common LoP	766	Gen params OK	779	MCBButnEcho	791
Common MP	766	GenCapClim	780	MixDnA	791
Common OfL	766	GenCapLlim	780	MixDnB	792
Common Sd	766	Gen-set active	780	MixUpA	792
Common SdOvr	767	Horn	780	MixUpB	793
Common Stp	767	Horn flashing	781	Modbus Sw 1	794
Common Wrn	767	HrnResButnEcho	781	Modbus Sw 2	795
CommonActLev 1	767	Idle run	781	Modbus Sw 3	796
CommonActLev 2	768	Idle/Nominal	782	Modbus Sw 4	797
CommonAILEv 1	768	Ignition	782	Modbus Sw 5	798
CommonAILEv 2	768	In synchronism / In RPM		Modbus Sw 6	799
Cooling Pump	768	window	783	Modbus Sw 7	800
Cooling	769	Initialized	783	Modbus Sw 8	801
Cranking	770	kWh pulse	784	Modbus Sw 9	802
CrankProcedure	771	LambdaHeatedA	784	Modbus Sw 10	803
CtrlHBeat FD	771	LambdaHeatedB	784	Modbus Sw 11	804
CtrlHeartBeat	771	LdShed stage 1	784	Modbus Sw 12	805
		LdShed stage 2	785		

Modbus Sw 13	806
Modbus Sw 14	807
Modbus Sw 15	808
Modbus Sw 16	809
Modbus Sw 17	810
Modbus Sw 18	811
Modbus Sw 19	812
Modbus Sw 20	813
Modbus Sw 21	814
Modbus Sw 22	815
Modbus Sw 23	816
Modbus Sw 24	817
Modbus Sw 25	818
Modbus Sw 26	819
Modbus Sw 27	820
Modbus Sw 28	821
Modbus Sw 29	822
Modbus Sw 30	823
Modbus Sw 31	824
Modbus Sw 32	825
MODES: Aut mode	825
MODES: Man mode	825
MODES: Off mode	826
MODES: Sem mode	826
MODES: Test mode	826
Neutral CB C/O	826
Not ready	827
OFF coil test	827
Operational	827
Overcurrent	827
OVRT Active	828
OVRT CurveTrip	828
Pave	828
Pave FLS	828
PeakShaveAct	829
PeriphCommErr	829
PforQ	829
PforQActive	829
PostVRT	830
Power1A	830

Power1B	830
Power2A	830
Power2B	830
Power3A	831
Power3B	831
Power4A	831
Power4B	831
Power5A	831
Power5B	832
PQ-C AreaLim	832
PQ-L AreaLim	832
Prelubr pump	832
Prestart	833
P(Um)	833
PwrDerating	833
PwrLimitation	834
PwrOverFreqLim	834
PwrReductActA	834
PwrReductActB	834
PwrReductActC	835
PwrReductFulFA	835
PwrReductFulFB	835
PwrReductFulFC	835
PwrReduction	836
PwrUnderFreq	836
Q/PF ctrl act	836
Q&U Protection	837
Ready for Load	837
Ready	837
ReadyToExcite	837
RemoteControl1	838
RemoteControl2	838
RemoteControl3	838
RemoteControl4	839
RemoteControl5	839
RemoteControl6	839
RemoteControl7	840
RemoteControl8	840
RetOvUnFreq	840
ReverseSynchro	840

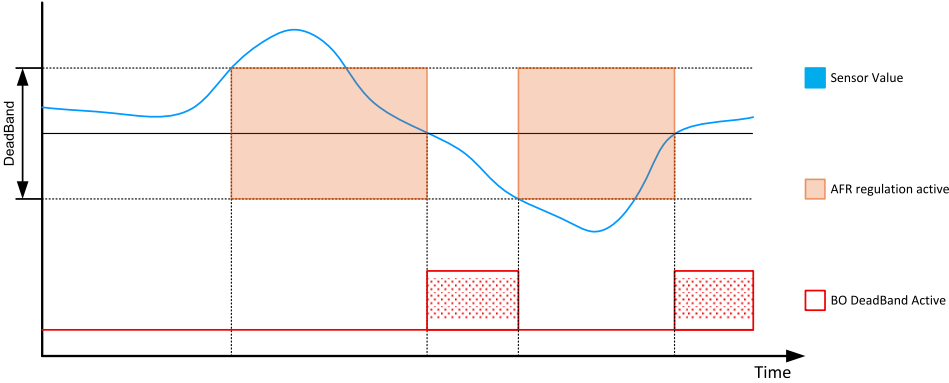
ROCOF Act	841
ROCOF Trp	841
Running	841
Soft load	841
Soft unld	842
SoftUnload	842
Speed dn	842
Speed up	842
Stand-by ready	843
Start Blocked	843
StartButnEcho	843
Starter	844
Starting	844
Stop Pulse	844
Stop Solenoid	845
StopButnEcho	845
Stopping	845
SUS excitation	846
Synchronizing	846
T cyl differ	846
TimerAct 1-4	846
TimerAct 5-8	847
TimerAct 9-12	847
TimerAct 13-16	847
TimerActiveCom	847
UQ-C AreaLim	848
UQ-L AreaLim	848
User Button 1	849
User Button 2	850
User Button 3	851
User Button 4	852
User Button 5	853
User Button 6	854
User Button 7	855
User Button 8	856
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User Button 13	861

User Button 14	862
User Button 15	863
User Button 16	864
VectorShiftAct	864
VectorShiftTrp	864
Ventilation	865
Vgen <>	865
Vmains <>	865
VRT Prot Trip	865
Warming	866
Wrn Stop fail	866
WrongPhSeq	866
Y/D	866

 **back to Controller
objects**

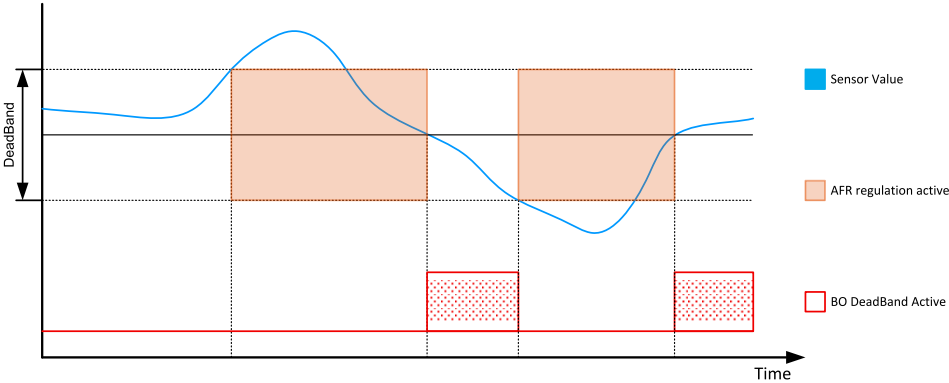
LBO: A

AFR DBA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1743		
Description			
Output is activated when the sensor value stays in range of deadband defined by setpoint DeadBand (page 551).			
			
Image 9.17 Sensor deadband			

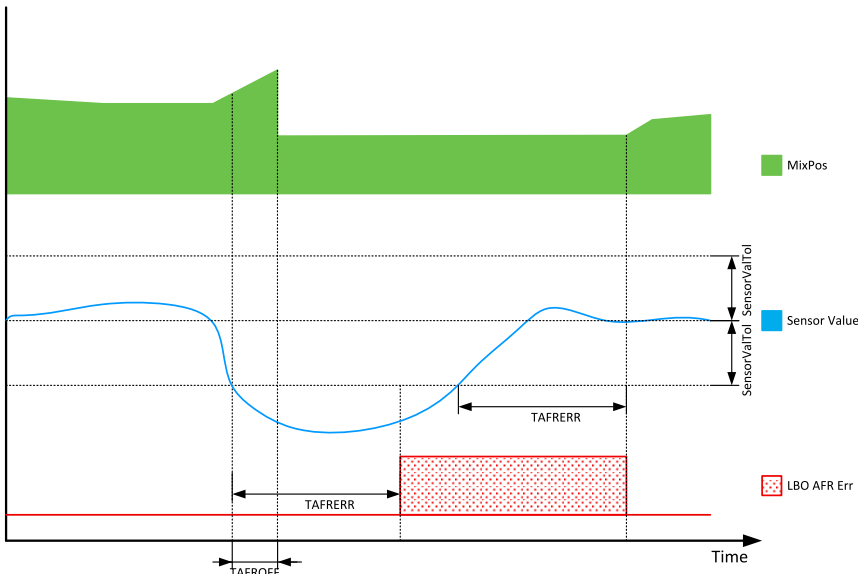
⬅ back to List of LBO

AFR DBB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1760		
Description			
Output is activated when the sensor Value stays in range of deadband defined by setpoint DeadBand (page 551).			
			
Image 9.18 Sensor deadband			

⬅ back to List of LBO

AFR ErrA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1744		
Description			
<p>Output is activated when the sensor value goes over the tolerance level defined by setpoint SensorValToIA (page 562) and stays there for time defined by setpoint TAFRERRA (page 561).</p> <p>Output stays active as long the sensor value stays above the tolerance level and for time TAFRERRA (page 561) when the sensor value is back in the tolerance level.</p>			
			

back to List of LBO

AFR ErrB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1761		
Description			
Output is activated when the sensor value goes over the tolerance level defined by setpoint SensorValToIB (page 573) and stays there for time defined by setpoint TAFRERRB (page 572).			
Output stays active as long the sensor value stays above the tolerance level and for time TAFRERRB (page 572) when the sensor value is back in the tolerance level.			
<p>The graph illustrates the sensor deadband logic. The top green area represents the 'MixPos' signal. The middle blue line represents the 'Sensor Value'. The bottom red hatched area represents the 'LBO AFR Err' signal. The 'Sensor Value' fluctuates around a baseline. A horizontal line represents the tolerance level 'SensorValToIB'. When the 'Sensor Value' drops below this level, a timer 'TAFRERR' starts. If it remains below for the duration 'TAFRERR', the 'LBO AFR Err' signal is activated (red hatched area). The error signal remains active for a duration 'TAFRERR' after the 'Sensor Value' returns above the tolerance level. A 'TAFROFF' period is also indicated at the start of the tolerance level.</p>			

Image 9.20 Sensor deadband

🔍 back to List of LBO

AFR limA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1742		
Description			
Output is activated when the mixer value AFRVlvRegA (page 669) reaches the limit value adjusted with setpoint LimPos (page 549) .			

🔍 back to List of LBO

AFR limB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1759		
Description			
Output is activated when the mixer value AFRVlvRegB (page 671) reaches the limit value adjusted with setpoint LimPos (page 549) .			

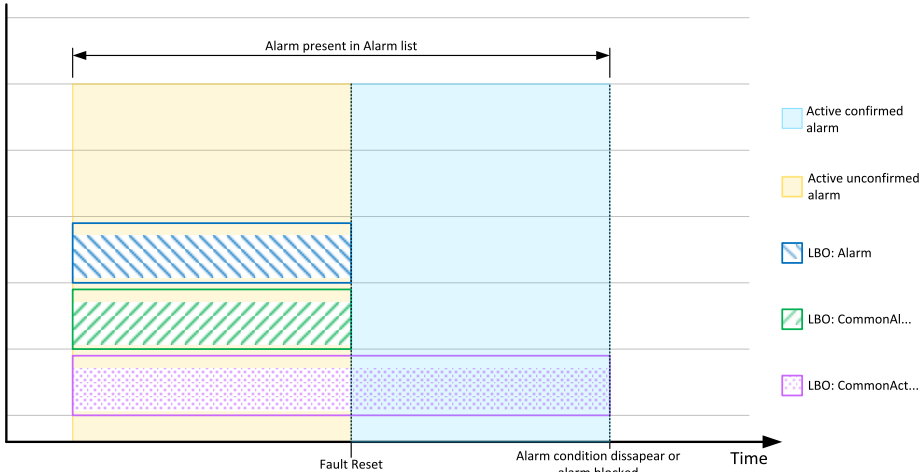
🔍 back to List of LBO

Alarm flashing

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	28		
Description			
This is the flashing alternative of the output ALARM (PAGE 762), i.e. the output flashes with period 1s/1s while the output ALARM (PAGE 762) is closed.			

🔍 back to List of LBO

Alarm

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2		
Description			
The output is closed if there is at least one unconfirmed alarm in the alarm list.			
<p>Note: Some alarm types as e.g. Off load, History record, Low power, Mains protection do not require confirmation, they disappear from the alarm list automatically when the alarm condition disappears. That means the Alarm output is not activated by alarms of these types.</p>			
			

🔍 back to List of LBO

AnyGCBclosed

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	222		
Description			
This LBO is closed, if any GCB is closed. This information is evaluated via CAN2 line, no additional wiring is necessary.			

🔍 back to List of LBO

AnyOthGCBclose

Related FW	2.2.0	Related applications	MINT, Combi
Comm object	1827		
Description			
This LBO is closed, if any GCB in actual Control group is closed. This information is evaluated via CAN2 line, no additional wiring is necessary.			

🔍 back to List of LBO

AVR dn

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	55		
Description			
This output together with the complementary output AVR UP (PAGE 763) are designed for voltage and power factor control at Gen-sets where the AVR does not support analogue control.			
Note: The AVR is recommended to be configured for droop function when these outputs are used for power factor control.			
Note: The alarm Wrn VoltRegLim is disabled when this output is used (configured onto any controller terminal or virtual output).			

🔍 back to List of LBO

AVR up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	54		
Description			
This output together with the complementary output AVR DN (PAGE 763) are designed for voltage and power factor control at Gen-sets where the AVR does not support analogue control.			
Note: The AVR is recommended to be configured for droop function when these outputs are used for power factor control.			
Note: The alarm Wrn VoltRegLim is disabled when this output is used (configured onto any controller terminal or virtual output).			

🔍 back to List of LBO

LBO: B

Bin selector 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	110		
Description			
Output is closed or opened according to the setpoint Bin selector 1 (page 388) .			
Note: The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.			

◀ back to List of LBO

Bin selector 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	111		
Description			
Output is closed or opened according to the setpoint Bin selector 2 (page 389) .			
Note: The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.			

◀ back to List of LBO

Bin selector 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	112		
Description			
Output is closed or opened according to the setpoint Bin selector 3 (page 389) .			
Note: The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.			

◀ back to List of LBO

Bin selector 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	113		
Description			
Output is closed or opened according to the setpoint Bin selector 4 (page 389) .			
Note: The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.			

◀ back to List of LBO

LBO: C

Common AI

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	11		
Description			
The output is closed while there is at least one alarm of the <i>Alarm only</i> type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common BOC

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	9		
Description			
The output is closed while there is at least one alarm of the <i>Breaker open&Cool-down</i> type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common Fls

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	6		
Description			
The output is closed while there is at least one alarm of the <i>Sensor fail</i> type present in the alarm list. The alarm can be in any state , i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common Hst

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	12		
Description			
The output is closed for 1 s when any alarm of <i>History record</i> type appears. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common LoP

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	7		
Description			
The output is closed while there is at least one alarm of the <i>Low power</i> type present in the alarm list. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common MP

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	10		
Description			
The output is closed while there is at least one alarm of the <i>Mains protection</i> type present in the alarm list. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common OfL

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	8		
Description			
The output is closed while there is at least one alarm of the <i>Off load</i> type present in the alarm list. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common Sd

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	4		
Description			
The output is closed while there is at least one alarm of the <i>Shutdown</i> type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common SdOvr

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	251		
Description			
Common output that closes with 2 s delay if any Shutdown override-type protection becomes active. If it is already active and another protection of that type becomes active, the output is deactivated for 2 seconds and then reactivated again to inform on this new alarm.			

🔍 back to List of LBO

Common Stp

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	5		
Description			
The output is closed while there is at least one alarm of the <i>Slow stop</i> type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Common Wrn

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	3		
Description			
The output is closed while there is at least one alarm of the <i>Warning</i> type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

CommonActLev 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	13		
Description			
The output is closed while there is at least one 1 st level (yellow) alarm present in the alarm list. The alarm can be in any state , i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

CommonActLev 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	15		
Description			
The output is closed while there is at least one 2 nd level (red) alarm present in the alarm list. The alarm can be in any state , i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

CommonAlLev 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	14		
Description			
This output is active if there is at least one unconfirmed 1 st level (yellow) alarm present in the alarm list. See the chapter Protections and Alarm management (page 194) for more information.			

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CommonAlLev 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	16		
Description			
This output is active if there is at least one unconfirmed 2nd level (red) alarm present in the alarm list. See the chapter Protections and Alarm management (page 194) for more information.			

🔍 back to List of LBO

Cooling Pump

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	40		
Description			
<p>This output is used for control of an external electric motor-driven cooling pump. The output closes when the gen-set is started (i.e. at the end of the <i>Starting</i> period) and opens at the end of the <i>Aftercooling</i> period, which takes place after the engine has been fully stopped. Duration of the aftercooling period is adjusted by the setpoint AfterCool time (page 385).</p> <p>The output opens immediately when EMERGENCY STOP (PAGE 680) is activated or if the controller is switched to OFF mode.</p>			

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Cooling

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	74		
Description			
The output is closed during the <i>Cooling</i> phase, which takes place after GCB has been opened before the engine is stopped.			

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Cranking

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	76		

Description

The output is closed while the engine is cranking. See the following diagrams for differences between outputs **CRANKPROCEDURE** (PAGE 771), Cranking and **STARTER** (PAGE 844). The diagrams show situation for gas engine and two crank attempts.

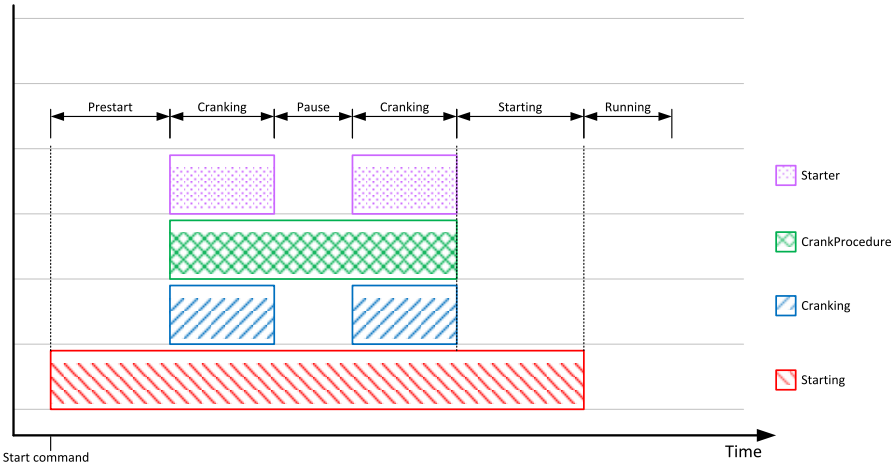


Image 9.21 Successful start

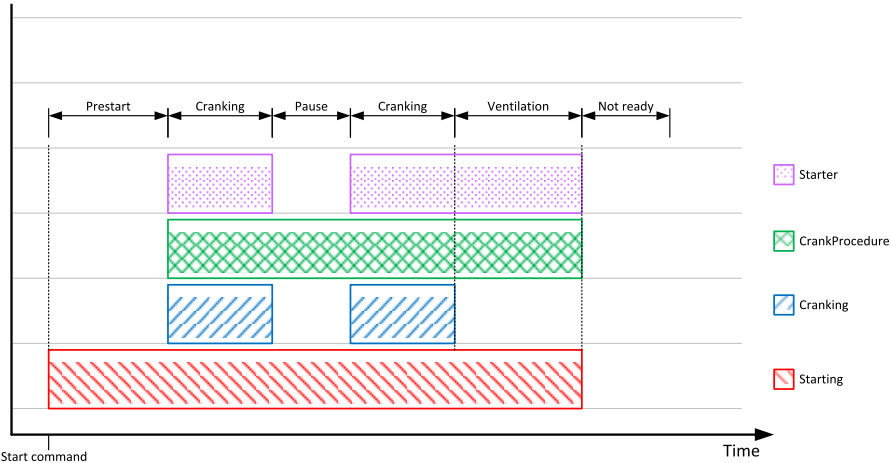


Image 9.22 Unsuccessful start

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CrankProcedure

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	64		
Description			
The output is closed while the engine is cranking and during pauses between crank attempts. The output is opened either when the Gen-set is started or failed to start. See the diagram in the description of the output CRANKING (PAGE 770) for differences between outputs CrankProcedure, CRANKING (PAGE 770) and STARTER (PAGE 844).			

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CtrlHBeat FD

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1177		
Description			
This output is used at a redundant controller to disconnect the main controller from the Gen-set, connect the redundant one instead and activate it.			
The output is closed:			
<ul style="list-style-type: none"> ➤ If the input CTRLHBEAT SENS (PAGE 677) is configured onto any input terminal and the redundancy controller does not sense the "heart beat" signal from the main controller at that terminal. ➤ If the redundant controller has not received two consequent messages from the main controller. The address of the main controller for the particular redundant one is selected by the setpoint WatchedContr (page 340). 			
Note: Learn more about redundancy in separate chapter Controller redundancy (page 146).			

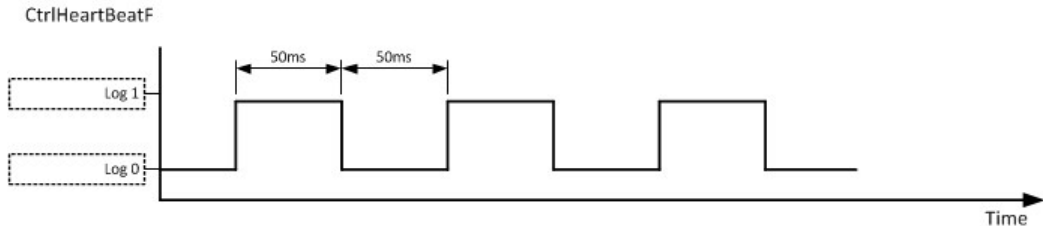
🔍 back to List of LBO

CtrlHeartBeat

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	81		
Description			
The output provides alternating signal with rate 500 ms active / 500 ms inactive while the controller is operational , i.e. it has passed all checks after startup and no failure was detected.			
If the output does not provide the alternating signal it may indicate following:			
<ul style="list-style-type: none"> ➤ controller is switched off or ➤ controller is damaged or ➤ incorrect/missing firmware and/or application or ➤ corrupted setpoints 			
The output is intended for using in wired redundancy systems at the main controller. Learn more about redundancy in separate chapter Controller redundancy (page 146).			

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CtrlHeartBeatF

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1192		
Description			
External Watchdog relay support. Logical binary output can be connected to pulse input of external WatchDog relay.			
<div><div>CtrlHeartBeatF</div></div>			

⬅ back to List of LBO

LBO: D

Derating 1 act

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	82		
Description			
This output is closed when level 1 derating is active. For more information on power derating see chapter Power derating (page 127) .			

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Derating 2 act

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	83		
Description			
This output is closed when level 2 derating is active. For more information on power derating see chapter Power derating (page 127) .			

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LBO: E

ECU Comm Error

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	114		
Description			
The output is closed while there is an error in the communication with ECU, i.e. while there is the alarm <i>ECU comm error</i> present in the alarm list.			

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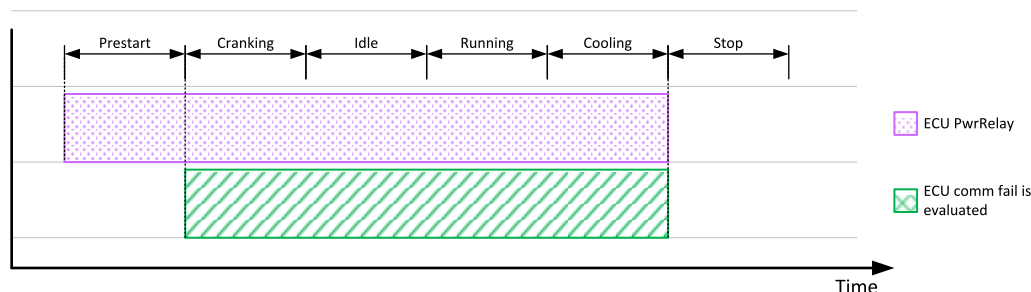
ECU PwrRelay

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	116		

Description

This output is used for control of the "Keyswitch" ECU input. The output is closed at the beginning of the prestart phase, remains closed while the engine is running, and is opened when the engine has to be stopped. The keyswitch input may be also labeled as "15" according to cable numbering convention used in vehicles.

- If this input is used (configured), the evaluation of ECU communication fault alarm and other ECU-related alarms is enabled only while the engine is being started or is running. The reason is that most of ECUs go to sleep mode and do not communicate while the keyswitch input is deactivated.



Note: It is recommended to adjust the **Prestart time** (page 379) to at least 3 sec to allow the ECU to wake-up and begin the communication prior to the ECU communication fault alarm is enabled.

- If this input is not configured the evaluation of ECU-related alarms is enabled all the time.

Note: If your ECU does not have the keyswitch input, however you want the ECU-related alarms to be disabled while the engine is not running, configure the output onto a virtual IO module (VPIO).

IMPORTANT: This output should not be used for disconnecting of main power supply from the ECU. Disconnecting of the main power supply while the engine is running might cause the ECU will not be able to record eventual trouble codes into it's nonvolatile memory.

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LBO: F

FltResButnEcho

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	30		
Description			
This output provides 1s pulse when:			
<div><div>></div><div>Fault reset button is pressed on the controller front panel or</div></div>			
<div><div>></div><div>Fault reset button is pressed on any of external local/remote terminals or</div></div>			
<div><div>></div><div>fault reset command is received via communication line or</div></div>			
<div><div>></div><div>the input FAULTRESBUTTON (PAGE 693) is activated.</div></div>			

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ForwardSynchro / RPM matching

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	68		
Description			
The output is closed during forward synchronizing and opens when the output GCB STATUS (PAGE 777) is activated (= GCB was closed).			
<i>Note: The output can be used for control of an external synchronizing module.</i>			
<i>Note: In Async applications, this output has name RPM matching and it is closed during RPM matching.</i>			

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Fuel Solenoid

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	22		
Description			
This output is used for control of the engine fuel valve. This output is activated when the gen-set reaches 30 RPM. The setpoint FuelSol offset (page 386) can be used to delay the activation of this output (it starts to be counted when the Gen-set reaches 30 RPM).			
Note: Learn more in the separate chapter Start sequence (page 131) .			

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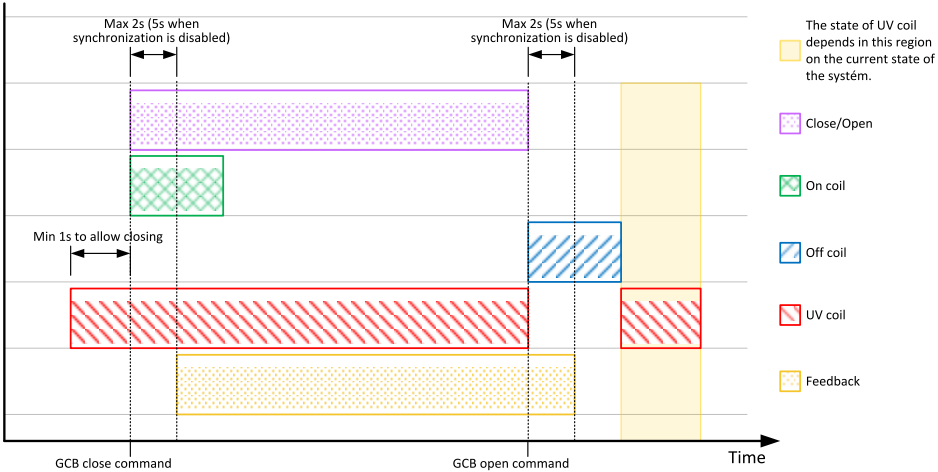
LBO: G

GasVTest run

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	164		
Description			
Output for Gas valve test activation. Configure this output in case you want to run the Gas valve check before each start of engine.			
Setpoint GasVTest (page 387) has to be ENABLED.			

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GCB Close/Open

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	41		
Description			
This output is intended for control of the GCB if a contactor is used as GCB. The output provides continuous signal while the GCB has to be closed.			
There are also other outputs available for GCB control:			
<ul style="list-style-type: none"> ➤ GCB ON COIL (PAGE 777) ➤ GCB OFF COIL (PAGE 776) ➤ GCB UV COIL (PAGE 778) 			
 <p>The state of UV coil depends in this region on the current state of the system.</p> <p>Close/Open</p> <p>On coil</p> <p>Off coil</p> <p>UV coil</p> <p>Feedback</p> <p>Max 2s (5s when synchronization is disabled)</p> <p>Min 1s to allow closing</p> <p>GCB close command</p> <p>GCB open command</p> <p>Time</p>			

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GCB OFF coil S

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1068		
Description			
Control of secondary GCB.			
Activation of this output is in same manner as primary output GCB OFF COIL (PAGE 776)			
Secondary GCB is taken in case there is also configured its feedback – LBI: GCB feedback S			

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GCB OFF Coil

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	43		
Description			
This output is intended for opening of the GCB using OFF coil if a circuit breaker is used as GCB. The output provides 2 sec pulse when the GCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5 sec. See timing diagram of all available breaker control outputs in the description of the GCB CLOSE/OPEN (PAGE 775) output.			
There are also other outputs available for GCB control:			
➤ GCB CLOSE/OPEN (PAGE 775)			
➤ GCB ON COIL (PAGE 777)			
➤ GCB UV COIL (PAGE 778)			

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GCB ON coil S

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1067		
Description			
Control of secondary GCB.			
Activation of this output is in same manner as primary output GCB ON COIL (PAGE 777)			
Secondary GCB is taken in case there is also configured its feedback – LBI: GCB feedback S			

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GCB ON Coil

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	42		
Description			
<p>This output is intended for closing of the GCB using ON coil if a circuit breaker is used as GCB. The output provides 2 sec pulse when the GCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5 sec. See timing diagram of all available breaker control outputs in the description of the GCB CLOSE/OPEN (PAGE 775) output.</p> <p>There are also other outputs available for GCB control:</p> <ul style="list-style-type: none">➤ GCB CLOSE/OPEN (PAGE 775)➤ GCB OFF COIL (PAGE 776)➤ GCB UV COIL (PAGE 778)			

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GCB status

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	84		
Description			
<p>This output indicates the GCB position, how it is internally considered in the controller. The position is based on GCB FEEDBACK (PAGE 707) input and optionally also on the GCB FDB NEG (PAGE 707) input.</p> <ul style="list-style-type: none">➤ If only the positive feedback input is used the output mirrors the feedback.➤ If both feedbacks are used and they match each other the output indicates the GCB position according to the feedbacks.➤ If both feedbacks are used, however they do not match each other, the output remains in previous position when they matched. <p>The output can be used for indication of the GCB position.</p>			

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GCB UV coil S

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1069		
Description			
Control of secondary GCB.			
Activation of this output is in same manner as primary output GCB UV COIL (PAGE 778)			
Secondary GCB is taken in case there is also configured its feedback – LBI: GCB feedback S			

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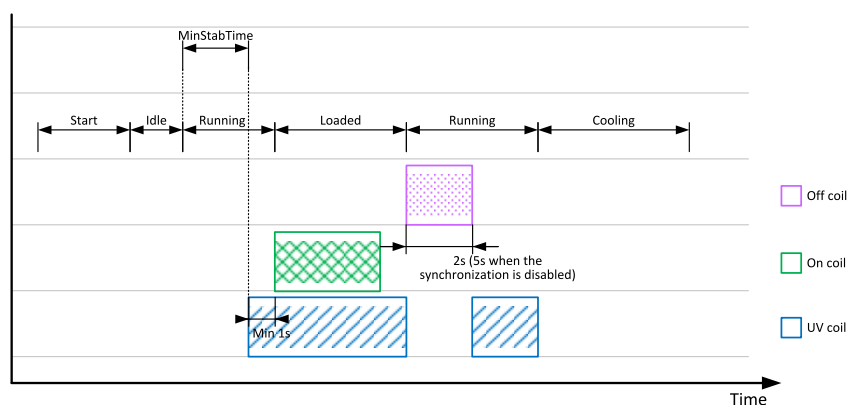
GCB UV Coil

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	44		

Description

This output is intended for opening of the GCB using an undervoltage coil if a **circuit breaker** is used as GCB.

- The output is closed after the Gen-set has been started, **Min stab time (page 382)** has elapsed and the generator voltage and frequency has got into limits. GCB closing command is blocked for 1 sec after the UV coil has been closed to allow the breaker mechanical system getting ready for closing.
- The output is opened for 2 sec when the GCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 5 sec.
- The output is closed again and remains closed while the generator voltage and frequency are in limits, if the *Running* phase follows after opening of the GCB (e.g. in MAN).
- The output remains opened if the *Cooling* phase follows after opening of the GCB.



There are also other outputs available for GCB control:

- **GCB CLOSE/OPEN (PAGE 775)**
- **GCB ON COIL (PAGE 777)**
- **GCB OFF COIL (PAGE 776)**

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GCBButnEcho

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	35		
Description			
<p>This output provides 1s pulse when:</p> <ul style="list-style-type: none"> ➤ GCB button is pressed on the controller front panel or ➤ GCB button is pressed on any of external local/remote terminals or ➤ GCB <i>close/open</i> command is received via communication line or ➤ the input MCBBUTTON (PAGE 726) is activated. 			

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GCBclose/openS

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1058		
Description			
<p>Control of secondary GCB.</p> <p>Activation of this output is in same manner as primary output GCB CLOSE/OPEN (PAGE 775)</p> <p>Secondary GCB is taken in case there is also configured its feedback – LBI: GCB feedback S</p>			

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Gen params OK

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	77		
Description			
<p>This output indicates that the generator actually provides proper voltage and frequency. The output is closed while the Gen-set is running (regardless of whether GCB is closed or not) and all generator electrical parameters are in limits and there is no BOC-type protection active (also under Sd Override)..</p> <p>Note: This output combined with a PLC block Delay can be used for switching on/off of some auxiliary devices (e.g. cooling pump), that are supplied directly from generator (before GCB). The delay is recommended to allow the generator getting stable and avoid unnecessary switching the auxiliary device on and off just after start.</p>			

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GenCapClim

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1427		
Description			
Output is activated in case the function PforQ is active and the required Q is in capacitive part (overexcited).			
Function PforQ and mentioned LBO is activated when the setpoint: PforQ limit (page 476) is ENABLED.			

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GenCapLlim

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1428		
Description			
Output is activated in case the function PforQ is active and the required Q is in inductive part (underexcited).			
Function PforQ and mentioned LBO is activated when the setpoint: PforQ limit (page 476) is ENABLED.			

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Gen-set active

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	60		
Description			
The output closes at the beginning of the prestart phase and opens after the Gen-set has been fully stopped. If the Gen-set fails to start the output opens after the last cranking attempt.			
Note: <i>The output also closes if the engine begins to rotate spontaneously.</i>			

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LBO: H

Horn

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1		
Description			
The output closes together with the output ALARM (PAGE 762) . It opens when the output ALARM (PAGE 762) is opened or <i>Horn reset</i> button is pressed or Horn Timeout (page 389) has elapsed.			

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Horn flashing

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	29		
Description			
This is the flashing alternative of the output HORN (PAGE 780) , i.e. the output flashes with period 1s/1s while the output HORN (PAGE 780) is closed.			

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HrnResButnEcho

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	31		
Description			
This output provides 1s pulse when:			
<div><div>></div><div><i>Horn reset</i> button is pressed on the controller front panel or</div></div> <div><div>></div><div><i>Horn reset</i> button is pressed on any of external local/remote terminals or</div></div> <div><div>></div><div><i>horn reset</i> command is received via communication line or</div></div> <div><div>></div><div>the input HORNRESBUTTON (PAGE 708) is activated.</div></div>			

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LBO: I

Idle run

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	66		
Description			
This output is closed while the timer Idle time (page 381) is counting down. This timer begins to count down when the engine is considered as started and the starter motor is deenergized. See also description of the output STARTER (PAGE 844) .			

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Idle/Nominal

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	39		
Description			
<p>This output is intended for switching of the speed governor reference from idle to nominal speed and vice versa. The output is opened when the engine is required to run at idle speed and it is closed when the engine is required to run at nominal speed.</p> <ul style="list-style-type: none">➤ The output is opened while the engine is not running and also during start.➤ The output is closed after the engine has been started when the timer Idle time (page 381) elapses.➤ The output remains closed while the engine is running.➤ The output is opened while stopping either at the beginning or at the end of the cooling phase. This is selectable by the setpoint Cooling speed (page 384). <p>Note: Some governors do not support speed reference switching.</p>			

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Ignition

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	37		
Description			
<p>The output is used for control of an ignition module on gas engines. The output is closed when the engine speed exceeds 30 RPM and opens when the engine is fully stopped regardless of the reason of the stop, i.e. whether it is an operational stop or shutdown stop. The only exception is activation of the input EMERGENCY STOP (PAGE 680), when the ignition output is opened immediately after the input is activated.</p>			
<p>Note: Learn more in the separate chapter Start sequence (page 131).</p>			

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In synchronism / In RPM window

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	80		
Description			
1) LBO in standard applications			
In standard applications, this output has name In synchronism .			
This output is closed during synchronization when all synchro conditions have been fulfilled. The output is opened either when:			
<div><div>></div>the synchro conditions are lost or</div> <div><div>></div>the corresponding breaker has been closed or</div> <div><div>></div>the synchronizing was interrupted or timed out.</div>			
Synchro conditions are following:			
<div><div>></div>Phase shift between generator and mains (bus) voltage must be within range of ±Phase window (page 446) for period longer than Dwell time (page 446).</div> <div><div>></div>Voltage difference between generator and mains (bus) voltage (in all phases) must be lower or equal to Voltage window (page 445) for period longer than Dwell time (page 446).</div>			
The output is intended for manual synchronization. Automatic closing of GCB must be disabled for this case. Use the input GCB DISABLE (PAGE 706) .			
2) LBO in Async applications			
In Async applications, this output has name In RPM window .			
This output is closed during RPM matching when the RPM matching condition has been fulfilled. The output is opened when:			
<div><div>></div>The RPM matching condition is lost or</div> <div><div>></div>The GCB has been closed or</div> <div><div>></div>The RPM matching was interrupted or timed out</div>			
The RPM matching condition is following:			
RPM difference between actual engine speed and required engine speed must be within range of ±Slip Freq Win / RPM window (page 455) for period longer than Dwell time (page 446) .			

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Initialized

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1222		
Description			
This LBO indicates that the controller finished the reboot after the restart. It can be used in internal PLC for blocking some binary inputs to avoid the hazards after restart of the controller.			

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LBO: K

kWh pulse

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	206		
Description			
This output generates 100 ms pulse always when the internal kWh counter incremented.			

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LBO: L

LambdaHeatedA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1740		
Description			
Output is activated when the time of setpoint StartTimeAFRA (page 553) is counted down.			

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LambdaHeatedB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1758		
Description			
Output is activated when the time of setpoint StartTimeAFRB (page 564) is counted down.			

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LdShed stage 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	51		
Description			
This output is used for control of first load group. This is the group which is disconnected as first one when the load shedding function becomes active. Connect least important loads to this group.			
Note: Learn more about load shedding in the separate chapter <i>Load shedding</i> (page 145).			

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LdShed stage 2

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	52		
Description			
This output is used for control of second load group. This group is disconnected as second one when the first group is already disconnected and the condition for disconnecting of next group is still fulfilled.			
Note: Learn more about load shedding in the separate chapter Load shedding (page 145) .			

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LdShed stage 3

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	53		
Description			
This output is used for control of third load group. This group is disconnected as last one when the first two groups are already disconnected and the condition for disconnecting of next group is still fulfilled.			
Note: Learn more about load shedding in the separate chapter Load shedding (page 145) .			

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LoadReduct

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1245		
Description			
Active when the load is reduced due to activation of LBI Load Reduct 1-4 or LAI Load Reduction. For activation binary or analog load reduction must be simultaneously activated LBI Load reduction.			

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Load reduct ON

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1245		
Description			
Output is activated in case the LBI: Load reduct 1-4 together with LBI: Load reduction or LAI: Load reduction together with LBI: Load reduction is configured and active.			

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Loaded

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	72		
Description			
The output is closed while the Gen-set is loaded and the load is being regulated according to selected mode (baseload, import/export, power management etc.) or is not being regulated in single island operation.			

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LoadReduct

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1434		
Description			
This output is active when the load is reduced due to activation of LBI Load Reduct 1-4 or LAI:LOAD REDUCTION (PAGE 885).			
For activation of binary or analog load reduction, the LBI: LOAD REDUCTION (PAGE 721) must be simultaneously activated.			

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Logical 0

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	26		
Description			
This output is always opened. It may be used in functions (e.g. ECU outputs or PLC modules inputs) where a binary value is required, however it has to be continuously inactive.			

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Logical 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	27		
Description			
This output is always closed. It may be used in functions (e.g. ECU outputs or PLC modules inputs) where continuously active binary value is required.			

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LVRT Active

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1245		
Description			
The output closes if the LVRT protection gets active. The output stays closed at least for 500 ms. History record – LVRT Active is written in case the general VRT function is evaluated and when the LBO is activated.			

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LVRT CurveTrip

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1245		
Description			
The output closes when the voltage drops below the line of LVRT curve. The output opens when the voltage goes above the line of LVRT curve.			
The LBO is closed for minimum 3 seconds after activation.			

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LBO: M

MainsAllowsSyn

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1057		
Description			
This logical binary output is active when synchronization to the mains is allowed or the Gen-set is in the Parallel to Mains operation. This means the output is activated when the time has elapsed. The output is deactivated when mains fail occurs. It is also deactivated when the Gen-set is not in the Parallel to Mains operation and mains voltage and frequency are not in limits given by the setpoints MainsSyncVMax (page 477) , MainsSyncVMin (page 477) , MainsSyncFMax (page 478) and MainsSyncFMin (page 478) .			

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MainsFrqFall

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1433		
Description			
Active when the mains frequency has falling tendency in ranges 52.5 Hz → 50.2 Hz and from 49.8 → 47.5 Hz.			

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MainsFrqRise

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1432		
Description			
Active when the mains frequency is increasing in ranges 50.2 → 52.5 Hz and from 47.5 → 49.8 Hz.			

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MainsParams OK

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	78		
Description			
This output indicates that the mains is healthy. The output is closed while all mains electrical parameters are in limits.			

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MainsProtState

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1246		
Description			
Output is activated in case any Mains protection is active.			

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MainsTripPer

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1435		
Description			
This output is active within period of time MainsTripPerT (page 480) after Mains Trip due to Mains Protection.			

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MCB Close/Open

Related FW	2.2.0	Related applications	SPTM, Combi
Comm object	45		
Description			
<p>This output is intended for control of the MCB if a contactor is used as MCB. The output provides continuous signal while the MCB has to be closed. See timing diagram of all available breaker control outputs in the description of the GCB CLOSE/OPEN (PAGE 775) output.</p> <p><i>Note: Use invert function when configuring the output in GenConfig to obtain inverted function of the output, i.e. output is closed while the MCB has to be open.</i></p>			
<p>There are also other outputs available for MCB control:</p> <ul style="list-style-type: none">> MCB ON COIL (PAGE 789)> MCB OFF COIL (PAGE 789)> MCB UV COIL (PAGE 790)			

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MCB OFF Coil

Related FW	2.2.0	Related applications	SPTM, Combi
Comm object	47		
Description			
<p>This output is intended for opening of the MCB using OFF coil if a circuit breaker is used as MCB. The output provides 2 sec pulse when the MCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5 sec. See timing diagram of all available breaker control outputs in the description of the GCB CLOSE/OPEN (PAGE 775) output.</p> <p>There are also other outputs available for MCB control:</p> <ul style="list-style-type: none">> MCB CLOSE/OPEN (PAGE 789)> MCB ON COIL (PAGE 789)> MCB UV COIL (PAGE 790)			

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MCB ON Coil

Related FW	2.2.0	Related applications	SPTM, Combi
Comm object	46		
Description			
<p>This output is intended for closing of the MCB using ON coil if a circuit breaker is used as MCB. The output provides 2 sec pulse when the MCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5 sec. See timing diagram of all available breaker control outputs in the description of the GCB CLOSE/OPEN (PAGE 775) output.</p> <p>There are also other outputs available for MCB control:</p> <ul style="list-style-type: none">> MCB CLOSE/OPEN (PAGE 789)> MCB OFF COIL (PAGE 789)> MCB UV COIL (PAGE 790)			

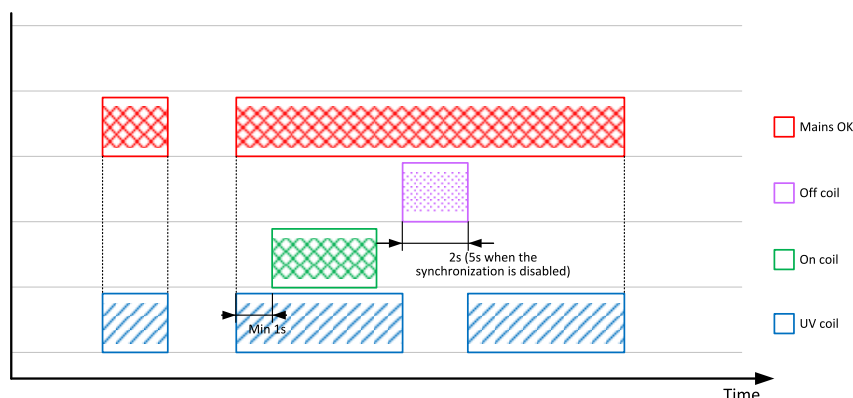
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MCB status

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	85		
Description			
<p>This output indicates the MCB position, how it is internally considered in the controller. The position is based on MCB FEEDBACK (PAGE 725) input and optionally also on the MCB FDB NEG (PAGE 725) input.</p> <ul style="list-style-type: none">➤ If only the positive feedback input is used the output mirrors the feedback.➤ If both feedbacks are used and they match each other the output indicates the MCB position according to the feedbacks.➤ If both feedbacks are used, however they do not match each other, the output remains in previous position when they matched. <p>The output can be used for indication of the MCB position.</p>			

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MCB UV Coil

Related FW	2.2.0	Related applications	SPtM, Combi
Comm object	48		
Description			
<p>This output is intended for opening of the MCB using an undervoltage coil if a circuit breaker is used as MCB.</p> <ul style="list-style-type: none">> The output is closed while mains values are within limits. MCB closing command is blocked for 1 sec after the UV coil has been closed to allow the breaker mechanical system getting ready for closing.> The output is opened for 2 sec when the MCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 5 sec.			
			
<p>There are also other outputs available for GCB control:</p> <ul style="list-style-type: none">> MCB CLOSE/OPEN (PAGE 789)> MCB ON COIL (PAGE 789)> MCB OFF COIL (PAGE 789)			

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MCBButnEcho

Related FW	2.2.0	Related applications	SPTM, Combi
Comm object	34		
Description			
This output provides 1s pulse when:			
<div><div>></div><div><i>MCB</i> button is pressed on the controller front panel or</div></div>			
<div><div>></div><div><i>MCB</i> button is pressed on any of external local/remote terminals or</div></div>			
<div><div>></div><div><i>MCB close/open</i> command is received via communication line or</div></div>			
<div><div>></div><div>the input gGCBBUTTON (PAGE 707) is activated.</div></div>			

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MixDnA

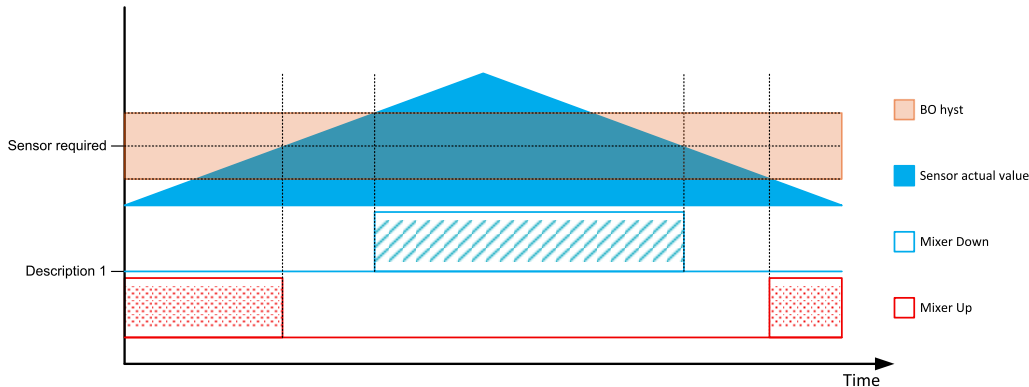
Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1746		
Description			
Binary output for Down Mixer control. This output is result of PID control, so it's pulse length is not fixed.			
			

Image 9.23 Mixer Up and Down control

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MixDnB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1752		
Description			
Binary output for Down Mixer control. This output is result of PID control, so it's pulse length is not fixed.			

The diagram illustrates the control logic for the Down Mixer (MixDnB). It features a horizontal time axis. A blue triangular waveform represents the 'Sensor actual value', which rises and then falls. An orange shaded region represents the 'Sensor required' range, which is wider than the sensor's range and includes a hysteresis band ('BO hyst'). A legend on the right identifies the components: 'BO hyst' (orange box), 'Sensor actual value' (blue triangle), 'Mixer Down' (blue hatched rectangle), and 'Mixer Up' (red dotted rectangle). The 'Mixer Down' pulse is active when the sensor value is within the required range. The 'Mixer Up' pulse is active when the sensor value is outside the required range. A 'Description 1' label points to the 'Mixer Up' pulse.

Image 9.24 Mixer Up and Down control

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MixUpA

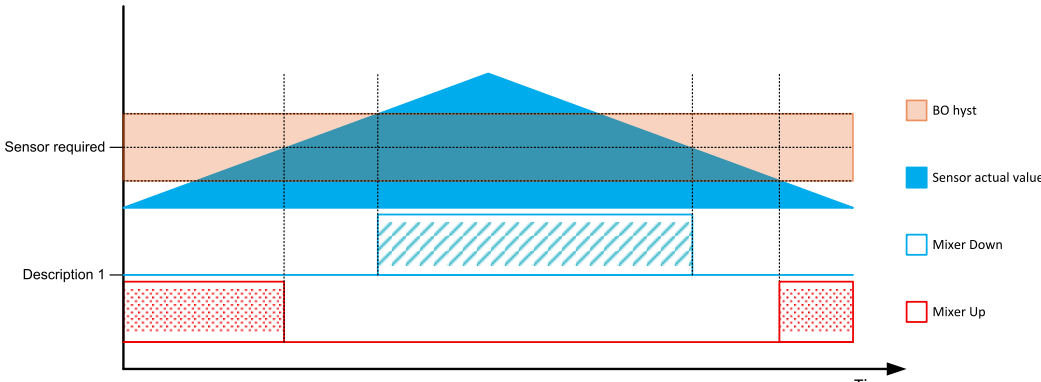
Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1745		
Description			
Binary output for Up Mixer control. This output is result of PID control, so it's pulse length is not fixed.			

The diagram illustrates the control logic for the Up Mixer (MixUpA). It features a horizontal time axis. A blue triangular waveform represents the 'Sensor actual value', which rises and then falls. An orange shaded region represents the 'Sensor required' range, which is wider than the sensor's range and includes a hysteresis band ('BO hyst'). A legend on the right identifies the components: 'BO hyst' (orange box), 'Sensor actual value' (blue triangle), 'Mixer Down' (blue hatched rectangle), and 'Mixer Up' (red dotted rectangle). The 'Mixer Down' pulse is active when the sensor value is within the required range. The 'Mixer Up' pulse is active when the sensor value is outside the required range. A 'Description 1' label points to the 'Mixer Up' pulse.

Image 9.25 Mixer Up and Down control

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MixUpB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1762		
Description			
Binary output for Up Mixer control.			
This output is result of PID control, so it's pulse length is not fixed.			
			
Image 9.26 Mixer Up and Down control			

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Modbus Sw 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1108		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1109		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1110		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1111		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1112		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1113		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 7

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1114		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1115		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 9

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1116		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 10

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1117		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 11

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1118		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 12

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1119		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 13

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1120		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 14

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1121		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 15

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1122		
Description			
<p>The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.</p>			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 16

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1123		
Description			
<p>The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.</p>			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: <i>The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"</i>			
Note: <i>The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"</i>			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 17

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1124		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 18

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1125		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 19

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1126		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 20

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1127		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 21

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1128		
Description			
<p>The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.</p>			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 22

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1129		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 23

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1130		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 24

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1131		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 25

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1132		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 26

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1133		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 27

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1134		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 28

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1135		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 29

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1136		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 30

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1137		
Description			
The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 31

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	1138		
Description			
<p>The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.</p>			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"			
Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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Modbus Sw 32

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1139		
Description			
<p>The "Modbus Switches" are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as "MODBUSSW1..MODBUSSW32". No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values "ModbusSw1" and "ModbusSw2" in group "Log Bout" available for back-reading.</p>			
Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548
<p>Note: The LSB of ModbusSw1 (46337) corresponds with LBO "ModbusSw1"</p>			
<p>Note: The LSB of ModbusSw2 (46338) corresponds with LBO "ModbusSw17"</p>			
Register port for writing	Input value	LBO ModbusSw16....ModbusSw1	
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111	
Register port for writing	Input value	LBO ModbusSw32....ModbusSw17	
ModbusSw1 (46338)	F000 HEX	1111 0000 0000 0000	

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MODES: Aut mode

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	20		
Description			
<p>The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input REMOTE AUT/REMOTE SEM (PAGE 738)).</p>			

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MODES: Man mode

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	18		
Description			
<p>The output is closed while the controller is currently in MAN mode (either switched by the mode selector on the front panel or by the input REMOTE MAN (PAGE 738)).</p>			

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MODES: Off mode

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	17		
Description			
The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input REMOTE OFF (PAGE 738)).			

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MODES: Sem mode

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, Combi
Comm object	19		
Description			
The output is closed while the controller is currently in SEM mode.			

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MODES: Test mode

Related FW	2.2.0	Related applications	SPtM, Combi
Comm object	21		
Description			
The output is closed while the controller is currently in TEST mode (either switched by the mode selector on the front panel or by the input REMOTE TEST (PAGE 739)).			

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LBO: N

Neutral CB C/O

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	50		
Description			
This output is intended for control of the neutral contactor. The output provides continuous signal while the neutral contactor has to be closed. Use the input NEUTRALCB FDB (PAGE 729) for the neutral contactor feedback.			
Response time of the contactor must be less than 400ms . If the contactor does not respond to an open or close command within this time, the alarm <i>Wrn NCB fail</i> is issued.			
Note: Learn more about neutral contactor in the description of the setpoint #Neutral cont (page 339).			

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Not ready

Related FW	2.2.0	Related applications	SptM, SPI, MINT, COX, Combi
Comm object	63		
Description			
The output is closed while the Gen-set is not in operation, however it is not ready to be put into operation. The output is closed while: <ul style="list-style-type: none">> the Gen-set is not running and> the controller is in OFF mode or> there is an alarm blocking start of the Gen-set.			

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LBO: O

OFF coil test

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	716		
Description			
11897 bit 14 (counting from bit 1, applicable for Combi only)			
Output is copy of standard output GCB OFF COIL (PAGE 776) but this output is activated also by standing Gen-set.			
Output is used from certification authority by testing of mains protections on standing Gen-sets.			

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Operational

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	61		
Description			
The output is closed when the Gen-set is ready for operation or is currently in operation.			

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Overcurrent

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	109		
Description			
The output is closed while there is either the <i>Generator IDMT Overcurrent</i> or <i>Generator Short current</i> alarms present in the alarm list.			

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OVRT Active

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	109		
Description			
The output closes when the voltage goes above the line of OVRT curve. The output opens when the voltage drops below the line of OVRT curve.			
The LBO is closed for minimum 3 seconds after activation.			

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OVRT CurveTrip

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	109		
Description			
The output closes if the OVRT protection gets active. The output stays closed at least for 500 ms. History record – OVRT Active is written in case the general VRT function is evaluated and when the LBO is activated.			

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LBO: P

Pave

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Comm object	828		
Description			
This output indicates that the value Pmom/Pave got above the curve Pmom/Pave Max, it is active for 5 seconds. The output is evaluated only when the PAV, E monitoring (page 223) function is enabled (setpoint Pave is not 0 (OFF)) and the Gen-set is in the parallel operation.			

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Pave FLS

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Comm object	828		
Description			
This output indicates that the LAI: PMOM (PAGE 891) is not configured or the value is invalid. The output is evaluated only when the PAV, E monitoring (page 223) function is enabled (setpoint Pave is not 0 (OFF)).			

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PeakShaveAct

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	828		
Description			
Binary output is active when the Gen-set is running (in SPtM application) or Gen-set group is activated by IntelliMains due to Peak Shaving or Peak kVA Shaving (dependence on parameters PeakLevelStart (page 330), PeakLevelStop (page 331), PeakAutS/S del (page 331), Peak kVA Start (page 332), Peak kVA Stop (page 332), PeakKVAS/S del (page 332) in ProcessControl group).			

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PeriphCommErr

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	115		
Description			
The output is closed while there is an error in the communication with any peripheral unit (e.g. IS-AIN8, IGS-PTM, ...).			

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PforQ

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1436		
Description			
Event – PforQ means situation when PforQ function is active. PforQ limit (page 476) is set to ENABLED and there are fulfilled conditions to reduce the P to reach the required Q			

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PforQActive

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1546		
Description			
Outputs gets active when the Gen-set active power is reduced in order to achieve reactive power. The output becomes inactive when the active power is not more reduced..			

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PostVRT

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1941		
Description			
Event – PostVRT means situation after VRT (voltage right through). In case the LVRT or OVRT is active, it is very usual that the current is higher then Nominal current. The active power has to be reduced till the actual current is equal to Nominal current.			

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Power1A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1747		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power1B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1753		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power2A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1748		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power2B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1754		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power3A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1749		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power3B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1755		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power4A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1750		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power4B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1756		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power5A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1751		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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Power5B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1757		
Description			
Binary output which serves as indication which part of characteristic of AFR regulation is active.			

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PQ-C AreaLim

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2244		
Description			
Logical binary output defines when is the required Q inside or outside the capacitive part of PQ area App Curve PQ curve.			
LBO is active when the required Q is outside the PQ area. PQ area is one of the conditions for activation of PforQ function in case the actual active power is lower than InstalledPower.			
In case the PQ area is not used as condition for PforQ function output stays deactivated.			

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PQ-L AreaLim

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2243		
Description			
Logical binary output defines when is the required Q inside or outside the inductive part of PQ area App Curve PQ curve.			
LBO is active when the required Q is outside the PQ area. PQ area is one of the conditions for activation of PforQ function in case the actual active power is lower than InstalledPower.			
In case the PQ area is not used as condition for PforQ function output stays deactivated.			

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Prelubr pump

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	49		
Description			
This output can be used for periodic lubrication of the engine while the engine is not running. The output is periodically closed for Prelubr time (page 380) and then opened for Prelubr pause (page 380) .			
The output opens immediately when EMERGENCY STOP (PAGE 680) is activated or if the controller is switched to OFF mode.			
Note: The engine must be equipped with an external electric motor-driven oil pump to allow this function.			

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Prestart

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	36		
Description			
<p>This output can be used for control of any device, which has to be activated just before start, i.e. glow plugs. The output is closed for time period of Prestart time (page 379) prior to activating of the starter motor and remains closed during cranking and also during pause between cranking attempts.</p> <p>Note: Learn more in the separate chapter Start sequence (page 131).</p>			

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P(Um)

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	828		
Description			
<p>Event – P(Um) means situation when P is controlled based on mains voltage Um.</p> <p>The setpoint P(Um)Function must be switched either to Pnom(Um)Enable or Pact(Um)Enable and there are fulfilled condition that the active power is reduced due to Um.</p>			

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PwrDerating

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2238		
Description			
<p>This output is active when the gen-set nominal power is ramped up or down due to the Power derating function. It uses the Load Ramp (page 458) to change the nominal power.</p> <p>Note: For more information about the Power Derating function, please refer to the chapter Power derating (page 127).</p>			

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PwrLimitation

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2241		
Description			
<p>This output is active during the limitation of active power. It can be activated by:</p> <ul style="list-style-type: none">➤ Grid codes related functions (events)➤ Power derating (page 127) function➤ Power reduction (page 128) function➤ Overheat protection in T By PWR (refer to the setpoint Load ctrl PtM (page 328)) <p>The output is not activated during standard soft unload state.</p>			

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PwrOverFreqLim

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1183		
Description			
Output is activated in case active Power Over Frequency function (PWROVRF).			

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PwrReductActA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1438		
Description			
Event means situation when power reduction A is active.			

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PwrReductActB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1785		
Description			
Event means situation when power reduction B is active.			

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PwrReductActC

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1786		
Description			
Event means situation when power reduction C is active.			

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PwrReductFulA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2774		
Description			
LBO is active when the condition for Power Reduction A is fulfilled.			

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PwrReductFulB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2775		
Description			
LBO is active when the condition for Power Reduction B is fulfilled.			

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PwrReductFulC

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2776		
Description			
LBO is active when the condition for Power Reduction C is fulfilled.			

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PwrReduction

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2240		
Description			
This output is active when the active power is reduced due to the <i>Power Reduction</i> function.			
Note: For more information about the <i>Power Reduction</i> function, please refer to the chapter <i>Power reduction</i> (page 128).			
This output is also active when the required active power cannot be fulfilled in the Import/Export load control mode (Load ctrl PtM (page 328) = IM/EX) because of the Gen-set InstalledPower (page 346) .			
For example:			
<ul style="list-style-type: none">➤ InstalledPower (page 346) = 200 kW➤ Act power (page 592) = 50 kW➤ P mains (page 606) = 100 kW➤ Import load (page 327) = -70 kW (request to export 70 kW to the Mains)➤ ActPwrReq (page 618) = 200 kW (limited by the InstalledPower (page 346))➤ To fulfill the required Import load (page 327), the Act power (page 592) 220 kW is needed. The LBO is active to indicate that the requirement cannot be fulfilled.			
It is also active when the active power required by LAI: LDCTRL:ANExBLD (PAGE 884) is higher than the InstalledPower (page 346) when Load ctrl PtM (page 328) = ANEXT BASELOAD.			

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PwrUnderFreq

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2115		
Description			
Output is active when the power starts to be forced to increase the actual (reduced) power due to PWRUNDRFREQ function and stays active all the time while the frequency is in under frequency (<49.8).			

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LBO: Q

Q/PF ctrl act

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1460		
Description			
Output is activated in case the regulation for Q or for PF is active (parallel to mains only).			

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Q&U Protection

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2113		
Description			
Output gets active when the Q&U protection is evaluated.			

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LBO: R

Ready for Load

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	58		
Description			
This output is closed while the Gen-set is running, it's voltage and frequency are in limits and the GCB is able to be closed or is already closed.			

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Ready

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	62		
Description			
The output is closed while the Gen-set is not in operation at the moment, however it is ready to be put into operation. The output is closed while: <ul style="list-style-type: none">> the Gen-set is not running and> the controller is not in OFF mode and> there isn't any alarm blocking start of the Gen-set			

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ReadyToExcite

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, Combi
Comm object	221		
Description			
If RPM of Gen-set achieves RPM window in RPM win TO (page 344) and stays there more than 0.5 second, the Logical Binary output ReadyToExcite is activated. (delay 1 s is fixed). The LBO ReadyToExcite is deactivated after SUS sequence.			

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RemoteControl1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	141		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	142		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	143		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	144		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	145		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	146		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl7

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	147		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RemoteControl8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	148		
Description			
<p>This is a general purpose output, which can be closed and opened remotely, e.g. from IntelliMonitor using the "Remote switches" tool or via Modbus using the register #46361 and command #26.</p> <p>Note: See the Remote switches chapter in the IntelliMonitor help for details about how to control the output from IntelliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.</p>			

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RetOvUnFreq

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2194		
Description			
Event is active for the time RetOvUnFreqT (page 469) in following situations:			
<div><div>></div>when Mains Frequency goes from Underfrequency and across >49.8 Hz</div>			
<div><div>></div>when Mains Frequency goes from Overfrequency and across <50.2 Hz</div>			
This means the LBO will be active during the ramping of the power.			

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ReverseSynchro

Related FW	2.2.0	Related applications	SPTM, Combi
Comm object	69		
Description			
<p>The output is closed during reverse synchronizing (synchronizing of loaded Gen-set back to the mains) and opens when the output MCB STATUS (PAGE 790) is activated (= MCB was closed).</p> <p><i>Note: The output can be used for external synchronizing module control.</i></p>			

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ROCOF Act

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	1005		
Description			
The output closes if the ROCOF protection gets active. It stays closed for 3 s, then opens again. This output is activated even if the selected breaker is actually not tripped because of the input SD OVERRIDE (PAGE 744) is active.			
Note: See also the output ROCOF TRP (PAGE 841).			

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ROCOF Trp

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1006		
Description			
The output closes if the ROCOF protection gets active and the controller trips the selected breaker. The output stays closed for 3 s, then opens again.			
Note: See also the output ROCOF ACT (PAGE 841).			

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Running

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	67		
Description			
This output is closed at the end of the IDLE RUN (PAGE 781) phase when the output IDLE/NOMINAL (PAGE 782) is closed to switch the Gen-set to nominal speed. The output is opened when the Gen-set goes to cooling phase or performs a shutdown.			

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LBO: S

Soft load

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	71		
Description			
The output is closed during Gen-set soft loading period – i.e. it is closed when the Gen-set has been synchronized to the mains/bus and GCB has been closed and opened again when the ramp of the Gen-set power reached the required level.			
Note: The output is not closed during the warming period.			

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Soft unld

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	73		
Description			
The output is closed while the Gen-set is being unloaded before opening GCB.			

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SoftUnload

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1437		
Description			
Event – SoftUnload means situation when the standard soft unload mode is active.			

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Speed dn

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	57		
Description			
This output together with the complementary output SPEED UP (PAGE 842) are designed for speed and power control at Gen-sets where the speed governor does not support analogue control.			
Note: The governor is recommended to be configured for droop function when these outputs are used for power control.			
Note: The alarm <i>Wrn SpdRegLim</i> is disabled when this output is used (configured onto any controller terminal or virtual output).			

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Speed up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	56		
Description			
This output together with the complementary output SPEED DN (PAGE 842) are designed for speed and power control at Gen-sets where the speed governor does not support analogue control.			
Note: The governor is recommended to be configured for droop function when these outputs are used for power control.			
Note: The alarm <i>Wrn SpdRegLim</i> is disabled when this output is used (configured onto any controller terminal or virtual output).			

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Stand-by ready

Related FW	2.2.0	Related applications	SPtM, Combi
Comm object	59		
Description			
<p>This output is intended for indication, that the Gen-set is ready for standby operation, i.e. for automatic start and taking over the load. The output is closed while:</p> <ul style="list-style-type: none">➤ the Gen-set is not running and➤ the controller is in AUT or SEM mode and➤ there isn't any alarm blocking start of the Gen-set and➤ AMF function and island operation are enabled (Island enable (page 337), MFStart enable (page 338)).			

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Start Blocked

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1226		
Description			
In some conditions given by non-sense settings of setpoints Island enable (page 337) , ParallelEnable (page 337) , in Process control group is this LBO closed and start of engine is blocked. The start is blocked and LBO Start Blocked is closed when LBI STARTBLOCKING (PAGE 745) is active as well.			

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StartButnEcho

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	33		
Description			
This output provides 1s pulse when:			
<div><div>></div><div>Start button is pressed on the controller front panel or</div></div> <div><div>></div><div>Start button is pressed on any of external local/remote terminals or</div></div> <div><div>></div><div>start command is received via communication line or</div></div> <div><div>></div><div>the input STARTBUTTON (PAGE 745) is activated.</div></div>			

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Starter

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	24		
Description			
The output is used to energize the starter motor. The output closes at the beginning of start sequence after prestart has been completed and opens when the engine is started.			
Note: Learn more in the separate chapter Start sequence (page 131) .			

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Starting

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	65		
Description			
The output is closed at the beginning of the prestart phase and remains closed during prestart, cranking and starting phases. The output is opened either when the gen-set goes to running phase or when it failed to start. See the diagram in the description of the output CRANKING (PAGE 770) for details.			

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Stop Pulse

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	25		
Description			
One second pulse is issued at this output when the engine is required to stop (i.e. this pulse does not commence stopping sequence but it is rather an actual command to engine physical stopping). The output is especially intended to be used as stop command for ECU-controlled engines, which support stop command via the communication bus (e.g. J1939).			

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Stop Solenoid

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	23		
Description			
<p>This output is used at diesel engines equipped with fuel valve, which must be energized to stop the engine.</p> <p>The output is closed when the engine has to stop, remains closed while the engine is stopping and is opened back if the engine has successfully stopped and STOPBUTTON (PAGE 746) elapsed. For other stopping sequences please refer to chapter Stop sequence (page 134).</p> <p>The total time this output is continuously active is never shorter than Stop time (page 386), i.e. if the Gen-set stops quickly, the output may remain closed even though all symptoms indicate the engine is stopped.</p> <p>This output is also closed if the engine begins to rotate unexpectedly, i.e. if it is started manually directly on the engine. To allow the engine to be operated manually without intervention from the controller, switch the controller to the <i>emergency manual</i> mode using the input EMERG. MANUAL (PAGE 679).</p> <p>Note: Learn more about this topic in the separate chapter Stop sequence (page 134).</p>			

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StopButnEcho

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	32		
Description			
<p>This output provides 1s pulse when:</p> <ul style="list-style-type: none">➤ Stop button is pressed on the controller front panel or➤ Stop button is pressed on any of external local/remote terminals or➤ stop command is received via communication line or➤ the input STOPBUTTON (PAGE 746) is activated.			

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Stopping

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	75		
Description			
<p>The output closes when the command to stop the engine has been issued, i.e. the output FUEL SOLENOID (PAGE 774) has been deactivated. It opens when the engine is fully stopped. The output also closes if the engine begins to rotate spontaneously.</p> <p>This output is closed for the whole time of the stopping sequence (regardless of the repeated opening of the STOP SOLENOID (PAGE 845)). It is deactivated immediately when the engine is considered stopped.</p>			

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SUS excitation

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, Combi
Comm object	223		
Description			
Logic binary output for activation / deactivation of excitation.			
This LBO SUS excitation is activated / deactivated based on condition #SUS min power (page 344) and LBO READYToExcITE (PAGE 837) .			
We recommend use this binary output for connecting / disconnecting power supply of AVR. In case of deactivating signal VoltRegOutput for IG-AVRi module – you don't "switch off" excitation of generator (AVR has power supply and in case of no signal from IG-AVRi – the generator is excited to nominal value – it is set in AVR).			
In case of standard start sequence LBO SUSexcitation is actived (standard start sequence works correctly with wiring bellow).			

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Synchronizing

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1463		
Description			
Output is active when is any synchronization active (Forward, Reverse).			

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LBO: T

T cyl differ

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	94		
Description			
The output is closed while the alarm <i>cylinder temperature difference</i> alarm is active.			

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TimerAct 1-4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	117		
Description			
This is combined output from timer channels 1-4. The output is closed if at least one of the channels is active.			
Note: See the chapter <i>General purpose timers (page 154)</i> for more details about timers.			

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TimerAct 5-8

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	118		
Description			
This is combined output from timer channels 5-8. The output is closed if at least one of the channels is active.			
Note: See the chapter <i>General purpose timers (page 154)</i> for more details about timers.			

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TimerAct 9-12

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	119		
Description			
This is combined output from timer channels 9-12. The output is closed if at least one of the channels is active.			
Note: See the chapter <i>General purpose timers (page 154)</i> for more details about timers.			

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TimerAct 13-16

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	120		
Description			
This is combined output from timer channels 13-16. The output is closed if at least one of the channels is active.			
Note: See the chapter <i>General purpose timers (page 154)</i> for more details about timers.			

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TimerActiveCom

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	121		
Description			
This is combined output from all timer channels. The output is active if at least one timer channel is active.			
Note: See the chapter <i>General purpose timers (page 154)</i> for more details about timers.			

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LBO: U

UQ-C AreaLim

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	2246		
Description			
Logical binary output defines when is the required Q inside or outside the capacitive part of UQ area App Curve UQ curve.			
LBO is active when the required Q is outside the UQ area.			
UQ area is one of the conditions for activation of PforQ function in case the actual active power is at the level of InstalledPower.			
In case the UQ area is not used as condition for PforQ function output stays deactivated.			

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UQ-L AreaLim

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	2245		
Description			
Logical binary output defines when is the required Q inside or outside the inductive part of UQ area App Curve UQ curve.			
LBO is active when the required Q is outside the UQ area.			
UQ area is one of the conditions for activation of PforQ function in case the actual active power is at the level of InstalledPower.			
In case the UQ area is not used as condition for PforQ function output stays deactivated.			

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User Button 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	726		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</p>		

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User Button 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	727		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	728		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	729		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	730		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	751		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 7

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	752		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 8

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1087		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 9

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1088		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</p>		

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User Button 10

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1089		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 11

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1090		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 12

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1091		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</p>		

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User Button 13

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1092		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 14

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1093		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 15

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1094		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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User Button 16

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1095		
Description			
<p>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in IntelliMonitor. Its state depends on function assigned to the related button.</p> <p>It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.</p>			
ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.		
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.		
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).		
Pulse ON	<p>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse (page 360).</p> <p><i>Note: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</i></p>		

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LBO: V

VectorShiftAct

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	93		
Description			
<p>The output closes if the Vector shift protection gets active. It stays closed for 3 s, then opens again. This output is activated even if the selected breaker is actually not tripped because of the input SD OVERRIDE (PAGE 744) is active.</p> <p><i>Note: See also the output VECTORSHIFTTRP (PAGE 864).</i></p>			

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VectorShiftTrp

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	92		
Description			
The output closes if the <i>Vector shift</i> protection gets active and the controller trips the selected breaker. The output stays closed for 3 s, then opens again.			
Note: See also the output VECTORSHIFTACT (PAGE 864).			

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Ventilation

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	38		
Description			
<p>The output is intended for control of an engine room ventilation fan or engine container ventilation fan. Intended for the engine ventilator control. The output is closed at the beginning of the start procedure together with PRESTART (PAGE 833) output and opens together with STOP SOLENOID (PAGE 845) after the engine is fully stopped.</p> <p>The output opens immediately when EMERGENCY STOP (PAGE 680) is activated or if the controller is switched to OFF mode.</p>			

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Vgen <>

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	95		
Description			
<p>The output is closed while the <i>generator over/under voltage</i> alarm is present in the alarm list.</p>			

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Vmains <>

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Comm object	96		
Description			
<p>The output is closed while the <i>mains over/under voltage</i> alarm is present in the alarm list.</p>			

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VRT Prot Trip

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	2117		
Description			
<p>The output closes if the VRT protection gets active and the controller trips the selected breaker. The output stays closed for 3 s, then opens again.</p>			

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LBO: W

Warming

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	70		
Description			
The output is closed during warming period. Learn more about warming in the description of the setpoint Warming load (page 383).			

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Wrn Stop fail

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	339		
Description			
<p>This output is activated when the Gen-set indicates that it is rotating although it has to be stopped. In this case the Gas Valves and Ignition outputs stay closed till the engine speed drops to 0 RPM. During this situation only this LBO is active.</p> <p>Note: <i>Despite the name of this LBO, no alarm and history record appear when it is activated.</i></p>			

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WrongPhSeq

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	719		
Description			
Binary output WrongPhSeq is active when at least one of the following conditions is fulfilled: Generator/Mains/Bus phase is inverted or wrong generator/mains/bus phase sequence or opposed generator/mains/bus phase sequence is detected.			

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LBO: Y

Y/D

Related FW	2.2.0	Related applications	ASYNc SPI, ASYNc MINT
Comm object	2546		
Description			
This output is closed when the engine speed reaches Y/D RPM (page 379) . When Engine Start (page 378) = Close GCB, the Engine state is switched into Soft load and controller starts to regulate power.			

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9.1.6 Logical analog inputs

What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

Alphabetical groups of Logical analog inputs

LAI: A	869
LAI: C	870
LAI: D	883
LAI: L	883
LAI: M	886
LAI: O	888
LAI: P	889
LAI: R	894
LAI: S	895
LAI: T	896
LAI: W	897

For full list of Logical analog inputs go to the chapter **List of LAI (page 868)**.

List of LAI

AFR ValveFdbA	869	Cyl temp 30	882	TestF	896
AFR ValveFdbB	869	Cyl temp 31	882	TestQ	896
Ana CH4A	869	Cyl temp 32	882	TestP	896
Ana CH4B	870	DynSpinResReq	883	TestU	897
Cold temp 1	870	DynSpinResOfst	883	Warming temp	897
Cold temp 2	871	LCD brightness	883		
Cold temp 3	871	LdCtrl:AnExBld	884		
Cold temp 4	872	LdCtrl:AnExI/E	884		
Cyl temp 1	872	LdCtrl:I/E-Pm	884		
Cyl temp 2	872	LdCtrl:TByPwr	884		
Cyl temp 3	873	Load reduction	885		
Cyl temp 4	873	Local Baseload	885		
Cyl temp 5	873	MainsMidVolt	886		
Cyl temp 6	874	MAT A	886		
Cyl temp 7	874	MAT B	887		
Cyl temp 8	874	MLC:AnExSysBld	887		
Cyl temp 9	875	MPF:AnExSysBPF	887		
Cyl temp 10	875	MQ:AnExSysBQ	888		
Cyl temp 11	875	Oil press	888		
Cyl temp 12	876	PFCtrl:AnExBPF	889		
Cyl temp 13	876	PFCtrl:AnExBQ	889		
Cyl temp 14	876	PFCtrl:AnExI/E	890		
Cyl temp 15	877	PFCtrl:AnExQI/E	890		
Cyl temp 16	877	PFCtrl:I/E-Qm	890		
Cyl temp 17	877	Pmom	891		
Cyl temp 18	878	PowerDerating1	891		
Cyl temp 19	878	PowerDerating2	891		
Cyl temp 20	878	PwrReductionA	891		
Cyl temp 21	879	PwrReductionB	892		
Cyl temp 22	879	PwrReductionC	892		
Cyl temp 23	879	PFCtrl:AnExQ0UmRef	892		
Cyl temp 24	880	PFCtrl:AnExQ0I/EUmRe	893		
Cyl temp 25	880	PFCtrl:AnExQref/Pnom	893		
Cyl temp 26	880	PFCtrl:AnExQrfl/EPnom	894		
Cyl temp 27	881	RPM pick-up	894		
Cyl temp 28	881	SensorA	895		
Cyl temp 29	881	SensorB	895		

 **back to Controller objects**

LAI: A

AFR ValveFdbA

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]	0.00 .. 100.00 [%]		
Resolution	0.01		
Comm object	53		
Description			
Functional input for configuration of feedback from AFR mixer.			
<i>Note: The controller is able to work with range -327.67 .. 327.67 [%] but correctly the position should be between 0.00 and 100.00 %</i>			

🔍 back to List of LAI

AFR ValveFdbB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0.00 .. 100.00 [%]		
Resolution	0.01		
Comm object	265		
Description			
Functional input for configuration of feedback from AFR mixer.			
<i>Note: The controller is able to work with range -327.67 .. 327.67 [%] but correctly the position should be between 0.00 and 100.00 %</i>			

🔍 back to List of LAI

Ana CH4A

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]	0.00 .. 100.00 [%]		
Resolution	0.01		
Comm object	51		
Description			
Gas content influences Mixer position during engine start and running unloaded state when setpoint Ana CH4A (page 563) is ENA-FIX or ENA-STEP.			
In this case the setpoints StartPositionA (page 553) , RunPositionA (page 554) and LoPwrPositionA (page 555) are ignored.			
This input is used in case of very fluctuating gas quality where the standard fixed mixer positions can't be used.			
Note: <i>In case that Ana CH4 is not detected (sensor value is out of range) StartPositionA (page 553), RunPositionA (page 554) and LoPwrPositionA (page 555) will be active.</i>			
Note: <i>Connect external gas analyzer to analogue input Ana CH4 and configure corresponding sensor characteristics with respect to 0 to 100 % Mixer control output range.</i>			

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Ana CH4B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0.00 .. 100.00 [%]		
Resolution	0.01		
Comm object	266		
Description			
Gas content influences Mixer position during engine start and running unloaded state when setpoint Ana CH4B (page 575) is ENA-FIX or ENA-STEP.			
In this case the setpoints StartPositionB (page 565) , RunPositionB (page 566) and LoPwrPositionB (page 566) are ignored.			
This input is used in case of very fluctuating gas quality where the standard fixed mixer positions can't be used.			
Note: <i>In case that Ana CH4 is not detected (sensor value is out of range) StartPositionB (page 565), RunPositionB (page 566) and LoPwrPositionB (page 566) will be active.</i>			
Note: <i>Connect external gas analyzer to analogue input Ana CH4 and configure corresponding sensor characteristics with respect to 0 to 100 % Mixer control output range.</i>			

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LAI: C

Cold temp 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]			
Resolution			
Comm object	56		
Description			
<p>If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module.</p> <p>This analog input is intended for measurement of this thermocouple compensation temperature for the IS-AIN8 module with index #1.</p>			
Note: <i>Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.</i>			

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Cold temp 2

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]			
Resolution			
Comm object	57		
Description			
<p>If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module.</p> <p>This analog input is intended for measurement of this thermocouple compensation temperature for the IS-AIN8 module with index #2.</p> <p>Note: Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.</p>			

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Cold temp 3

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]			
Resolution			
Comm object	58		
Description			
<p>If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module.</p> <p>This analog input is intended for measurement of this thermocouple compensation temperature for the IS-AIN8 module with index #3.</p> <p>Note: Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.</p>			

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Cold temp 4

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]			
Resolution			
Comm object	59		
Description			
<p>If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module.</p> <p>This analog input is intended for measurement of this thermocouple compensation temperature for the IS-AIN8 module with index #4.</p> <p>Note: Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.</p>			

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Cyl temp 1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	16		
Description			
Logical analog input for cylinder temperature #1. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Related setpoints and values have the same resolution and dimension as this LAI.</i>			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	18		
Description			
Logical analog input for cylinder temperature #2. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 3

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	19		
Description			
Logical analog input for cylinder temperature #3. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 4

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	20		
Description			
Logical analog input for cylinder temperature #4. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 5

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	21		
Description			
Logical analog input for cylinder temperature #5. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 6

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	22		
Description			
Logical analog input for cylinder temperature #6. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 7

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	23		
Description			
Logical analog input for cylinder temperature #7. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 8

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	24		
Description			
Logical analog input for cylinder temperature #8. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 9

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	25		
Description			
Logical analog input for cylinder temperature #9. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 10

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	26		
Description			
Logical analog input for cylinder temperature #10. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 11

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	27		
Description			
Logical analog input for cylinder temperature #11. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 12

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	28		
Description			
Logical analog input for cylinder temperature #12. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 13

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	29		
Description			
Logical analog input for cylinder temperature #13. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 14

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	30		
Description			
Logical analog input for cylinder temperature #14. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 15

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	31		
Description			
Logical analog input for cylinder temperature #15. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 16

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	32		
Description			
Logical analog input for cylinder temperature #16. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 17

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	33		
Description			
Logical analog input for cylinder temperature #17. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 18

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	34		
Description			
Logical analog input for cylinder temperature #18. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 19

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	35		
Description			
Logical analog input for cylinder temperature #19. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 20

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	36		
Description			
Logical analog input for cylinder temperature #20. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 21

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	37		
Description			
Logical analog input for cylinder temperature #21. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 22

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	38		
Description			
Logical analog input for cylinder temperature #22. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 23

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	39		
Description			
Logical analog input for cylinder temperature #23. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 24

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	40		
Description			
Logical analog input for cylinder temperature #24. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 25

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	41		
Description			
Logical analog input for cylinder temperature #25. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 26

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	42		
Description			
Logical analog input for cylinder temperature #26. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 27

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	43		
Description			
Logical analog input for cylinder temperature #27. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
Note: Available in IS-NT only.			

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Cyl temp 28

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	44		
Description			
Logical analog input for cylinder temperature #28. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 29

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	45		
Description			
Logical analog input for cylinder temperature #29. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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Cyl temp 30

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	46		
Description			
Logical analog input for cylinder temperature #30. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 31

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	47		
Description			
Logical analog input for cylinder temperature #31. Used for computing of values T Cyl aver (page 591) , T Cyl max (page 591) , T Cyl min (page 592) .			
<i>Note: Available in IS-NT only.</i>			

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Cyl temp 32

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [°C / °F]		
Resolution	1		
Comm object	48		
Description			
Logical analog input for cylinder temperature #32. Used for computing of values T Cyl aver (page 591), T Cyl max (page 591), T Cyl min (page 592).			
Note: Available in IS-NT only.			

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LAI: D

DynSpinResReq

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Range [units]	-32767 .. 32767 [-]		
Resolution			
Comm object	192		
Description			
DynSpinResReq (Dynamic Spinning Reserve Request) is source of the DynSpinRes (page 615) value, if the LAI is configured.			

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DynSpinResOfst

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Range [units]	-32767 .. 32767 [-]		
Resolution			
Comm object	233		
Description			
DynSpinResOfst (Dynamic Spinning Reserve Offset) is source of the DynamSpinResOffs (page 616) value, if the LAI is configured.			

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LAI: L

LCD brightness

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]	0 .. 100 [%]		
Resolution	1		
Comm object	7		
Description			
This functional input is used to adjust the backlight intensity of the IG-NT built-in terminal (display) by an analog input (e.g. a potentiometer). If this input is configured to a physical analog input or other value, the brightness adjusted by buttons at the terminal is overridden by this analog input.			

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LdCtrl:AnExBld

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	0 .. InstalledPower (page 346) [Power format: kW / MW]		
Resolution	Same as the selected Power format		
Comm object	1		
Description			
This functional input is used for requesting the Gen-set baseload externally by an analog input. The setpoint Load ctrl PtM (page 328) must be set to ANEXT BASELOAD position.			
<i>Note: The lower limit of active power is set by Min Power PtM (page 401).</i>			

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LdCtrl:AnExI/E

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	-32767 .. 32767 [Power format: kW / MW]		
Resolution	Same as the selected Power format		
Comm object	2		
Description			
This functional input is used for requesting the mains import value externally by an analog input. The setpoint Load ctrl PtM (page 328) must be set to ANEXT IM/EX position.			

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LdCtrl:I/E-Pm

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	-32767 .. 32767 [Power format: kW / MW]		
Resolution	Same as the selected Power format		
Comm object	5		
Description			
This functional input is used for connecting of an external device, which measures the active power imported from the mains. The device is connected to the controller via an analog input (e.g. -20 .. 20 mA). The setpoint I/E-Pm meas (page 329) must be set to the ANALOG INPUT position for this case.			

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LdCtrl:TByPwr

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	-32000 .. 32000 [°C]		
Resolution	1		
Comm object	13		
Description			
This functional input is used as the temperature input into the load control loop if the loop is switched into "T BY PWR" position. More information is available at the setpoint Load ctrl PtM (page 328) .			

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Load reduction

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	0 .. 100 [%]		
Resolution	1		
Comm object	193		
Description			
<p>This functional input is used for load reduction via analog input. If there is also configured LBI: Load reduct 1-4, the lower requested value is required.</p> <p>Simultaneously must be activated LBI: LOAD REDUCTION (PAGE 721).</p> <p>Note: The lower limit of active power is set by <i>Min Power PtM (page 401)</i>.</p>			

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Local Baseload

Related FW	2.2.0	Related applications	MINT, Combi
Range [units]	OFF, 1 .. Nomin power (page 345) [kW] (this depends on selected Power formats (page 165))		
Resolution	1 (this depends on selected Power formats (page 165))		
Comm object	405		
Description			
<p>This functional input is used to adjust setpoint LocalBaseload (page 322) from 0 to 100 %.</p> <p>Force value must work as before, if someone uses both Force value and LAI, force value will have higher priority than LAI.</p> <p>No more condition like additional LBI to activate this LAI is not required.</p> <p>When the setpoint LocalBaseload (page 322) is not in OFF then the Gen-set must be still counted in power management system.</p> <p>When the LAI: LOCAL BASELOAD will be configured, then will be available to change setpoint: LocalBaseload (page 322) from OFF to Nomin power.</p>			

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LAI: M

MainsMidVolt

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	0 .. 32767 [V]		
Resolution	1		
Comm object	172		
Description			
<p>This functional input is used for measuring of medium voltage. Nominal medium voltage is defined by the setpoint MainsNomMidV (page 360) and by dedicated voltage ratio defined by VmMid VT ratio (page 350). When this LAI is configured, this value is taken as the reference Mains voltage for Q(Um) regulation activated by switching the PF/Qctrl PtM (page 328) to Q(Um) or Q-IM/EX(Um).</p>			
Note: Range, units and resolution are not changed by the selected power format.			
Note: The value of this LAI multiplied with the setpoint VmMid VT ratio (page 350) must not exceed 65535 V.			

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MAT A

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32767 .. 32767 [°C]		
Resolution	Any		
Comm object	271		
Description			
This functional input is used for AFR functionality.			
MAT is second condition for correct configuration of AFR functionality.			
Note: The controller is able to work with any dimension, but the most commonly used dimension is °C			
Note: The range also depends on the selected resolution. For example, when Resolution = 0.01, the range is -327.67 to 327.67			

🔍 back to List of LAI

MAT B

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32767 .. 32767 [°C]		
Resolution	Any		
Comm object	272		
Description			
This functional input is used for AFR functionality.			
MAT is second condition for correct configuration of AFR functionality.			
Note: The controller is able to work with any dimension, but the most commonly used dimension is °C			
Note: The range also depends on the selected resolution. For example, when Resolution = 0.01, the range is -327.67 to 327.67			

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MLC:AnExSysBld

Related FW	2.2.0	Related applications	MINT, Combi
Range [units]	0 .. InstalledPower (page 346) [Power format: kW / MW]		
Resolution	Same as the selected Power format		
Comm object	14		
Description			
<p>This functional input is used for requesting the system baseload externally by an analog input. The setpoint SysBaseLdMode (page 324) must be set to EXTERNAL to read the system baseload from this input.</p>			
<p>Note: This logical analog input must be configured at each Gen-set to the identical source. The shared peripheral modules can be used to distribute the value over the controllers via the CAN2. See the note in the description of the setpoint SysBaseLdMode (page 324).</p>			

🔍 back to List of LAI

MPF:AnExSysBPF

Related FW	2.2.0	Related applications	MINT, Combi
Range [units]	0.01 .. 1.99 [-]		
Resolution	0.01		
Comm object	15		
Description			
<p>This functional input is used for requesting the system power factor externally by an analog input. The setpoint SysBasePFQMode (page 325) must be set to EXTERNAL to read the requested system power factor from this input.</p>			
<p><i>Note: This logical analog input must be configured at each gen-set to the identical source. The shared peripheral modules can be used to distribute the value over the controllers via the CAN2. See the note in the description of the setpoint SysBasePFQMode (page 325).</i></p>			
<p><i>Note: The required power factor can be also limited by the capability curves (Capability QL, Capability QC)</i></p>			

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MQ:AnExSysBQ

Related FW	2.2.0	Related applications	MINT, Combi
Range [units]	-32000 .. 32000 [Power format: kVAr / MVar]		
Resolution	Same as the selected Power format		
Comm object	146		
Description			
Logical analog input to enable to control the #SysBaseQ in case there is used setpoint # SysPFCtrl PtM (page 324) v. 001 in mode BASEQ and simultaneously is requested to control this mode externally.			
<i>Note: This logical analog input must be configured at each Gen-set to the identical source. The shared peripheral modules can be used to distribute the value over the controllers via the CAN2. See the note in the description of the setpoint SysBasePFQMode (page 325).</i>			
<i>Note: The required Base Q can be also limited by the capability curves (Capability QL, Capability QC).</i>			

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LAI: O

Oil press

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]	0.0 .. 10.0 [Bar]		
Resolution	0.1		
Comm object	9		
Description			
<p>This functional input is used as an additional information whether the engine is running or not. If you want to use this additional feature configure this input onto the physical analog input where the oil pressure sensor is connected and adjust the setpoint Starting POil (page 379) to cca 50 % of typical engine oil pressure at idle speed.</p>			
<i>Note: See also the chapter Engine control (page 129) for more details.</i>			

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LAI: P

PFCtrl:AnExBPF

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Range [units]	0.600 .. 1.200 [-]		
Resolution	0.001		
Comm object	3		
Description			
This functional input is used for requesting the Gen-set cos phi factor externally by an analog input. The setpoint PF/Qctrl PtM (page 328) must be set to PF control position and PF/Qctrl ANEXT (page 329) must be set to ENABLED.			
Note: <i>The required power factor can be also limited by the capability curves (Capability QL, Capability QC).</i>			
The analog value is transformed to the requested cos phi factor following way:			
Analog value		cos phi factor	
< 0.600		0.600L	
0.600 .. 1.000		0.600L .. 1.000R	
1.000 .. 1.200		1.000R .. 0.800C	
> 1.200		0.800C	

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PFCtrl:AnExBQ

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Range [units]	-32767 .. 32767 [Power format: kVAr / MVar]		
Resolution	Same as the selected Power format		
Comm object	1		
Description			
This functional input is used for requesting the Gen-set base Q externally by an analog input. The setpoint Load ctrl PtM (page 328) must be set to ANEXT BASEQ position.			
Note: The required Base Q can be also limited by the capability curves (Capability QL, Capability QC).			

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PFCtrl:AnExI/E

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	0.600 .. 1.200 [-]		
Resolution	0.001		
Comm object	4		
Description			
This functional input is used for requesting the mains cos phi factor externally by an analog input. The setpoint PF/Qctrl PtM (page 328) must be set to ANEXT PF-IM/EX position.			
<i>Note: The required mains power factor can be also limited by the capability curves (Capability QL, Capability QC).</i>			
The analog value is transformed to the requested cos phi factor following way:			
Analog value		cos phi factor	
<60		0.6L	
60 .. 100		0.6L .. 1.00	
101 .. 120		0.99C .. 0.80C	

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PFCtrl:AnExQI/E

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Range [units]	-32767 .. 32767 [Power format: kVAr / MVar]		
Resolution	Same as the selected Power format		
Comm object	195		
Description			
This functional input is used for requesting the mains reactive power externally by an analog input. The setpoint PF/Qctrl PtM (page 328) must be set to ANEXT BASEQ position.			
<i>Note: The required mains Q can be also limited by the capability curves (Capability QL, Capability QC).</i>			

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PFCtrl:I/E-Qm

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32767 .. 32767 [Power format: kVAr / MVar]		
Resolution	Same as the selected Power format		
Comm object	6		
Description			
<p>This functional input is used for connecting of an external device, which measures the reactive power imported from the mains. The device is connected to the controller via an analog input (e.g. -20 .. 20mA). The setpoint I/E-Pm meas (page 329) must be set to the ANALOG INPUT position for this case.</p>			

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Pmom

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	-32767 .. 32767 [Power format: kW / MW]		
Resolution	Same as the selected Power format		
Comm object	340		
Description			
Exported power typically measured in all 3 phases and sent via CAN2 (from IntelliPro Sync, IntelliPro or IntelliMains) or connected to physical analog input. This input is used by the PAV, E monitoring (page 223) function.			
<i>Note: IntelliPro SYNC is recommended for power measurement because it has fast shared analog output (SHAOUT) transmitting period (20 ms). This period can be set by putting the setpoint SHAOUT Period (in IntelliPro SYNC) to the position Fast.</i>			

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PowerDerating1

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32000 .. 32000 [°C]		
Resolution	1		
Comm object	11		
Description			
This is the input into the <i>Power derating</i> block #1. See details about the function in the chapter Power derating (page 127) .			

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PowerDerating2

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32000 .. 32000 [°C]		
Resolution	1		
Comm object	12		
Description			
This is the input into the <i>Power derating</i> block #2. See details about the function in the chapter Power derating (page 127) .			

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PwrReductionA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32000 .. 32000 [Any]		
Resolution	1		
Comm object	275		
Description			
This functional input is used for power reduction function on actual engine state.			
His configuration has an influence on format of all setpoints or values which are related to this LAI.			

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PwrReductionB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32000 .. 32000 [Any]		
Resolution	1		
Comm object	276		
Description			
This functional input is used for power reduction function on actual engine state.			
His configuration has an influence on format of all setpoints or values which are related to this LAI.			

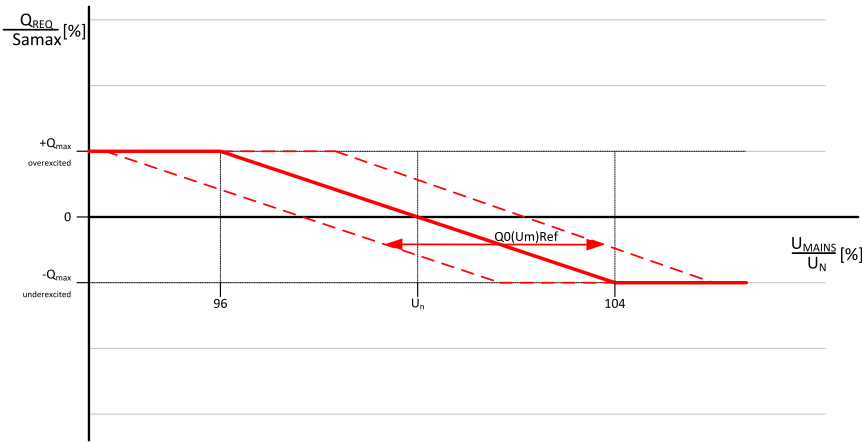
🔍 back to List of LAI

PwrReductionC

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Range [units]	-32000 .. 32000 [Any]		
Resolution	1		
Comm object	277		
Description			
This functional input is used for power reduction function on actual engine state.			
His configuration has an influence on format of all setpoints or values which are related to this LAI.			

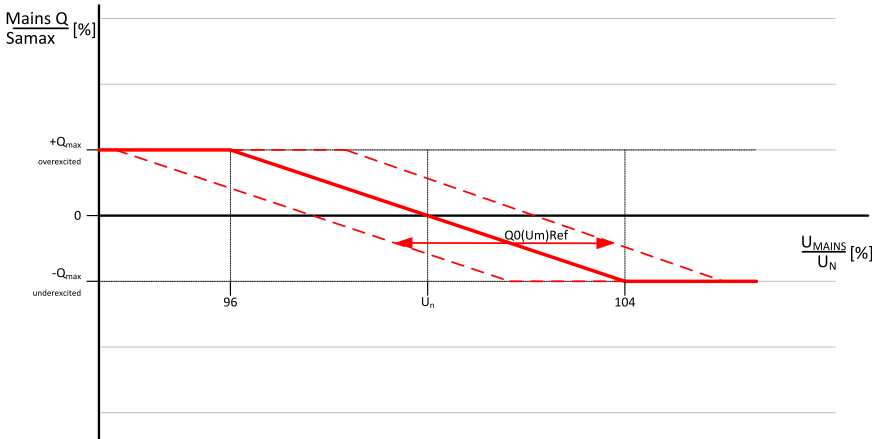
🔍 back to List of LAI

PFCtrl:AnExQ0UmRef

Related FW	2.2.0	Related applications	SPTM, SPI, Combi
Range [units]	75 .. 125 [%]		
Resolution	1		
Comm object	326		
Description			
This functional input is used for requesting the Q0UmRef externally by an analog input.			
			

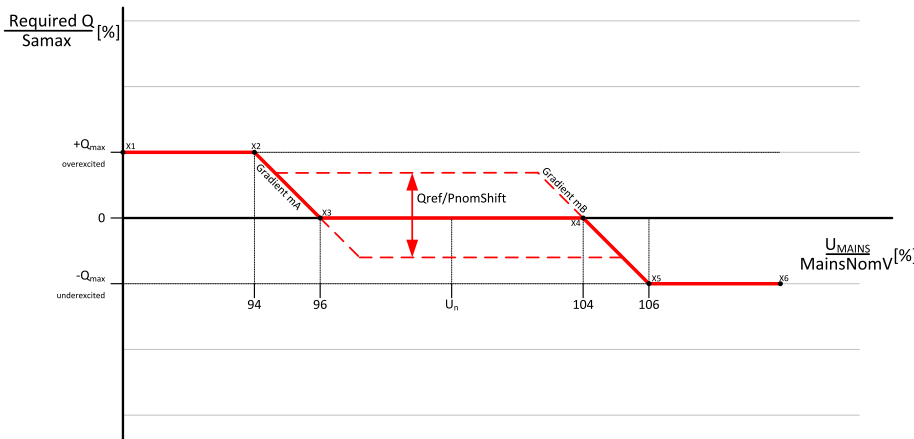
🔍 back to List of LAI

PFCtrl:AnExQ0I/EUmRe

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	75 .. 125 [%]		
Resolution	1		
Comm object	327		
Description			
This functional input is used for requesting the Q0UmRef externally by an analog input when the import export of Q is required.			
			

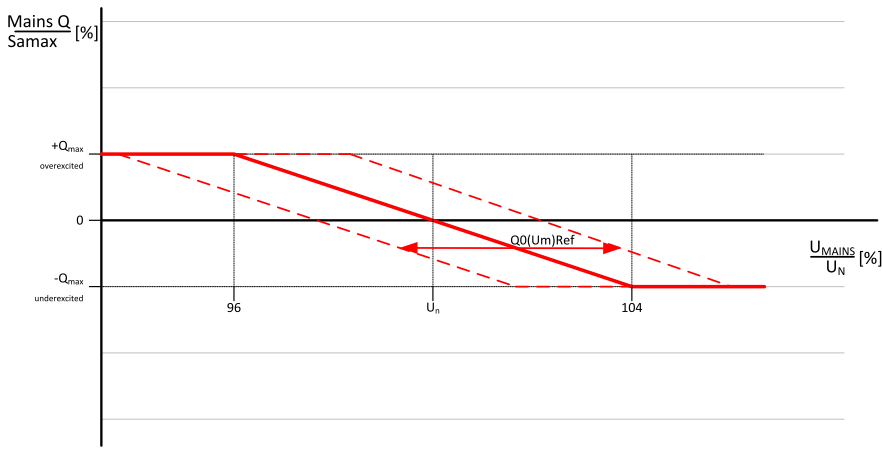
back to List of LAI

PFCtrl:AnExQref/Pnom

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	-33 .. 33 [%]		
Resolution	1		
Comm object	328		
Description			
This functional input is used for requesting the Qref/Pnom externally by an analog input.			
			

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PFCtrl:AnExQrfI/EPnom

Related FW	2.2.0	Related applications	SPtM, SPI, Combi
Range [units]	-33 .. 33 [%]		
Resolution	1		
Comm object	329		
Description			
This functional input is used for requesting the Qref/Pnom externally by an analog input when the import export of Q is required.			
			

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LAI: R

RPM pick-up

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	0 .. 32767 [RPM]		
Resolution	1		
Comm object	8		
Description			
This functional input is used for reading of the gen-set speed from other source than pickup or generator frequency. This source is typically an ECU unit, which provides the speed at the communication bus.			

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LAI: S

SensorA

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32767 .. 32767 [Bar / mV / °C]		
Resolution	Any		
Comm object	273		
Description			
<p>This functional input is used for AFR functionality.</p> <p>With using AFR functionality is requirement to configure type of Sensor.</p> <p>In default can be chosen from Bar, mV, °C type of sensor.</p> <p>His configuration has an influence on format of all setpoints or values which are related to this LAI.</p> <p>Note: The controller is able to work with any dimension, but the most commonly used dimensions are Bar / mV / °C.</p> <p>Note: The range also depends on the selected resolution. For example, when Resolution = 0.01, the range is -327.67 to 327.67</p>			

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SensorB

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32767 .. 32767 [Bar / mV / °C]		
Resolution	Any		
Comm object	264		
Description			
<p>This functional input is used for AFR functionality.</p> <p>With using AFR functionality is requirement to configure type of Sensor.</p> <p>In default can be chosen from Bar, mV, °C type of sensor.</p> <p>His configuration has an influence on format of all setpoints or values which are related to this LAI.</p> <p>Note: <i>The controller is able to work with any dimension, but the most commonly used dimensions are Bar / mV / °C.</i></p> <p>Note: <i>The range also depends on the selected resolution. For example, when Resolution = 0.01, the range is -327.67 to 327.67</i></p>			

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LAI: T

TestF

Related FW	2.2.0	Related applications	SPTM, MINT, Combi
Range [units]	-2.50 .. 2.50 [Hz]		
Resolution	0.001		
Comm object	194		
Description			
This functional input is used for simulation of mains frequency in PWROVERFREQ and PWRUNDERFREQ mode.			
Value must be configured as offset to the nominal frequency in 0.01 Hz resolution.			
Note: <i>Frequency protections are during this simulation disabled.</i>			

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TestQ

Related FW	2.2.0	Related applications	SPtM, MINT, Combi
Range [units]	-32767 .. 32767 [Power format: kVAr / MVar]		
Resolution	Same as the selected Power format		
Comm object	232		
Description			
This functional input is used for simulation of generator reactive power for testing PforQ function.			

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TestP

Related FW	2.2.0	Related applications	SPTM, MINT, Combi
Range [units]	-32767 .. 32767 [Power format: kW / MW]		
Resolution	Same as the selected Power format		
Comm object	231		
Description			
This functional input is used for simulation of generator active power for testing PforQ function.			

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TestU

Related FW	2.2.0	Related applications	SPtM, MINT, Combi
Range [units]	0.0 .. 3276.7 [%]		
Resolution	0.1		
Comm object	385		
Description			
<p>This simulation can help with testing of grid code functions like P(U_m), Q(U_m), Q_{ref}/U_{lim} or VRT (Dynamic Support).</p> <p>Value of this LAI is relative (in %) to the nominal mains voltage. For example, to simulate the nominal voltage, the input should have value 100.0 %.</p> <p>Function can't be used for simulation of mains protections, protections are in that case still active and can release the mains protect according to measured the real values on the measurement terminals.</p>			

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LAI: W

Warming temp

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Range [units]	-32000 .. 32000 [°C]		
Resolution	1		
Comm object	10		
Description			
This functional input is used for <i>engine warming</i> . See also the setpoint Warming load (page 383) .			

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9.1.7 Prg. States

What Prg. States are:

Prg. States are outputs of states related to alarm or history messages.

List of Prg. States

Q&U Prot	898
SHAINCfgErr	898
SHBINCfgErr	899
VRT Prot Trip	899
Wrn PF(Pm)Fail	899
Wrn PFctrlFail	899
Wrn Q(P)Fail	900
Wrn Q(Um)Fail	900
Wrn QctrlFail	900
Wrn TestPQF	900
WrnPFQ IE Fail	901
WrnQrfUlimFail	901

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Prg. States: Q

Q&U Prot

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	779		
Description			
Output gets active when the Q&U protection is evaluated.			

[back to List of Prg. States](#)

Prg. States: S

SHAINCfgErr

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object			
Description			
The output is closed while there is the SHAINCfgErr alarm present in the alarm list, i.e. if there is more than one controller on the CAN2 bus, which has configured the SHAOUT peripheral module with the same index.			

[back to List of Prg. States](#)

SHBinCfgErr

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object			
Description			
The output is closed while there is the SHBinCfgErr alarm present in the alarm list, i.e. if there is more than one controller on the CAN2 bus, which has configured the SHBOUT peripheral module with the same index.			

🔍 back to List of Prg. States

Prg. States: V

VRT Prot Trip

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1043		
Description			
The output closes if the VRT protection gets active and the controller trips the selected breaker. The output stays closed for 3 s, then opens again.			

🔍 back to List of Prg. States

Prg. States: W

Wrn PF(Pm)Fail

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1048		
Description			
The protection gets active (the alarm occurs) when the curve is not initialized (not configured) or the setpoint PF/Qctrl ANEXT is set to ENABLED, the actual mode is internally "forced" to the mode PF control and this mode will be active until the reason of this protection is not anymore and the alarm is confirmed.			

🔍 back to List of Prg. States

Wrn PFctrlFail

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1053		
Description			
The protection gets active (the alarm occurs) when the particular LAI is has invalid value. The requested value is taken from setpoint Base PF resp. Import PF.			

🔍 back to List of Prg. States

Wrn Q(P)Fail

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1051		
Description			
The protection gets active (the alarm occurs) when the curve is not initialized (not configured) or the setpoint PF/Qctrl ANEXT is set to ENABLED, the actual mode is internally "forced" to the mode Q control and this mode will be active until the reason of this protection is not anymore and the alarm is confirmed.			

🔍 back to List of Prg. States

Wrn Q(Um)Fail

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1050		
Description			
The protection gets active (the alarm occurs) when the Q(Um) curve is not configured or the LAI is not configured or the LAI has invalid value.			

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Wrn QctrlFail

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	1049		
Description			
The protection gets active (the alarm occurs) when the particular LAI is has invalid value. The requested value is taken from setpoint Base Q resp. Import Q.			

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Wrn TestPQF

Related FW	2.2.0	Related applications	SPtM, SPI, MINT, COX, Combi
Comm object	583		
Description			
The protection gets active (the alarm occurs) when the setpoint GridCodesTest is set to TEST. In this mode is possible to change the mains frequency or actual power and reactive power of generator.			

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WrnPfQ IE Fail

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1054		
Description			
The protection gets active (the alarm occurs) when the setpoint PF/Qctrl IM/EX is set to ENABLED and the mains import measurement is not available (setpoint I/E-Qm meas is switched to NONE or to ANALOG INPUT and the LAI is not configured or has invalid value).			

[▲ back to List of Prg. States](#)

WrnQrfUlimFail

Related FW	2.2.0	Related applications	SPTM, SPI, MINT, COX, Combi
Comm object	1052		
Description			
The protection gets active (the alarm occurs) when the Qref/Ulim curve is not configured or the LAI is not configured or the LAI has invalid value.			

[▲ back to List of Prg. States](#)

9.2 AVR interfaces

It is possible to connect various AVRs to the controllers.

9.2.1 AVR interfaces alphabetically

ABB Unitrol 1005

connection between AVRi and unitrol are:

- > OUT1 AVRi -----> 42 - AI1 - Analog input 1, positive (PELV)
- > COM AVRi -----> 43 - BI1 - Analog input 1, negative (PELV)

if you want to regulate with 4-20mA signal you must close pin 46 - CN1 and pin 47 - CP1

if you want to regulate with 0-10V signal you must leave open pin 46 and pin 47.

or

- > OUT1 AVRi -----> 50 - AI2 - Analog input 2, positive (PELV)
- > COM AVRi -----> 49 - BI2 - Analog input 2, negative (PELV)

if you want to regulate with 4-20mA signal you must close pin 52 - CN2 and pin 53 - CP2

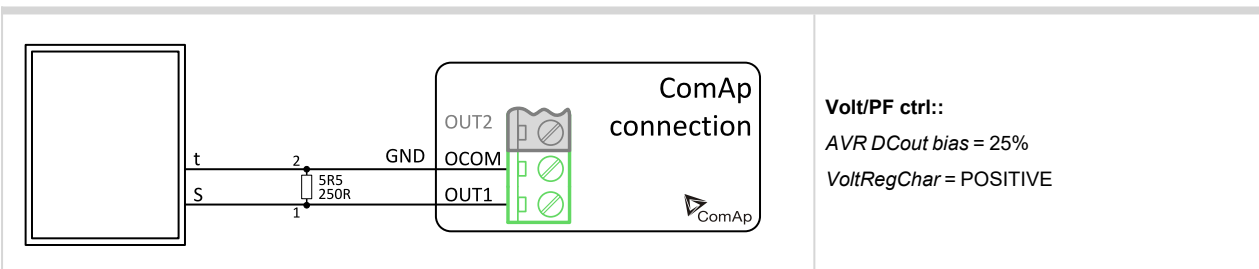
if you want to regulate with 0-10V signal you must leave open pin 52 and pin 53

dcout Bias in both cases you can set to 50% In case you are using 4-20mA regulation you must rotate the AVRi potenziometer till you'll reach 12mA (with Bias 50%) In case you are using 0-10V regulation you can rotate the AVRi potenziometer till 100%. ABB is programmable so you can set limits of analog input as you want.

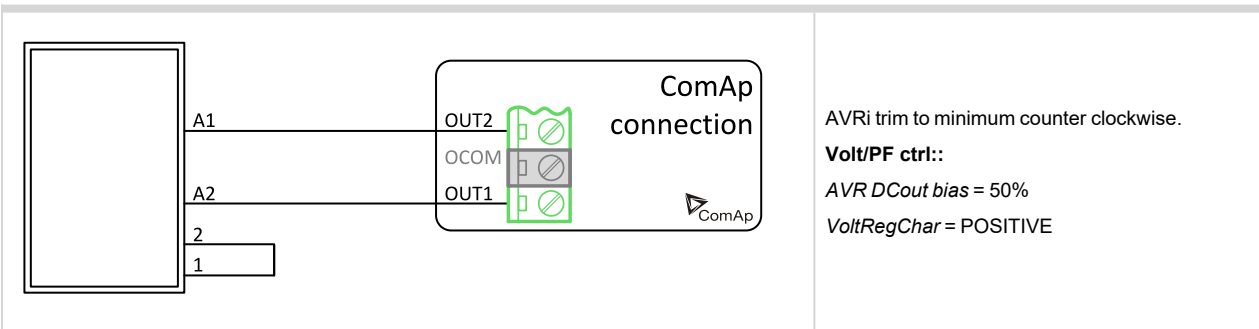
You must configure ABB Unitrol 1005 to accept signal from analog input. Attached I send you the configuration of ABB device. Inside that configuration you can find:

- > One binary input set to "Remote SP Enable": to enable the regulation from the analog input;
- > Analog input 1 set to "Auto remote SP" (20mA or not it depends how you connect wires from AVRi).

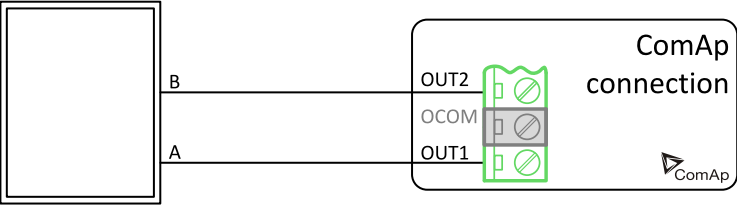
AVK Newage Cosimat N+



AVK Newage MA330, 327, 321, 341



Basler: DECS 100

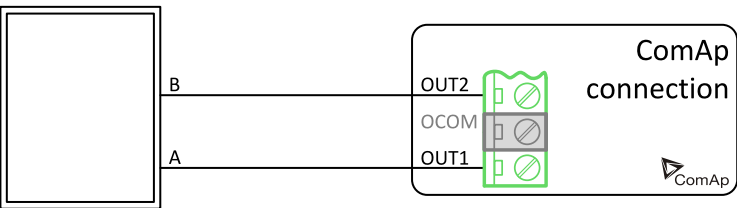


The diagram shows a terminal block on the left with terminals labeled B and A. Terminal B is connected to OUT2 of the ComAp connection block. Terminal A is connected to OUT1 of the ComAp connection block. The ComAp connection block also has an OCOM terminal. A green box highlights the OUT2, OCOM, and OUT1 terminals. The text 'ComAp connection' and the ComAp logo are also present.

AVRi output is connected instead of external resistor for voltage adjusting.

AVRi trim to minimum counter clockwise.
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

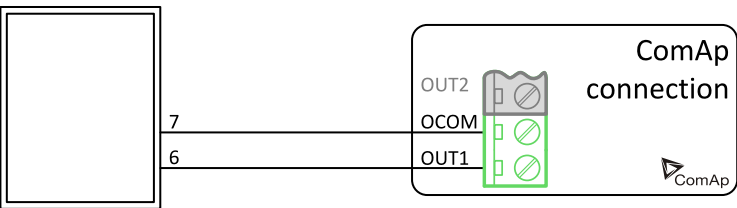
Basler: DECS 200



The diagram shows a terminal block on the left with terminals labeled B and A. Terminal B is connected to OUT2 of the ComAp connection block. Terminal A is connected to OUT1 of the ComAp connection block. The ComAp connection block also has an OCOM terminal. A green box highlights the OUT2, OCOM, and OUT1 terminals. The text 'ComAp connection' and the ComAp logo are also present.

AVRi trim to minimum counter clockwise.
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

Basler: APR 63-5, AEC 63-7, KR-FX, KR-FFX

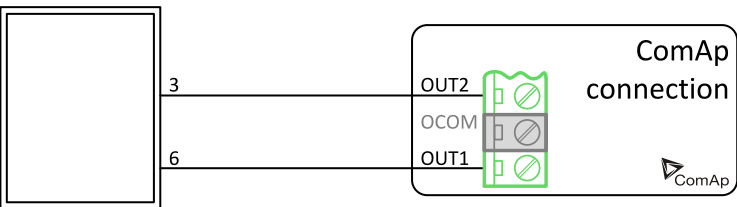


The diagram shows a terminal block on the left with terminals labeled 7 and 6. Terminal 7 is connected to OUT2 of the ComAp connection block. Terminal 6 is connected to OUT1 of the ComAp connection block. The ComAp connection block also has an OCOM terminal. A green box highlights the OUT2, OCOM, and OUT1 terminals. The text 'ComAp connection' and the ComAp logo are also present.

AVRi output is connected instead of external resistor for voltage adjusting.

AVRi trim to minimum counter clockwise.
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

Catterpillar CDVR

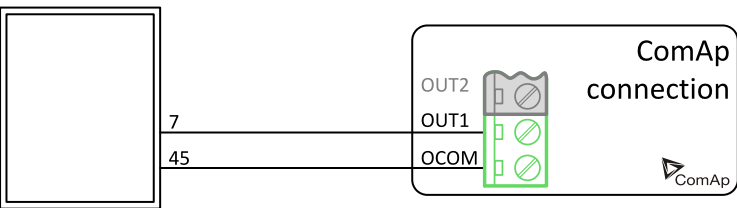


The diagram shows a terminal block on the left with terminals labeled 3 and 6. Terminal 3 is connected to OUT2 of the ComAp connection block. Terminal 6 is connected to OUT1 of the ComAp connection block. The ComAp connection block also has an OCOM terminal. A green box highlights the OUT2, OCOM, and OUT1 terminals. The text 'ComAp connection' and the ComAp logo are also present.

Pin 44 on DVR – PF regulation directly from DVR is not connected.

AVRi trim to 50%.
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

Catterpillar DVR

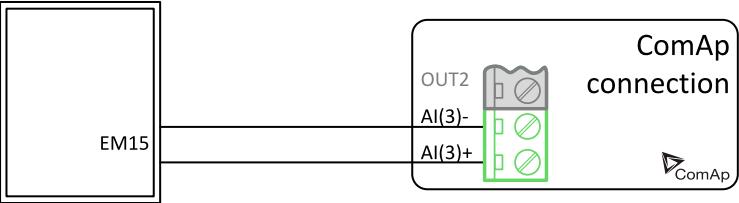


The diagram shows a terminal block on the left with terminals labeled 7 and 45. Terminal 7 is connected to OUT1 of the ComAp connection block. Terminal 45 is connected to OCOM of the ComAp connection block. The ComAp connection block also has an OUT2 terminal. A green box highlights the OUT2, OUT1, and OCOM terminals. The text 'ComAp connection' and the ComAp logo are also present.

Pin 44 on DVR – PF regulation directly from DVR is not connected.

AVRi trim to 25 %.
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

Catterpillar EM15



ComAp connection

AVRi trim to 9 of clock counter clockwise.

Volt/PF ctrl:

AVRDCout bias= 70%

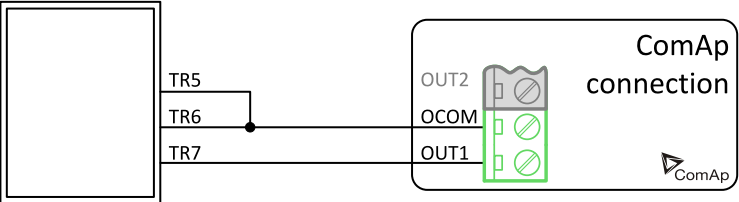
VoltRegChar = POSITIVE

Recommended settings:

Voltage Gain = 66 °

Voltage Int = 50 °

Catterpillar VR6, VR3F



ComAp connection

AVRi trim to minimum counter clockwise.

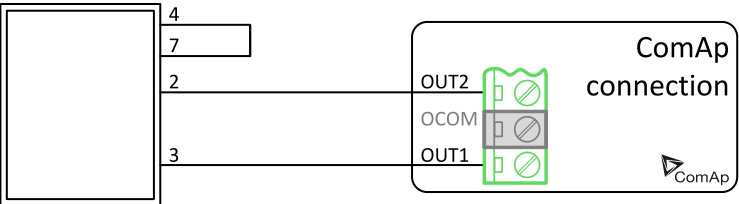
Volt/PF ctrl:

AVR DCout bias = 50%

VoltRegChar = POSITIVE

For VR3F link 4-7 has to be removed.

Catterpillar VR6-B



ComAp connection

AVRi trim to minimum counter clockwise.

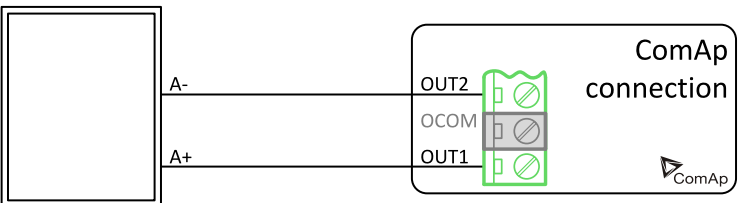
Volt/PF ctrl:

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Voltage range (-2 V, 2 V)

ENGGA WT- 2



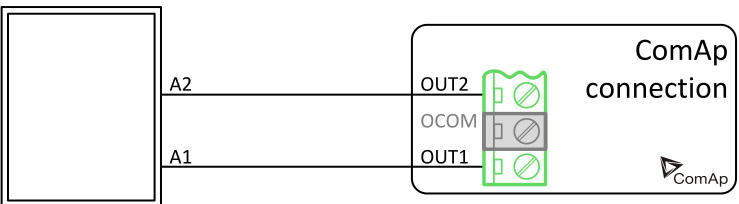
ComAp connection

Volt/PF ctrl:

AVR DCout bias = 50%

VoltRegChar = POSITIVE

ENGGA WT- 3



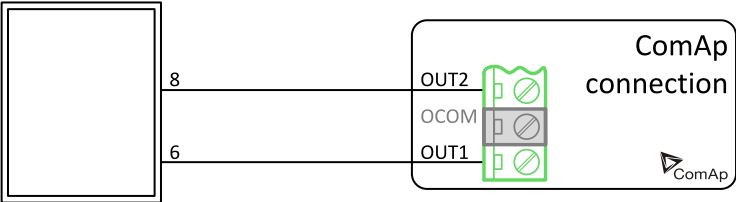
ComAp connection

Volt/PF ctrl:

AVR DCout bias = 50%

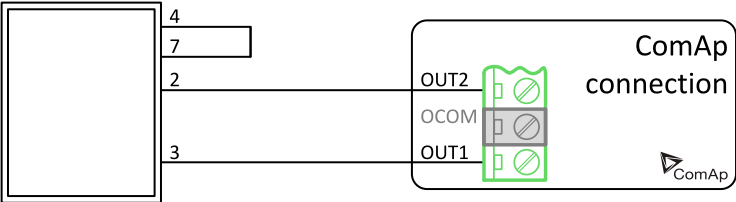
VoltRegChar = POSITIVE

KATO KCR 360



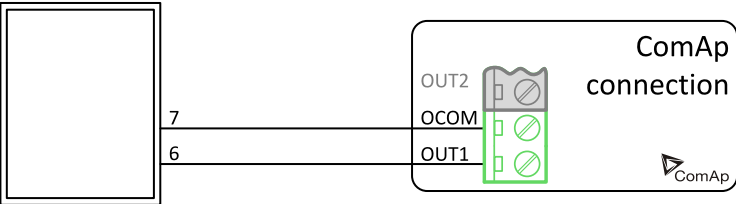
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

KATO KCR 760



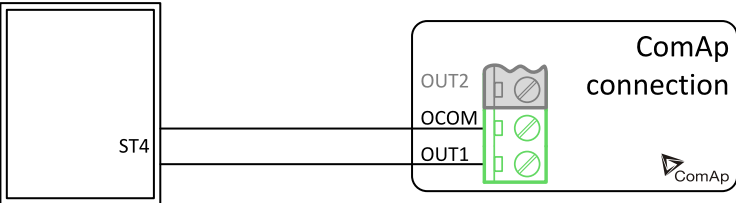
AVRi trim to minimum position (fully counter clockwise).
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

KATO KCR 760



AVRi trim to minimum position (fully counter clockwise).
Volt/PF ctrl::
AVR DCout bias = 45%
VoltRegChar = POSITIVE

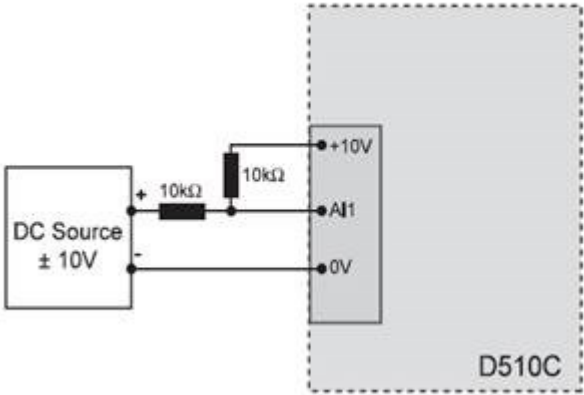
Kutai EA448



AVRi trim to minimum counter clockwise.
Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal ST4. Module R726 is not required.

Leroy somer D510C

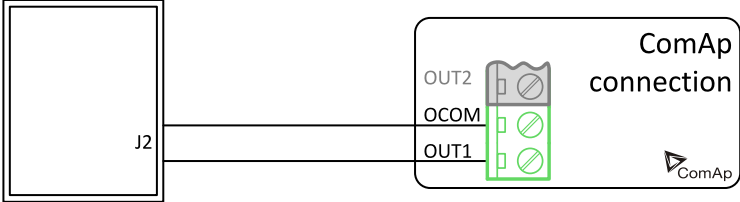


Regulator of automatic voltage.

Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal J2.
module R726 is not required.

Leroy Somer: R 129



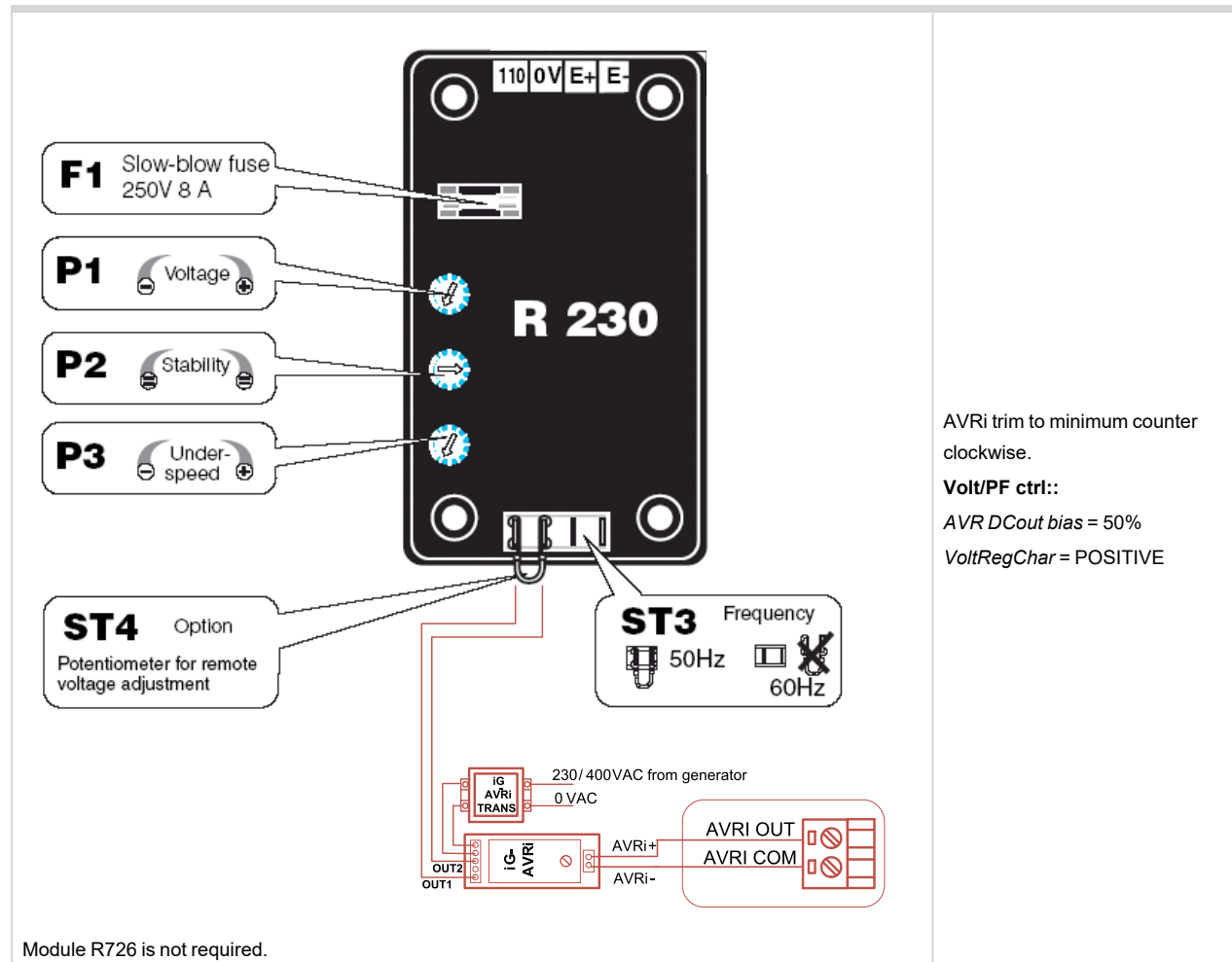
AVRi trim to minimum counter clockwise.

Volt/PF ctrl::
AVR DCout bias = 50%
VoltRegChar = POSITIVE

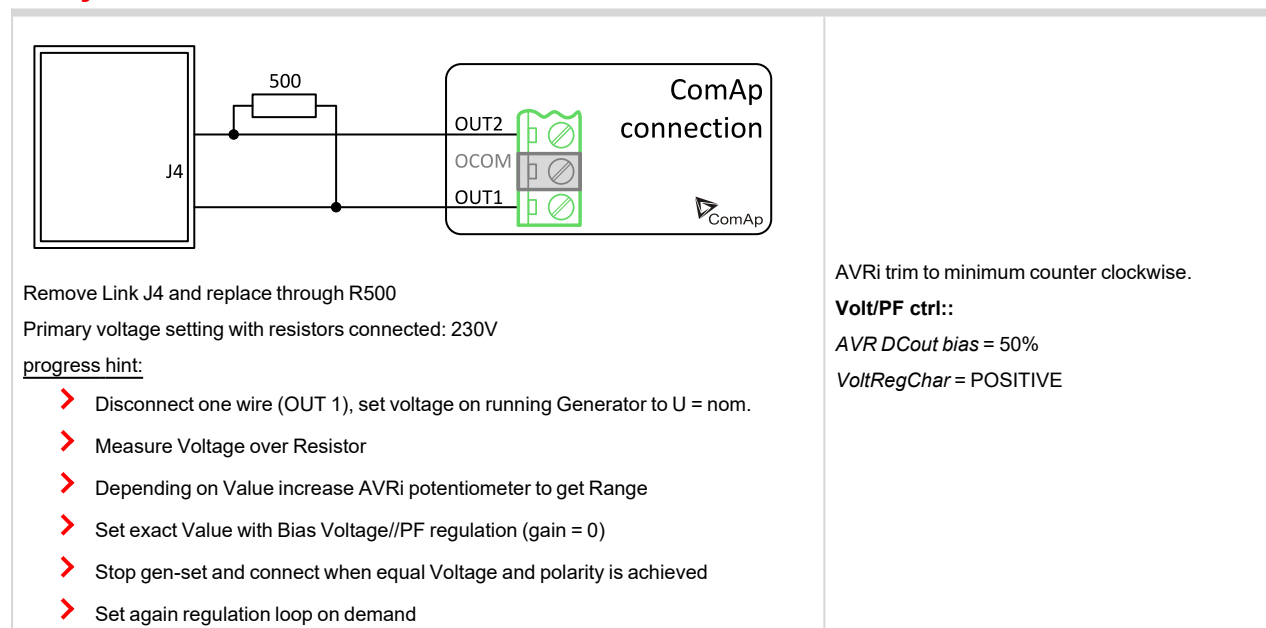
AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal J2. module R726 is not required.

Leroy Somer: R 221, R 222

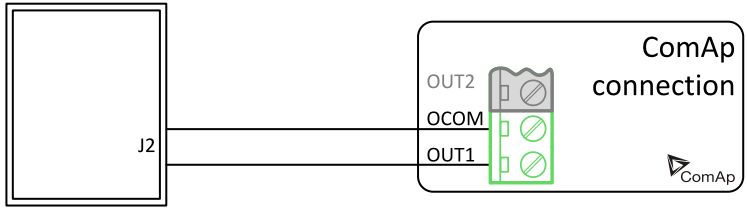
Leroy Somer: R 230



Leroy Somer: R 230



Leroy Somer: R 250



ComAp connection

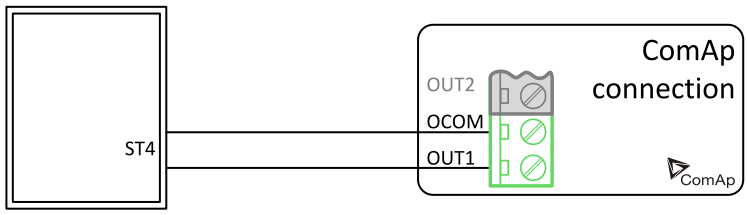
AVRi trim to minimum counter clockwise.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Leroy Somer: R 438 LS, R448



ComAp connection

AVRi output is connected (Undefined variable: Specific.Remote Voltage trimmer 470 Ω to terminals) ST4. (Undefined variable: Specific.Module R726 is not required.).

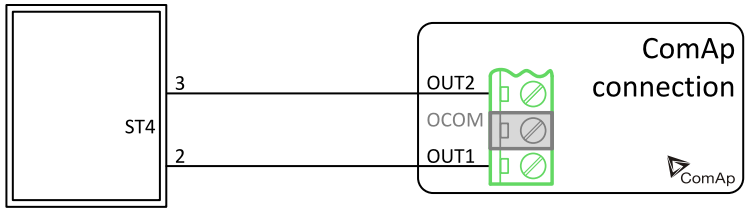
AVRi trim to minimum counter clockwise.

Volt/PF ctrl:

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Leroy Somer: R 449



ComAp connection

Module R726 is not required..

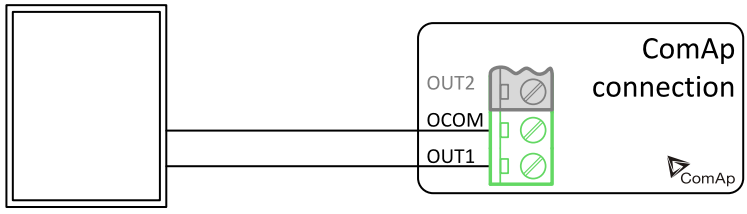
AVRi trim to minimum counter clockwise.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Leroy Somer: R 450



ComAp connection

Use Avri instead pf potentiometer 1000 Ω. Read Leroy Somer R 450 manual before use.

AVRi trim to minimum counter clockwise.

Volt/PF ctrl::

AVR DCout bias = 50%

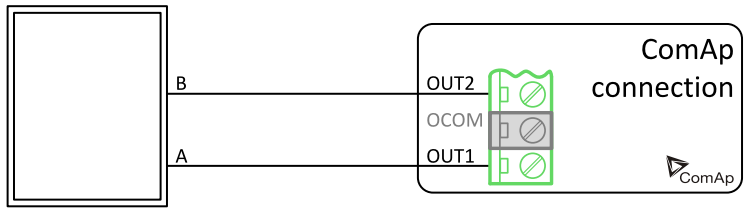
VoltRegChar = POSITIVE

LSA D510

Wire analog signal for voltage control (ouput from IG200 or IG-AVRi - use OUT1 and OUT2) to D510 using analog input 1 or 2. Entry setpoint AVR DCout Bias to 50%.

Disable voltage regulation (gain = 0), then try slightly change AVR DCout Bias setpoint up/down and find nominal voltage level. In case of using IG-AVRi you can increase output range by potentiometer on IG-AVRi

Marathon DVR2000E



ComAp connection

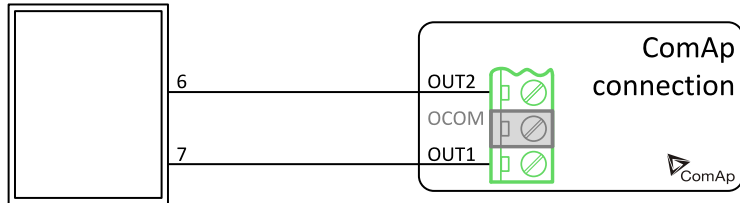
AVRi trim to 1/3 clockwise.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Marathon PM100, 200

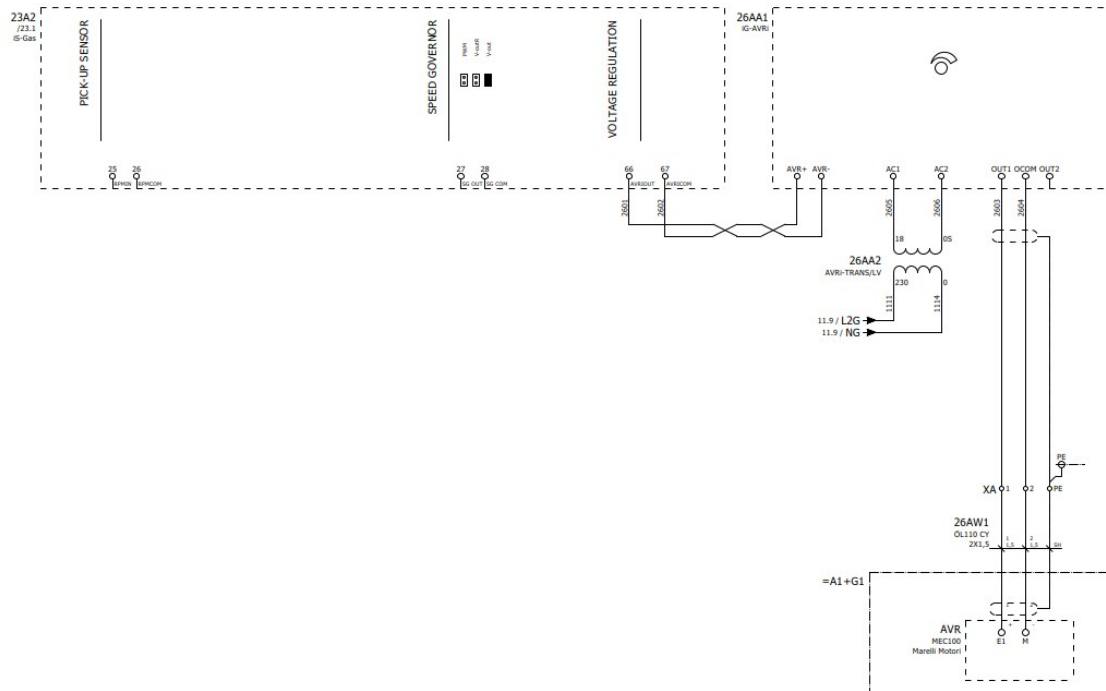


Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Marelli MEC 100



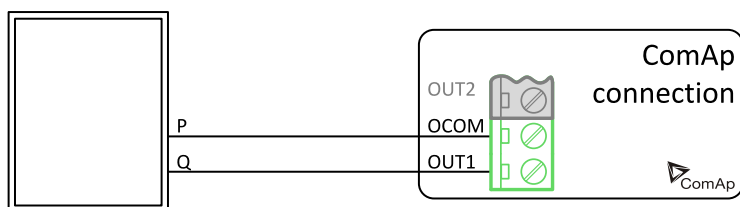
Connections:

- > OUT1 (AVRi) -> E1 (MEC100)
- > OCOM (AVRi) -> M (MEC100)

The potenziometer must be set in order to measure 12mA on the output when nominal voltage is reached.

Marelli MEC 100 must be programmed in order to accept the analog signal.

MarelliGenerators MARK 5 (M16FA655A)



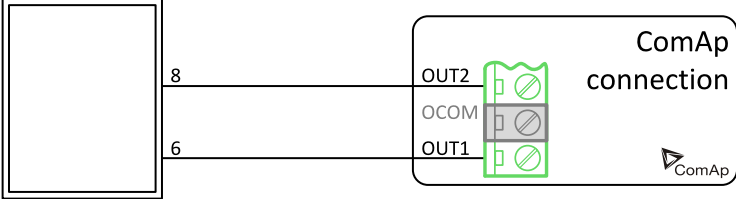
AVRi trim to 1/4 position.

Volt/PF ctrl::

AVR DCout bias = 15%

VoltRegChar = POSITIVE

MarelliMotori (M40FA610A)



8

6

OUT2

OCOM

OUT1

ComAp connection

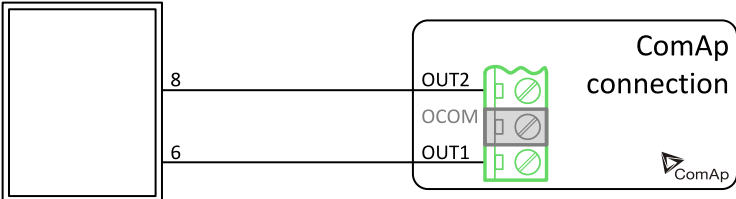
ComAp

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

MarelliMotori Mark I (M40FA640A/A)



8

6

OUT2

OCOM

OUT1

ComAp connection

ComAp

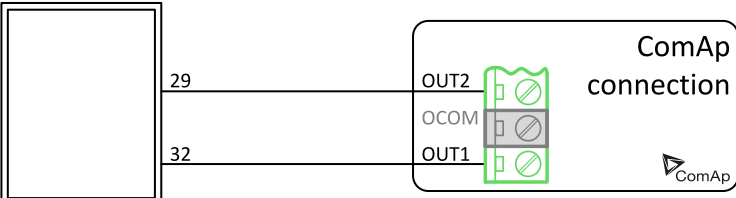
AVRi trim to 20%.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Mecc Alte DER1



29

32

OUT2

OCOM

OUT1

ComAp connection

ComAp

Remove jumpers connecting input 29 to 32 or input 30 to 31.

Note: For values exceeding the limits of ± 10 V the external input is automatically disabled.

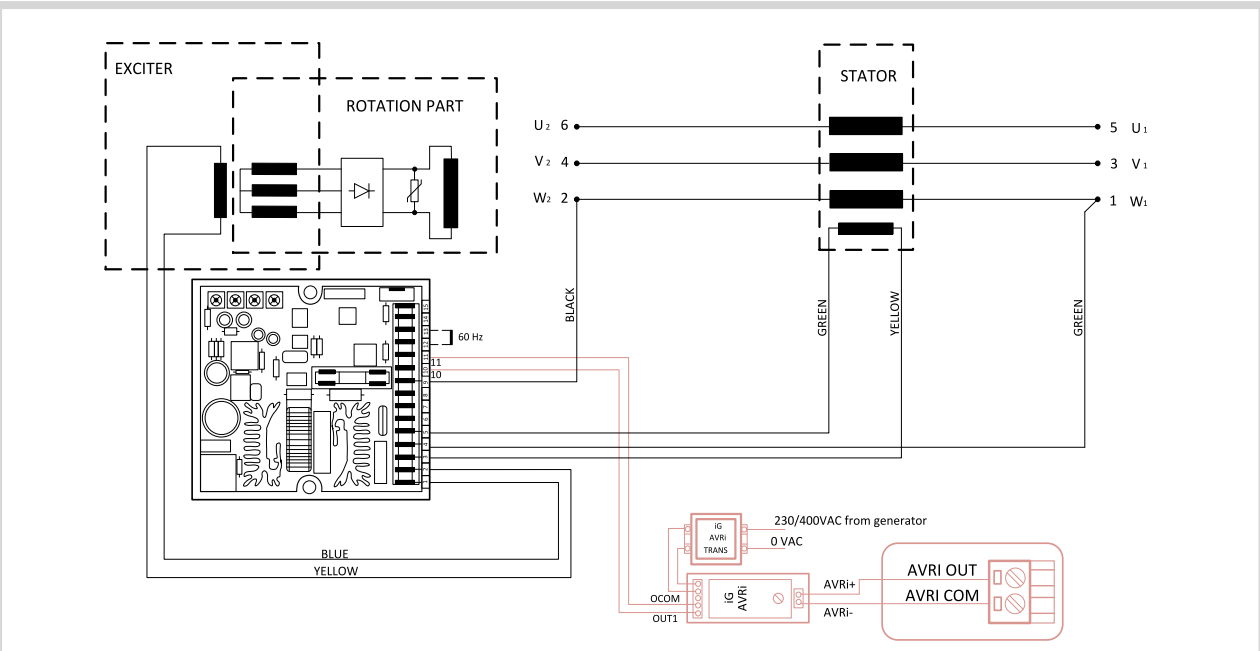
AVRi trim = maximum.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Mecc Alte DSR



AVRi trim = 1/16 from minimum (=6,25% => max. = 2,5V).

The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage with a programmable variation range of up to $\pm 10\%$ (parameter 16, by default the setting is $\pm 5\%$) with respect to the value set. If you want to use continuous voltage, it will be effective if it is in the range between 0 V and +2,5 V. The input tolerates voltages from -5 V to +5 V, but for values exceeding the limits of 0 V / +2,5 V (or in the event of disconnection) it is automatically disabled and the voltage adjustment goes back to the value set through the trimmer (if enabled) or through parameter 19 (as shown on the picture). Changing of DSR parameters requires PC with dedicated software and DI1-DSR unit! DSR automatically detects presence of transformer for parallel operation (if used it works with droop, if not used it works isochronous).

Voltage Control:

Voltage Regulator Character = POSITIVE

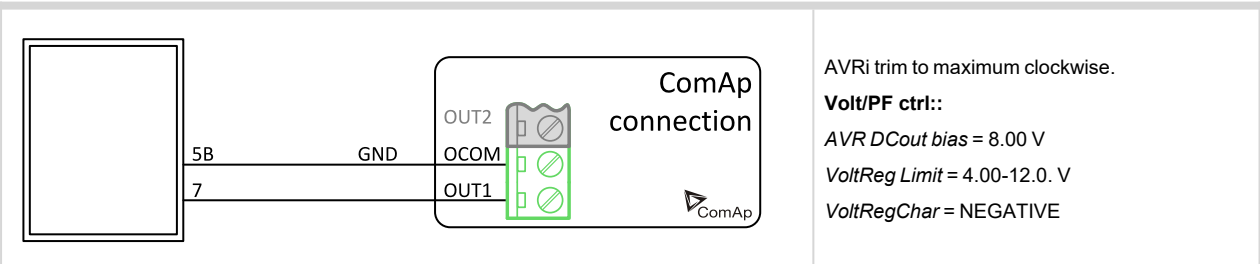
Voltage Regulator Bias = 1.25 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.50 V

Note: For values exceeding the limits of 0 V / +2.5 V, the external input is automatically disabled.

Mecc Alte Spa: S.R.7/2



AVRi trim to maximum clockwise.

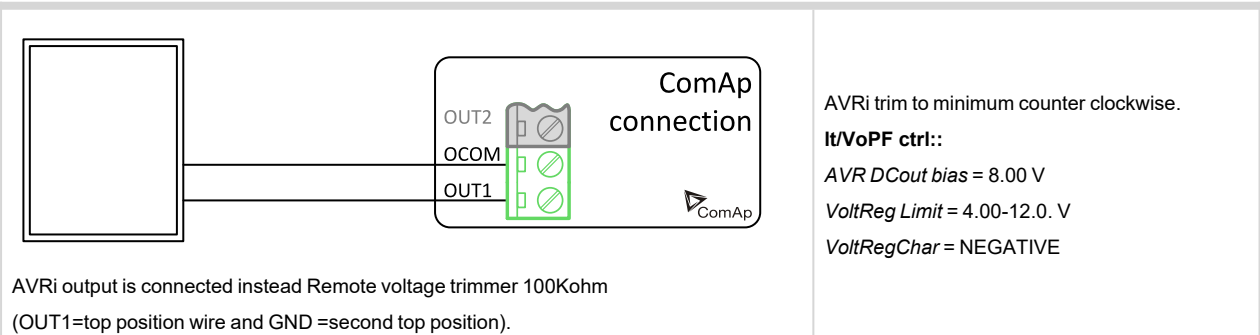
Volt/PF ctrl::

AVR DCout bias = 8.00 V

VoltReg Limit = 4.00-12.0. V

VoltRegChar = NEGATIVE

Mecc Alte Spa U.V.R.6



AVRi trim to minimum counter clockwise.

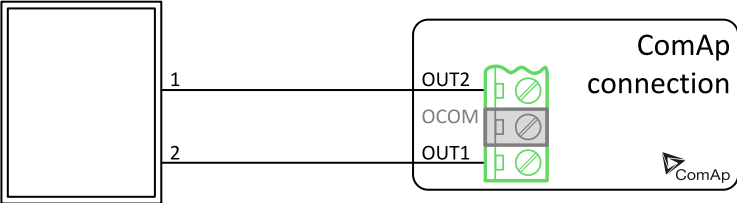
It/VoPF ctrl::

AVR DCout bias = 8.00 V

VoltReg Limit = 4.00-12.0. V

VoltRegChar = NEGATIVE

Piller



AVRi output is connected instead Remote voltage trimmer 100 kΩ.

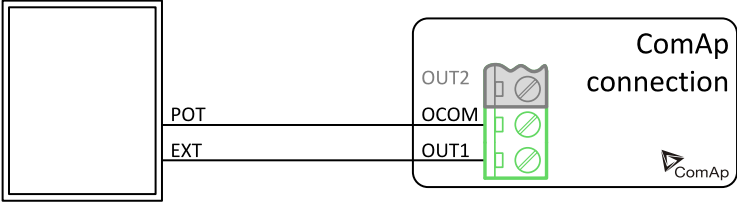
AVRi trim to minimum counter clockwise.

Volt/PF ctrl::

AVR DCout bias = 39%

VoltRegChar = POSITIVE

SINCRO AVR BL4 or AVR BL3



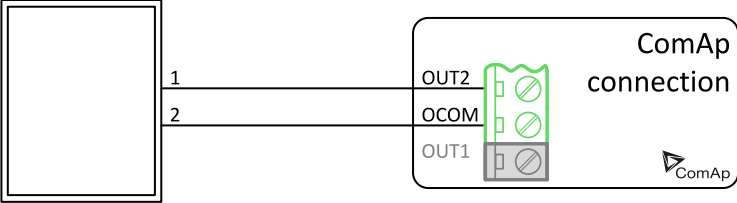
AVRi trim to middle position.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Stamfrod AS 480



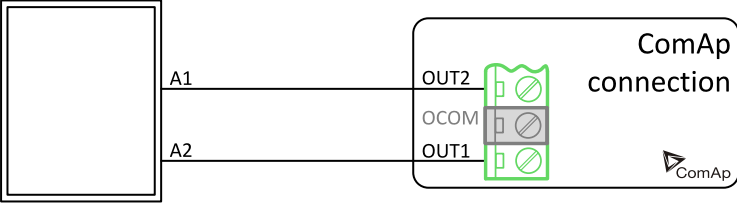
AVRi output is connected instead of external resistor for voltage adjusting.

Volt/PF ctrl::

AVR DCout bias = 30%

VoltRegChar = POSITIVE

Stamfrod MX 341



Disconnect the droop CT (terminal S1&S2) and short the droop CT leads short the terminal S1, S2 ont he AVR

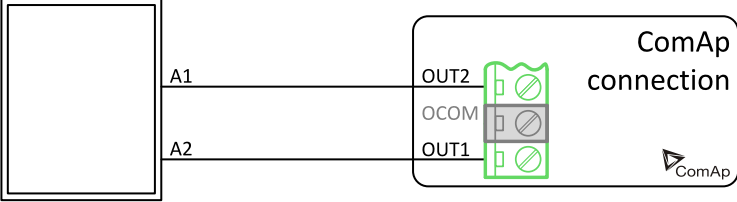
AVRi trim to minimum counter clockwise.

Volt/PF ctrl::

AVR DCout bias = 0%

VoltRegChar = POSITIVE

Stamford SX 440, AS 440, MX 321, SX 421



PFC3 module is not required.

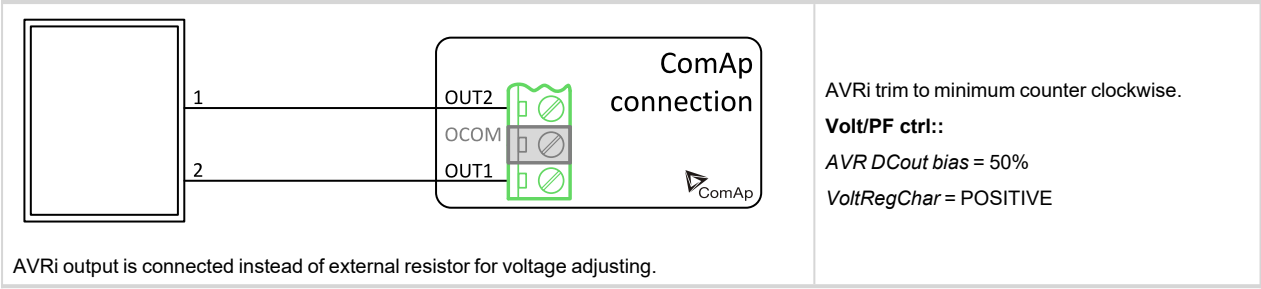
AVRi trim to minimum counter clockwise.

Volt/PF ctrl::

AVR DCout bias = 50%

VoltRegChar = POSITIVE

Stamford SX 460

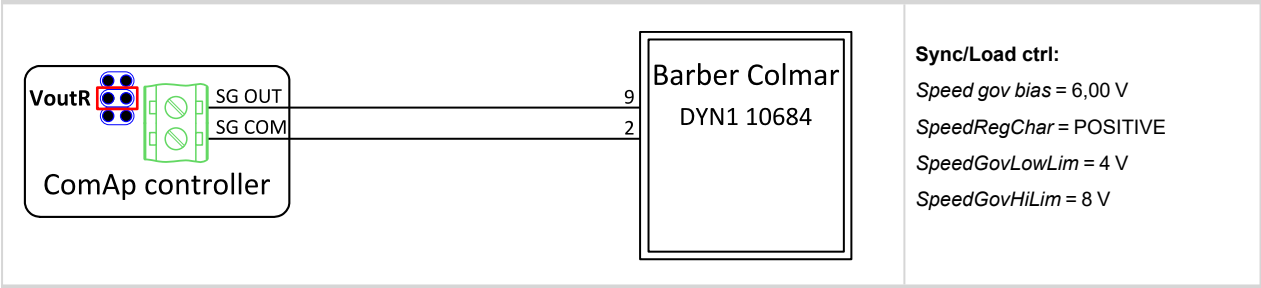


9.3 Speed governors interfaces

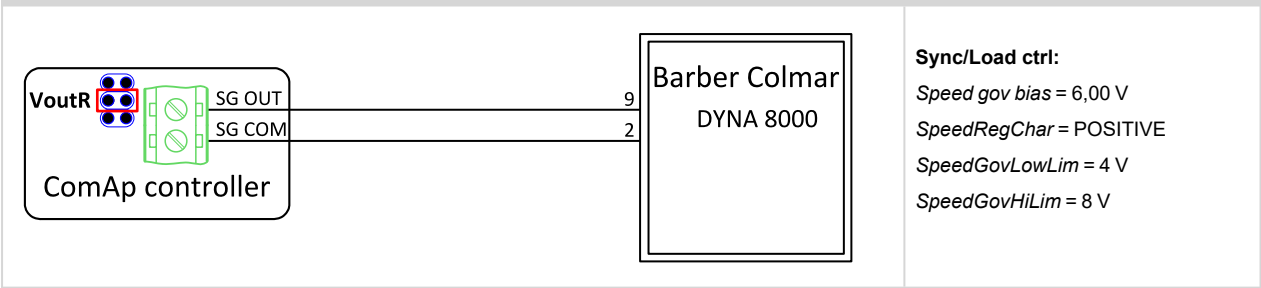
It is possible to connect various Speed governors to the controller. To get more general information regarding settings in the controller refer to the chapter **Speed Governor and AVR general settings (page 205)**.

9.3.1 Speed governors interfaces alphabetically

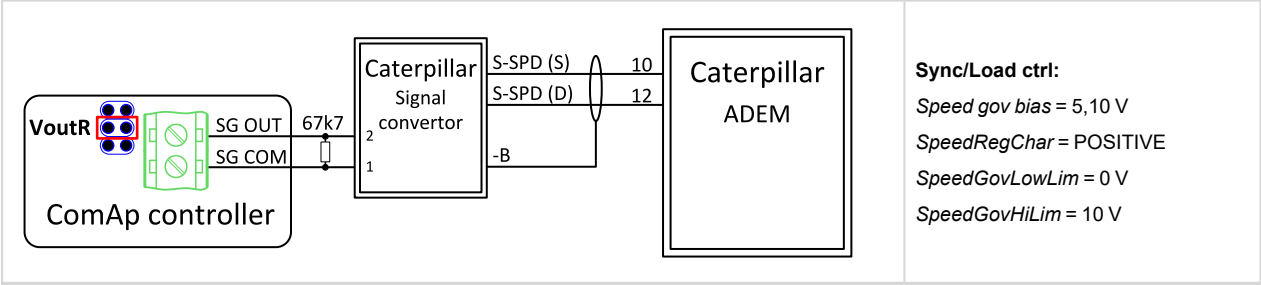
Barber Colmar DYN1 10684



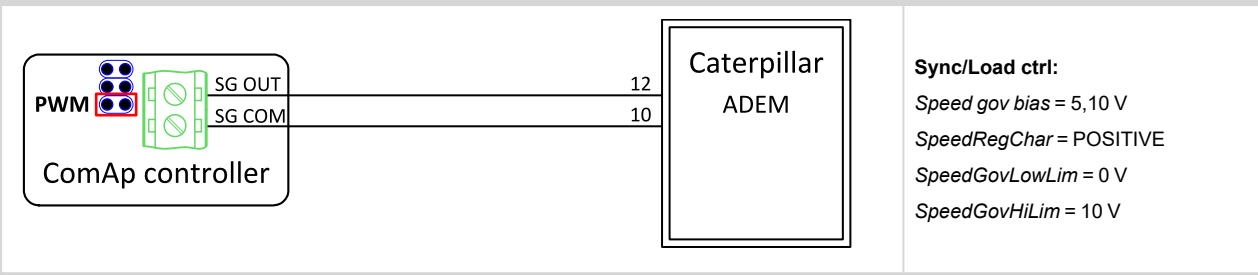
Barber Colmar DYNA 8000



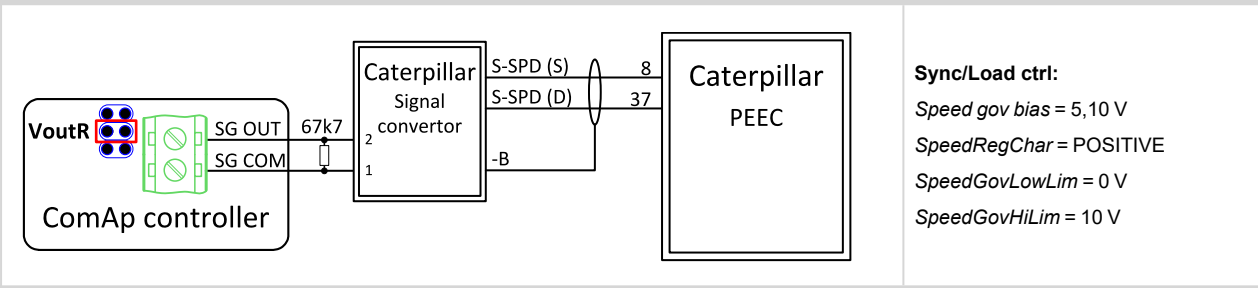
Caterpillar ADEM + Signal convertor



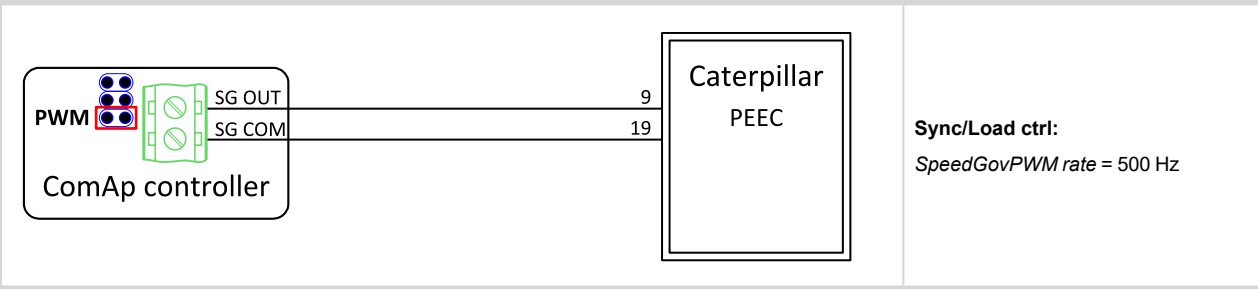
Caterpillar ADEM



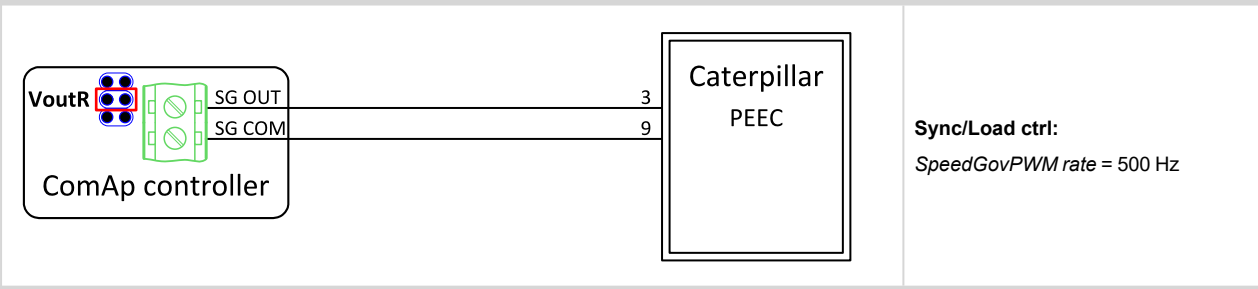
Caterpillar PEEC + Signal convertor



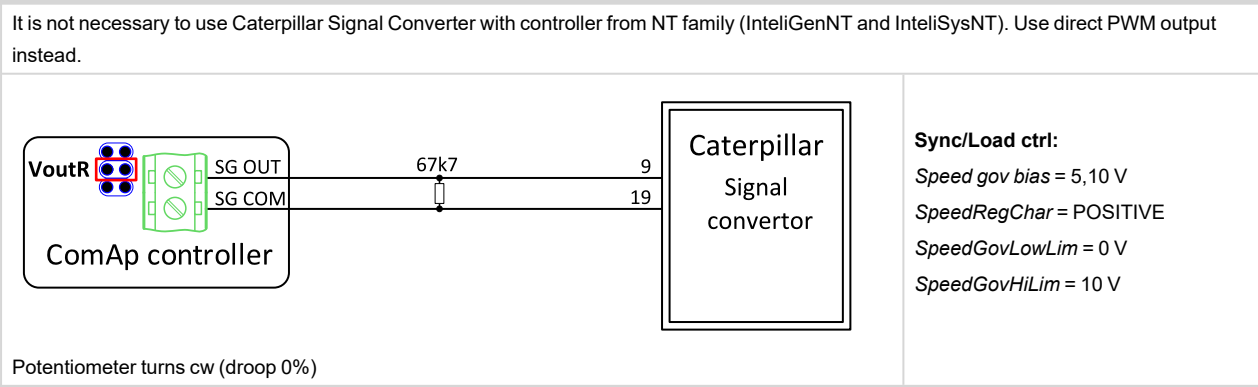
Caterpillar PEEC



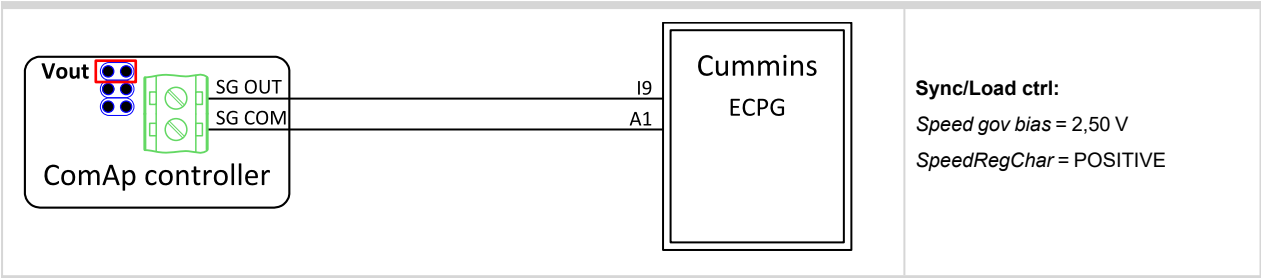
Caterpillar PEEC



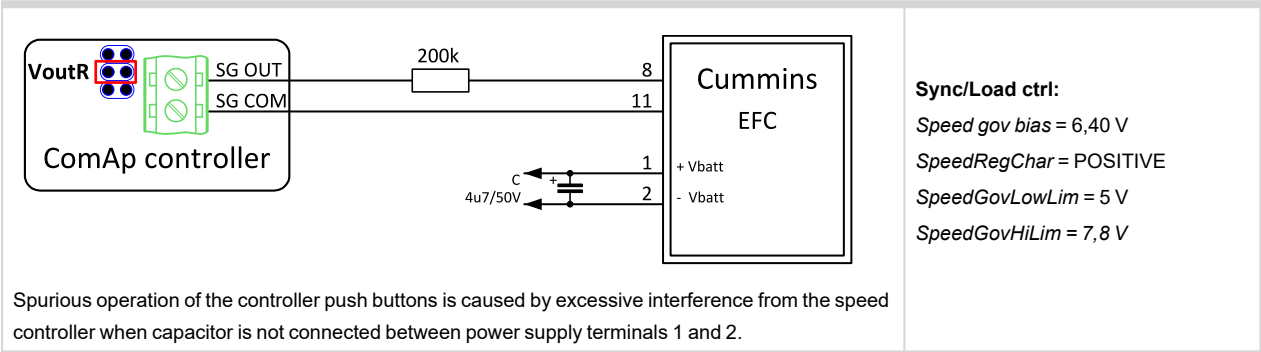
Caterpillar Signal Converter



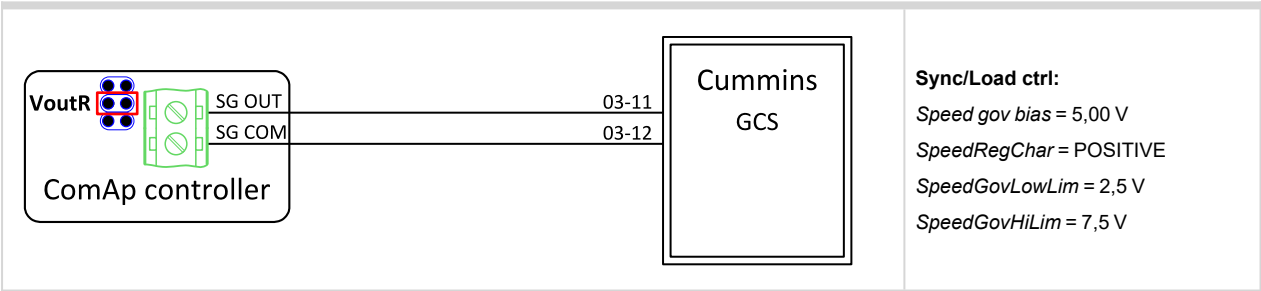
Cummins ECPG



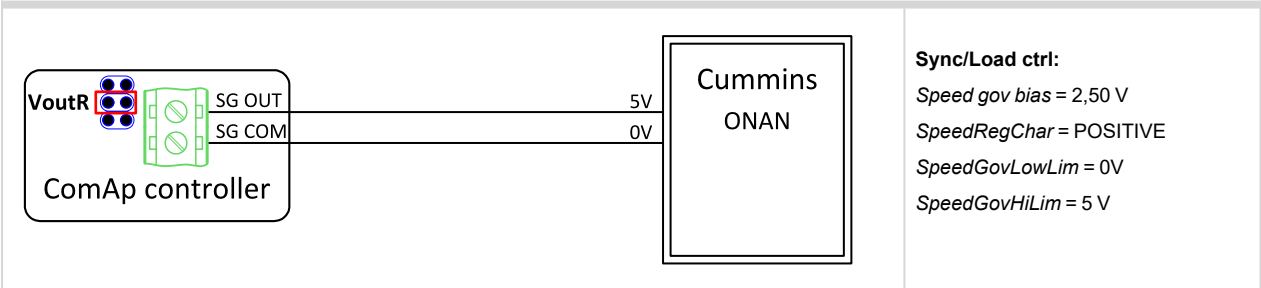
Cummins EFC



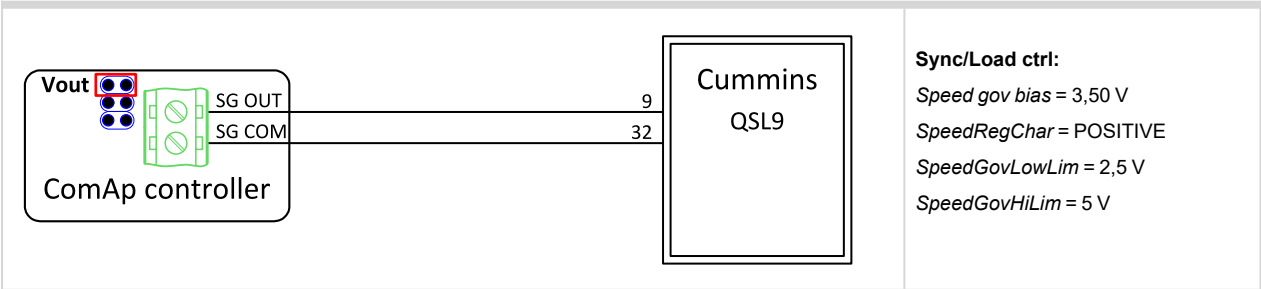
Cummins GCS



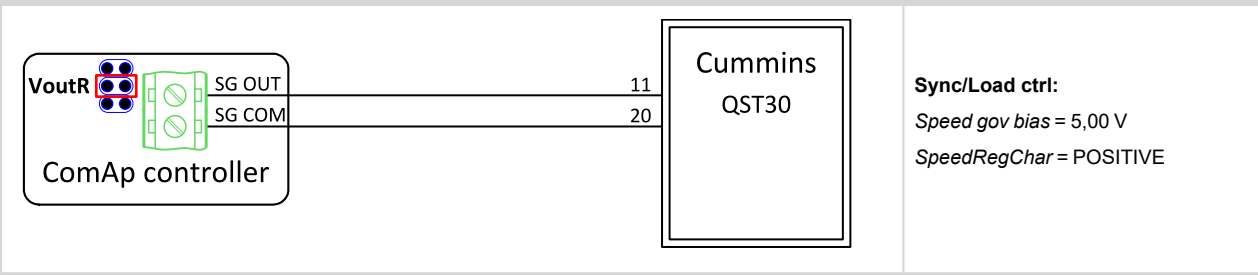
Cummins ONAN



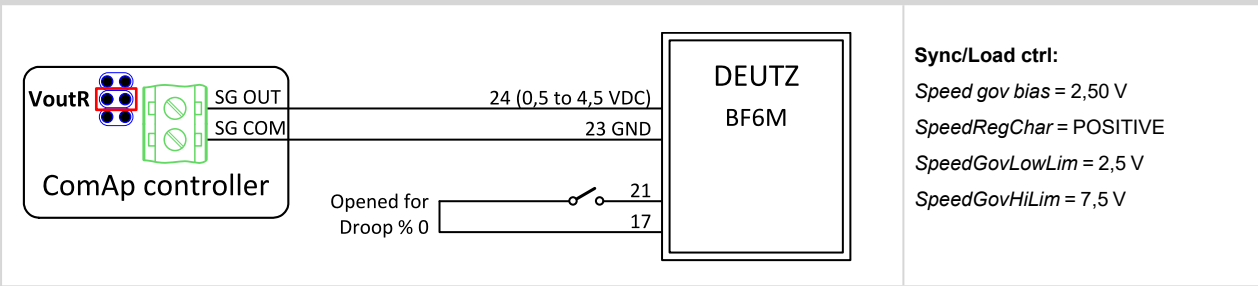
Cummins QSL9



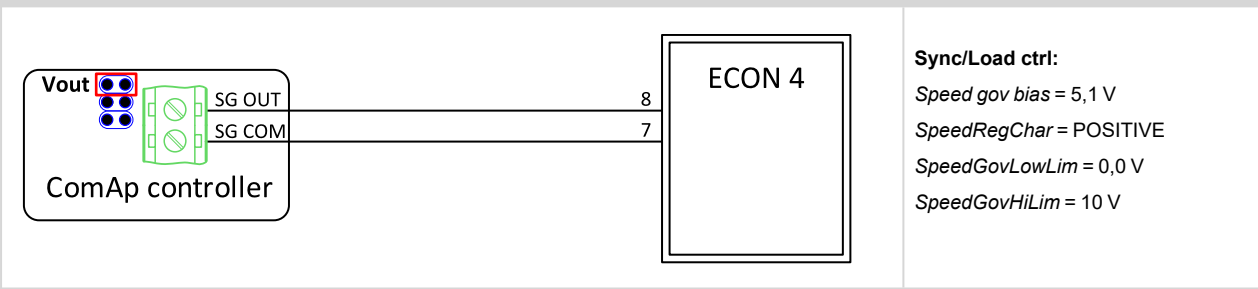
Cummins QST30



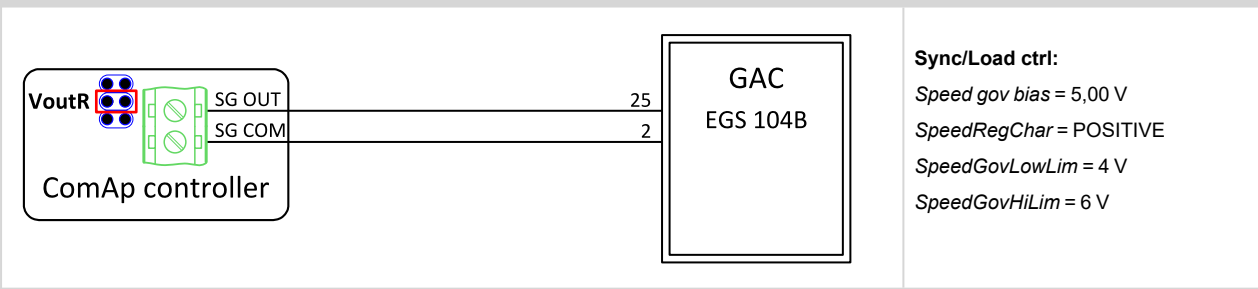
DEUTZ BF6M



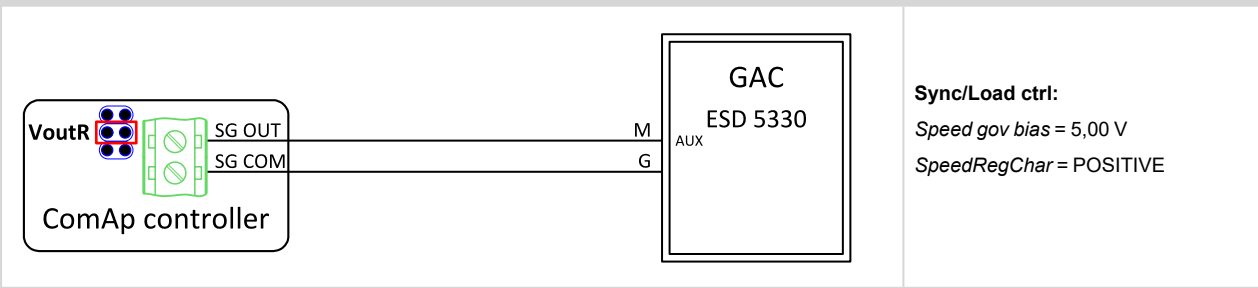
ECON 4



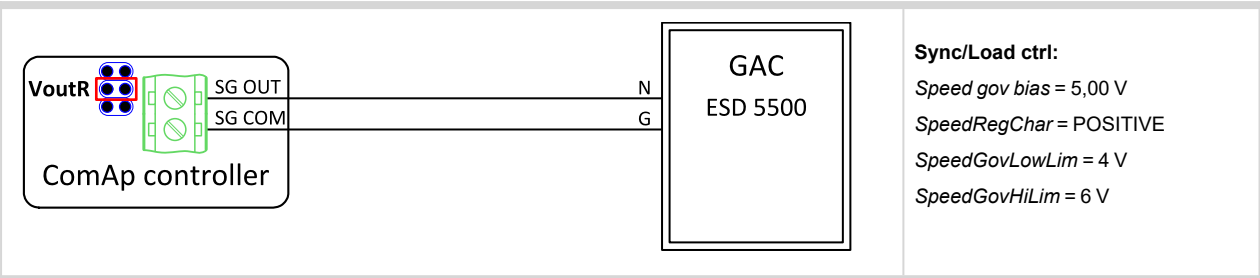
GAC EGS 104B



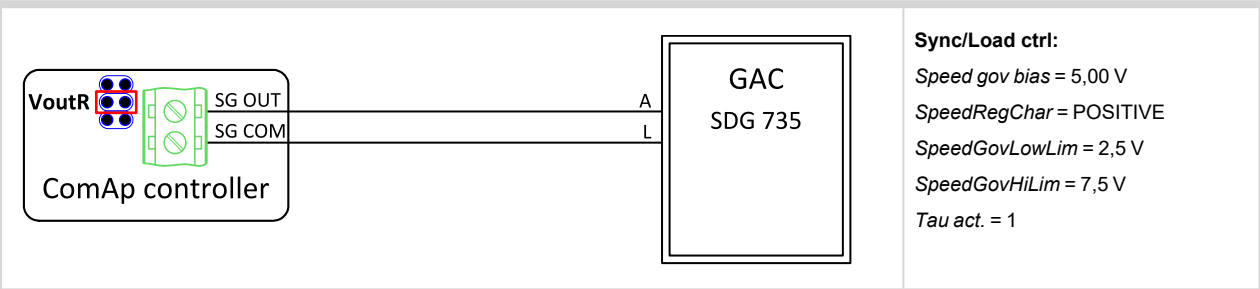
GAC ESD 5330



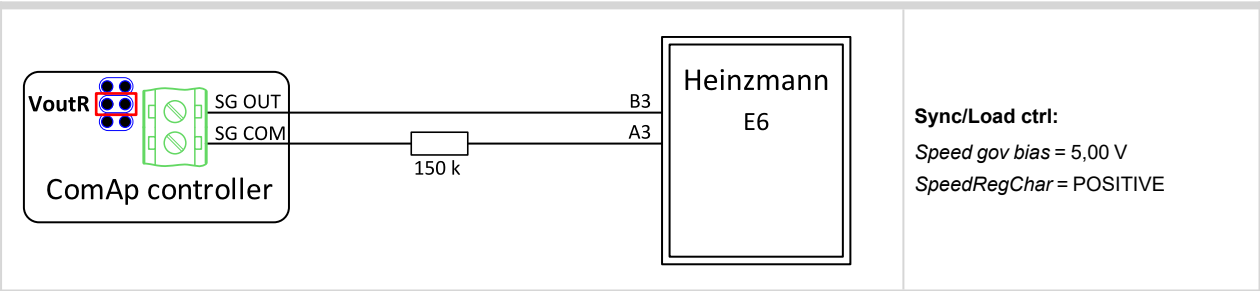
GAC ESD 5500



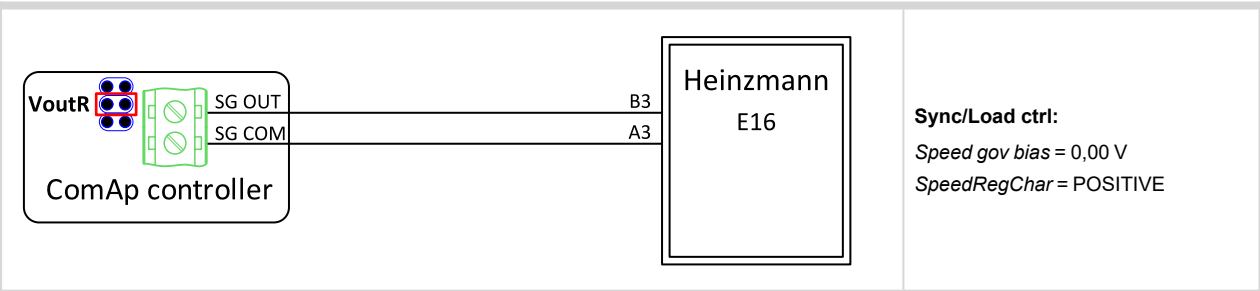
GAC SDG 735



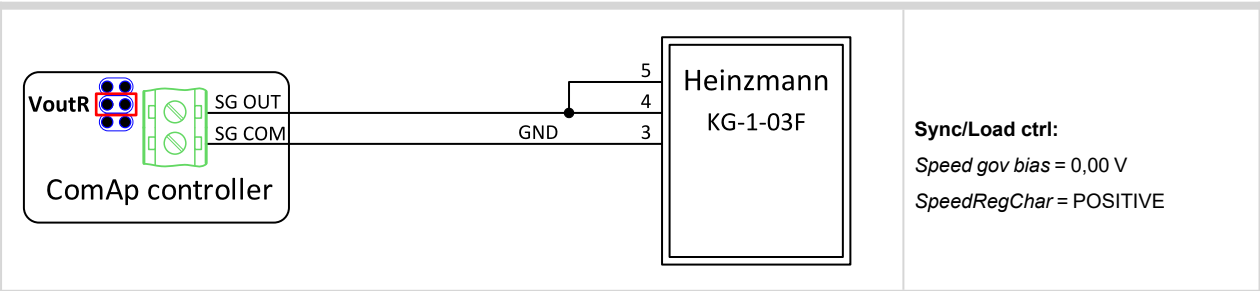
Heinzmann E6



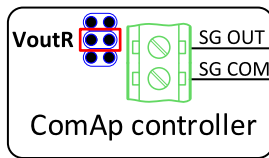
Heinzmann E16



Heinzmann KG-1-03F



Heinzmann PANDAROS DC6



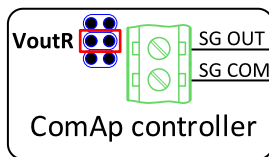
Terminals A3 and B3 are on OEM 14-pin connector.
Mounted on Perkins 40xx engines.

Heinzmann
PANDAROS
DC6

Sync/Load ctrl:

Speed gov bias = 5 V
SpeedRegChar = POSITIVE
SpeedGovLowLim = 0,8 V
For connection w/o resistor refer to the next setting

Heinzmann PANDAROS DC6

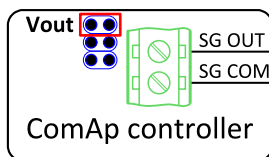


Heinzmann
PANDAROS
DC6

Sync/Load ctrl:

Speed gov bias = 2,7 V
SpeedRegChar = POSITIVE
SpeedGovLowLim = 0 V
SpeedGovHiLim = 6 V

MTU MDEC 2000, 4000

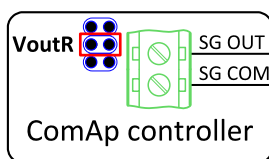


MTU MDEC
2000, 4000

Sync/Load ctrl:

Speed gov bias = 4,90 V
SpeedRegChar = POSITIVE
SpeedGovLowLim = 0 V
SpeedGovHiLim = 10 V

PERKINS 1300 EDi

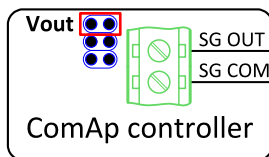


PERKINS
1300 EDi

Sync/Load ctrl:

Speed gov bias = 2,50 V
SpeedRegChar = POSITIVE
SpeedGovLowLim = 0,8V
SpeedGovHiLim = 4,5 V

PERKINS 2300, 2800



PERKINS
2300, 2800

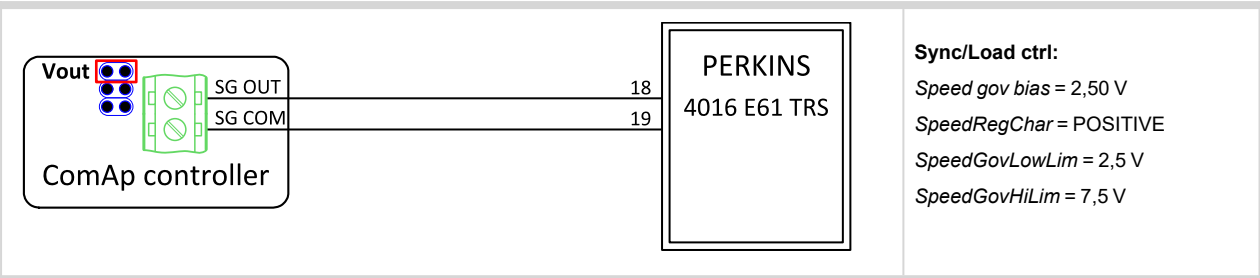
Sync/Load ctrl:

Speed gov bias = 2,50 V
SpeedRegChar = POSITIVE
SpeedGovLowLim = 0,5 V
SpeedGovHiLim = 4,5 V

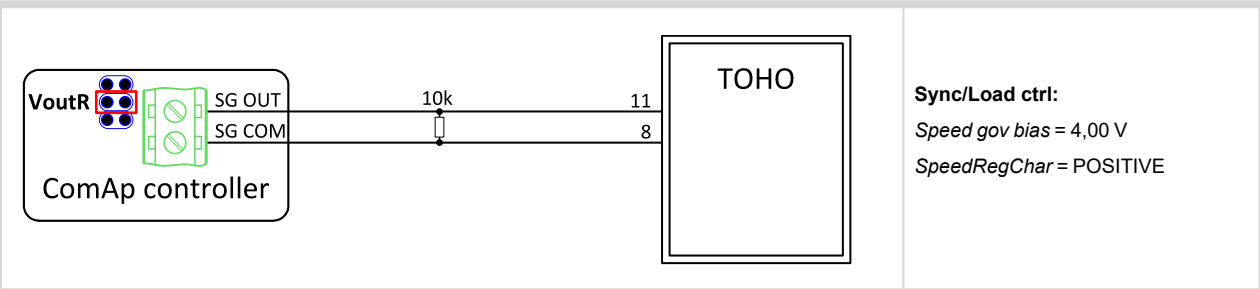
Above mentioned pin numbers refer to the Customer Interface Connector. The J1 connector on ECM has the following numbering:

20 = J1/3; 24 = J1/17

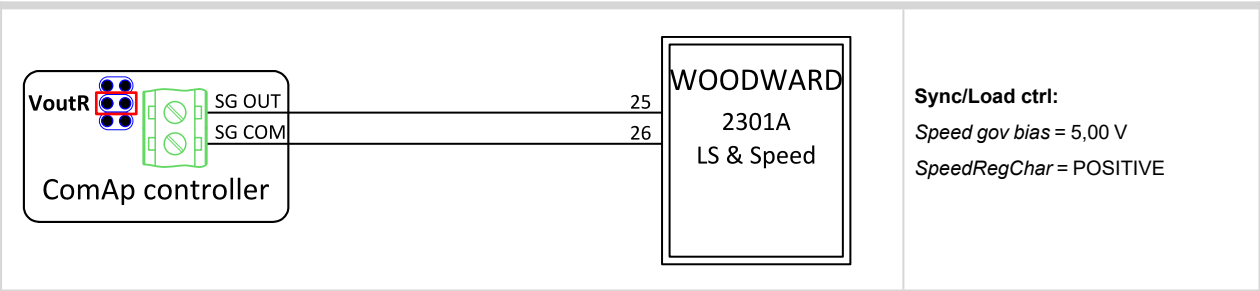
PERKINS 4016 E61 TRS



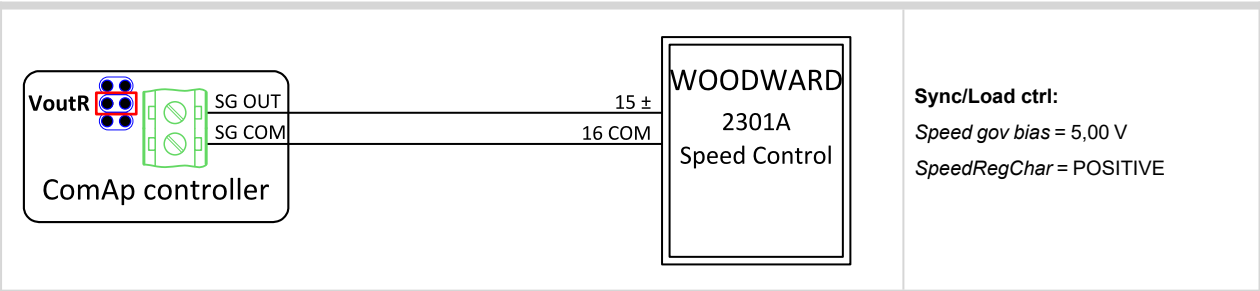
TOHO



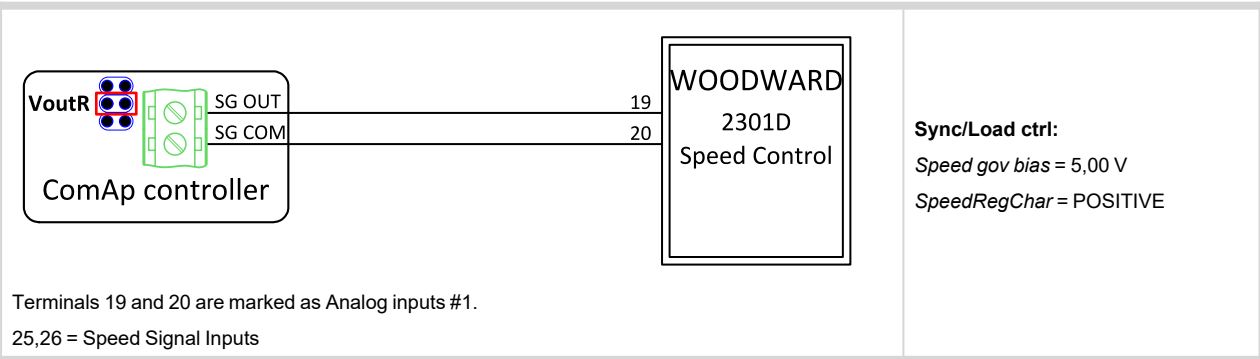
WOODWARD 2301A LS and Speed



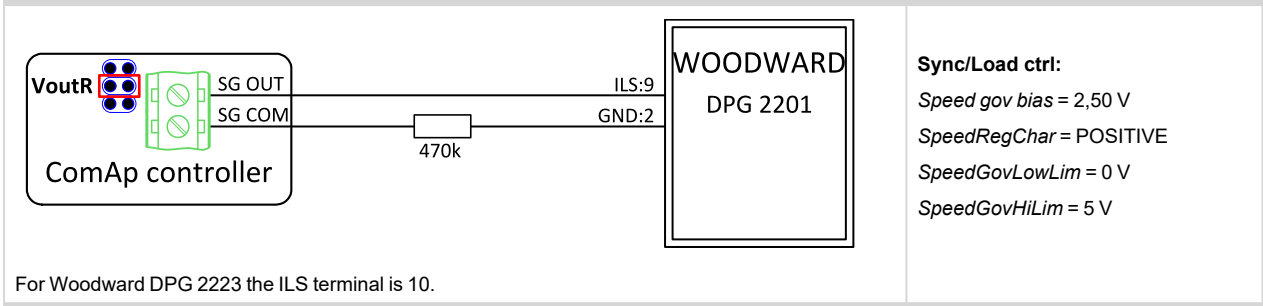
WOODWARD 2301A Speed Control



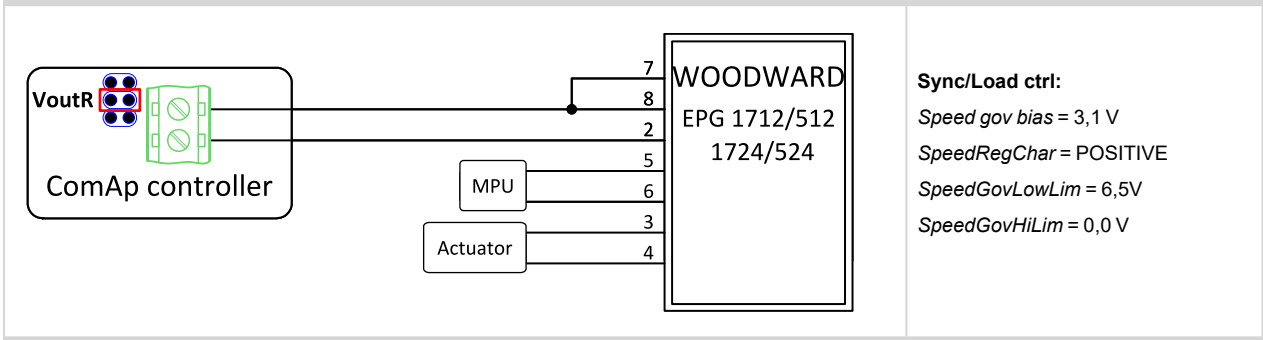
WOODWARD 2301D Speed Control



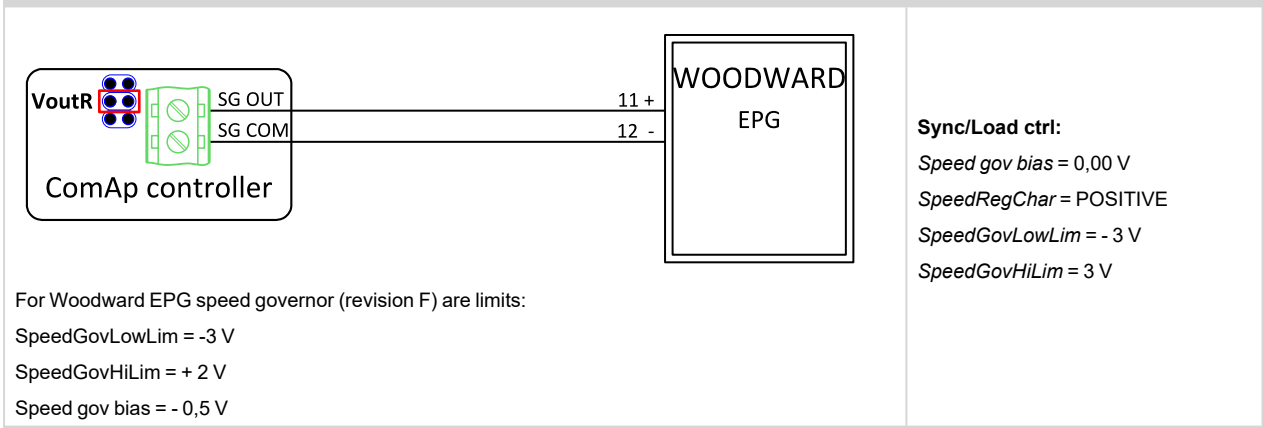
WOODWARD DPG 2201



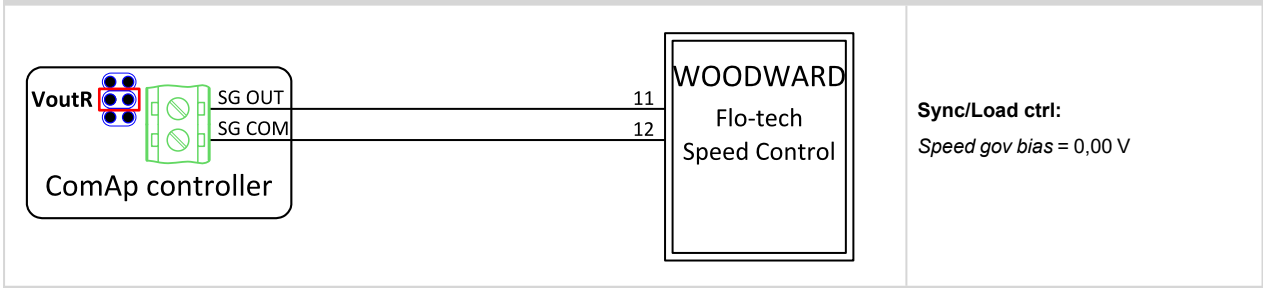
WOODWARD EPG 1712/512 (1724/524)



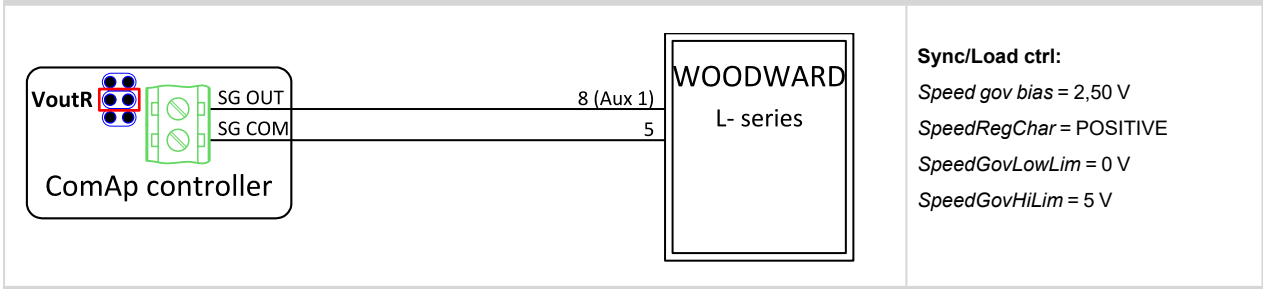
WOODWARD EPG



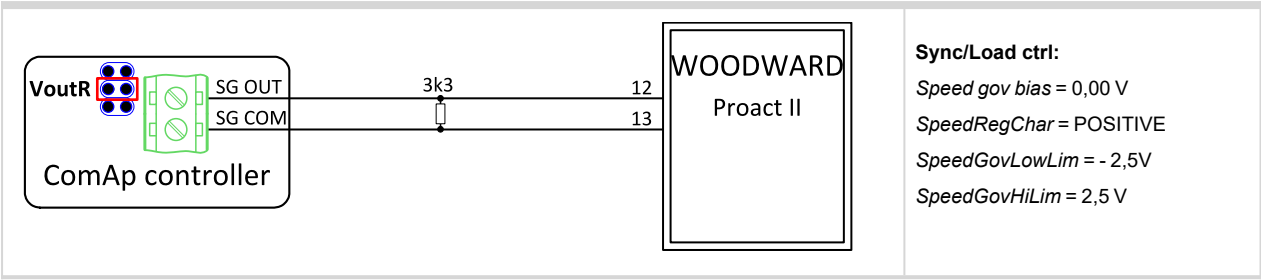
WOODWARD Flo - tech Speed Control



WOODWARD L - series



WOODWARD Proact II



9.4 Modules

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9.4.1 External modules connection

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Note: For expansion of number of ComAp controllers inputs and/or outputs use dedicated ComAp modules only. List of the compatible I/O modules is mentioned in related documentation to each ComAp controller

Example of Wiring

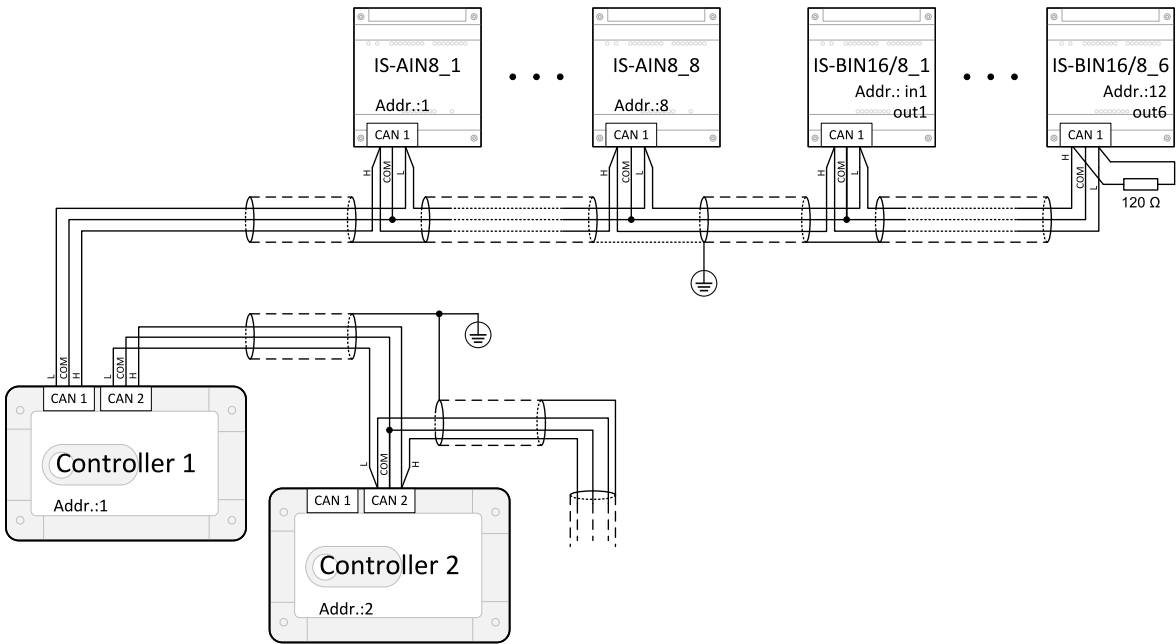
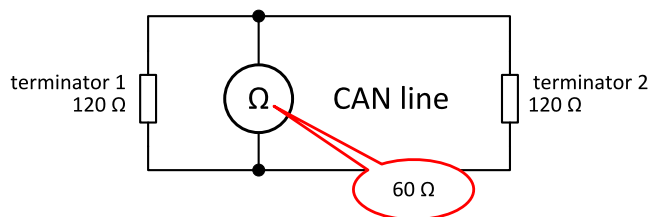


Image 9.27 Example of wiring IS-BIN 16/8 and IS-AIN8

IMPORTANT: CAN bus line has to be terminated by 120 ohm resistors on the both ends.

Always check the number and placement of terminating resistors in the CAN bus line, only correct wiring ensures reliable operation! Resistors must be placed at either end of the line (see picture), and correct number of resistors must be used! Correct number can be checked using ohmmeter – when power supply for ALL devices on the CAN bus line (including third party, e.g. ECU) is switched off, the resistance measured between A and B wire should be 60 Ω.



For longer distances is recommended to connect one CAN COM terminal (one connection for whole site) and cable shielding to the ground in one point.

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

To find recommended CAN bus data cables **see Technical data on page 315**.

IG-MU and IG-IB units are connected to CONTROLLER CAN2 bus.

Connection of ECU on CAN1 with Other Modules Connected

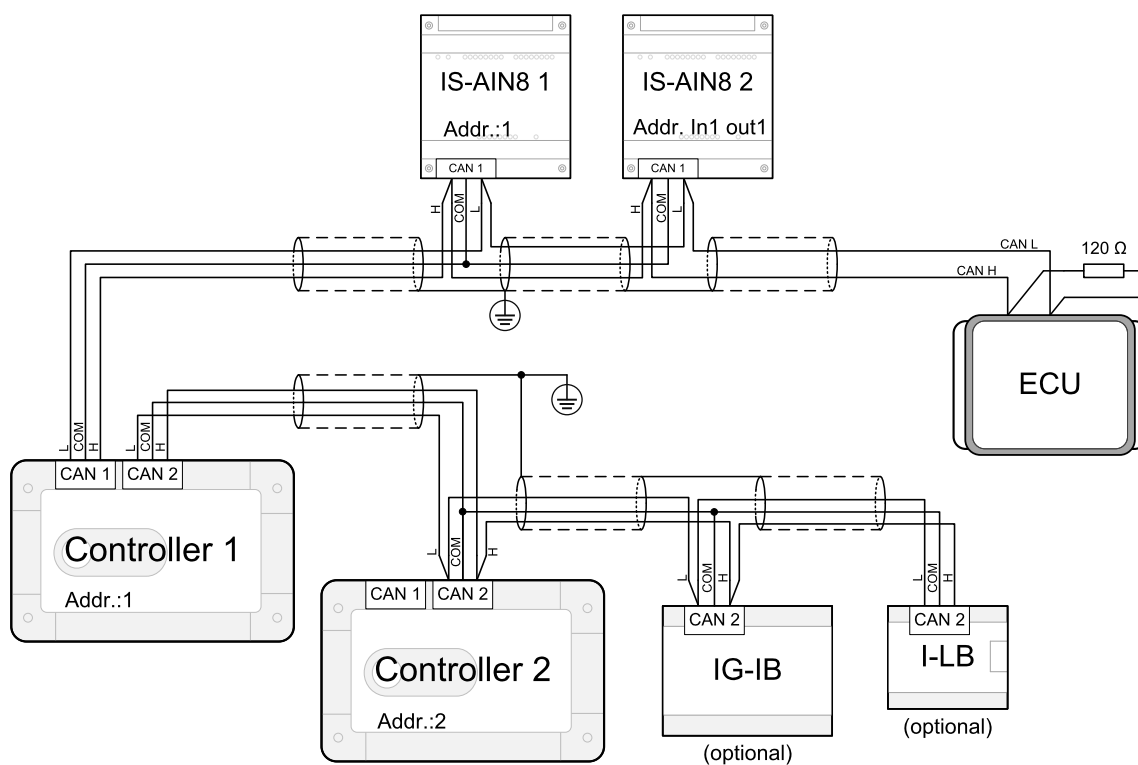


Image 9.28 Connection of ECU on CAN1 with Other Modules Connected

ECU communicating over the CAN bus is connected to CAN1 port of the controller and other ComAp modules can be connected to this CAN bus as well. For detailed description of connection of various ECUs refer to ComAp Electronic Engines Support manual.

I-CB wiring and configuration

1. Configure I-CB using I-CBEdit software. Configured I-CB behaves like fictive IS-AIN and IS-BIN units. I-CB configuration associates selected values (from ECU database) received from Engine Control Unit to selected CAN addressees (fictive IS-AIN, IS-BIN inputs and outputs).
2. Configure corresponding controller CAN addresses and tick in PC configuration tool.

3. Configure separate inputs and outputs in corresponding Analog, Binary inputs, outputs in PC configuration tool.

Note: In case of CAT engines, there is RS232 connection between I-CB and CCM.

Lost Communication Protection

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 IGS or IM configuration and corresponding external IS-AIN, IS-BIN unit address setting.

You can change the related protection for each external module in GenConfig.

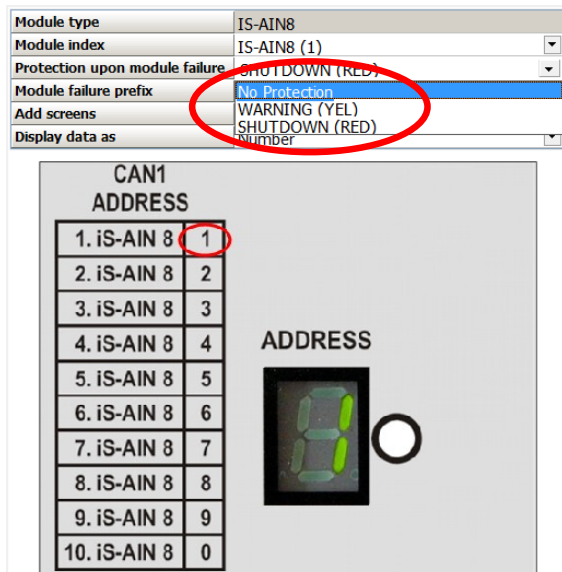


Image 9.29 Lost communication protection

IS-BIN 16/8 and IS-AIN8

IS-BIN 16/8 is an extension module with 16 binary inputs and 8 binary outputs. IS-AIN8 is an extension module with 8 analog inputs. All I/O can be configured to any logical function or protection. It is possible to connect up to 10 IS-AIN8 and 4 IS-BIN 16/8 external units to one controller.

External modules IS-BIN 16/8 and IS-AIN8 are connected to CONTROLLER CAN1 bus.

Controllers are connected to CONTROLLER CAN2 bus in multiple applications.

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-BIN 16/8 inputs, 1 to 4 for IS-BIN 16/8 outputs (address 0 switches corresponding communication OFF) or 0 to 9 for IS-AIN8 (0 has address meaning of 10).
- > Input output address is displayed on the front panel LED's
- > Use PC configuration tool to configure controller according external modules setting

IS-BIN 16/8 module has two separate CAN1 addresses for binary inputs Group 1, Group 2 and binary outputs Group (total three addresses). The CAN1 address for BI Group 1 and for BO Group 2 can be adjusted on the IS-BIN 16/8. The address for BI Group 2 is set automatically to the address following BI Group 1.

Note: If part of IS-BIN 16/8 is not required for use, CAN address 0 disables corresponding CAN message (group data are not send).

IS-AIN8, IS-BIN 16/8 address setting

- Press Address button during IS-AIN8 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.

IS-AIN8, IS-BIN 16/8 SW version check

Let suppose IS-AIN8 of SW version 1.4 for this example. 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.

IGS-PTM and IGL-RA15

It is possible to connect up to four IGS-PTM and one IGL-RA15 to one controller. IGS-PTM can be connected to the controller like IS-AIN8 and IS-BIN 16/8. IGS-PTM behaves like IS-AIN8 and IS-BIN 16/8 modules in one unit. IGS-PTM and IGL-RA15 units contain internal jumper removable 120Ω resistor.

9.4.2 Communication modules

InternetBridge-NT

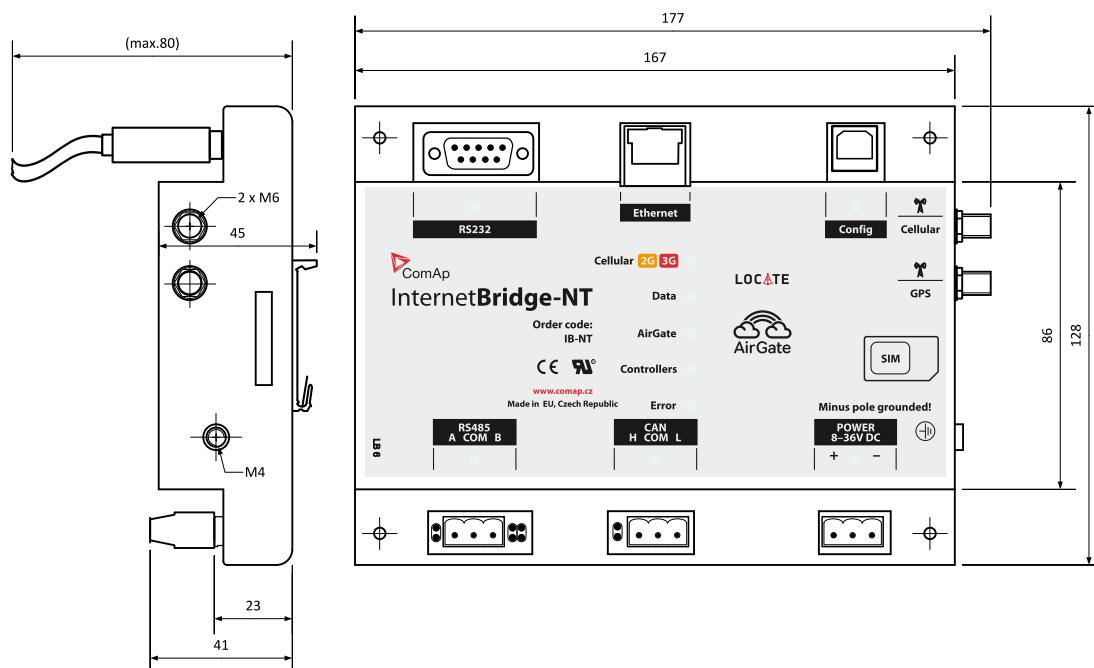


Image 9.30 Dimensions of InternetBridge-NT

Note: All dimensions are in millimeters.

I-LB+ Local Bridge

I-LB+ is a successor of the IG-MU and I-LB units designed to be used with IG-NT, IS-NT and IM-NT controllers. It therefore provides additional communication port and higher communication speed. Speed for direct/modem connection can be up to 57600 bps (IG-MU provided only 19200 bps).

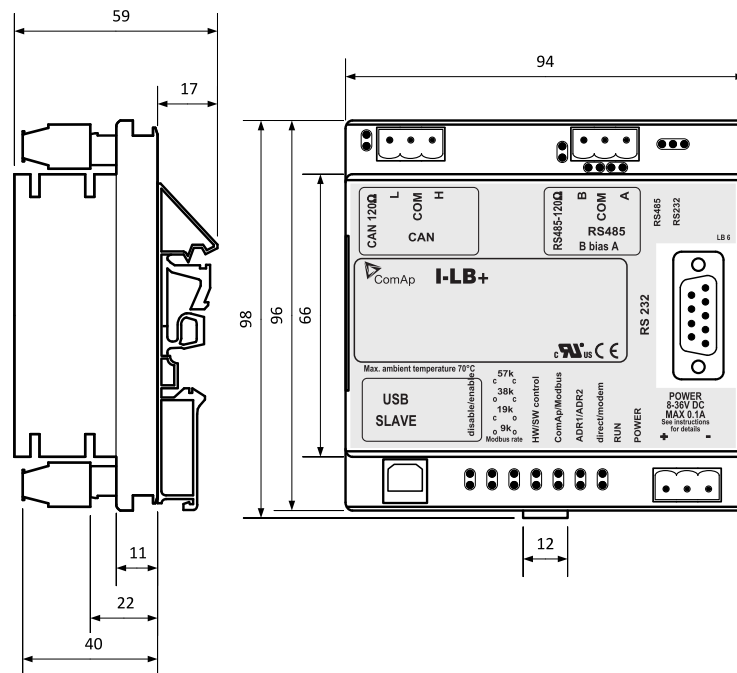


Image 9.31 Dimensions of I-LB+

I-LB+ unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

TxC, RxC	Indicates data transfer on the CAN line.
TxD, RxD	Indicates data transfer on the RS232 line.
Tx, Rx	Indicates data transfer on USB
RUN	Lights when at least one other unit is active on the CAN bus. Blinks when no unit is communicated on the CAN bus (during communication speed detection).
PWR	Lights All the time when power supply is switched on.

Table 9.1 Indication LED

I-CB Communication Bridge

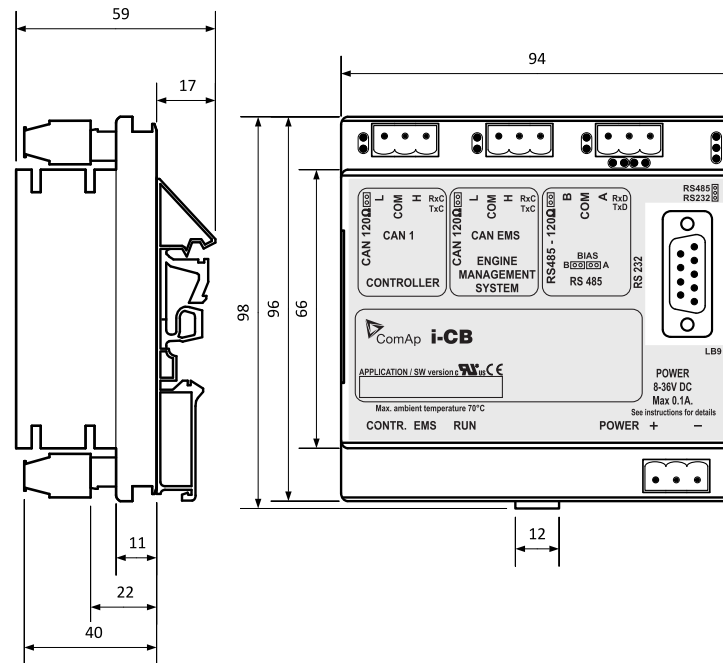


Image 9.32 Dimensions of I-CB

I-CB unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

I-CB (Communication bridge) is CAN bus interface between Controller and Engine Control Unit (ECU) for ECUs which don't support standard J1939 communication (MTU, CAT etc.). Engine values (RPM, Oil pressure and other) are received from ECU via CAN and corresponding sensors are not needed on controller. Use ICBEdit software for I-CB configuration (included in installation package).

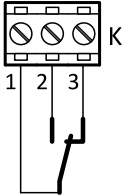
I-CB wiring and configuration

1. Configure I-CB using I-CBEdit software. Configured I-CB behaves like fictive IS-AIN and IS-BIN units. I-CB configuration associates selected values (from ECU database) received from Engine Control Unit to selected CAN addressees (fictive IS-AIN, IS-BIN inputs and outputs).
2. Configure corresponding controller CAN addresses and tick in PC configuration tool.
3. Configure separate inputs and outputs in corresponding Analog, Binary inputs, outputs in PC configuration tool.

Note: In case of CAT engines, there is RS232 connection between I-CB and CCM.

I-RB16, I-RB16/231 relay board

Relay board contains 16 relays for Binary output (open collector) separation. All relays are place in sockets.

Number relays:	16 in socket
Nominal voltage:	24 VDC
Voltage range:	16.8-36 VDC
Relay opens at:	10 % of nominal voltage
Electric / mechanic cycles:	100 000 (when switching 16A) / 10 000 000
Operating temperature range:	- 40°C to 70°C
Maximal load:	16 A resistive load 4 A inductive load
Contacts protection:	varistor 14DK390
Relay-connector connection:	<div>1 - 2 n.o. 1 - 3 n.c.</div> 

One unit contains two parts (separate PCBs). There are 8 relays on each part which is located on common plastic base.

I-RB16 is 60 mm high from DIN rail base.

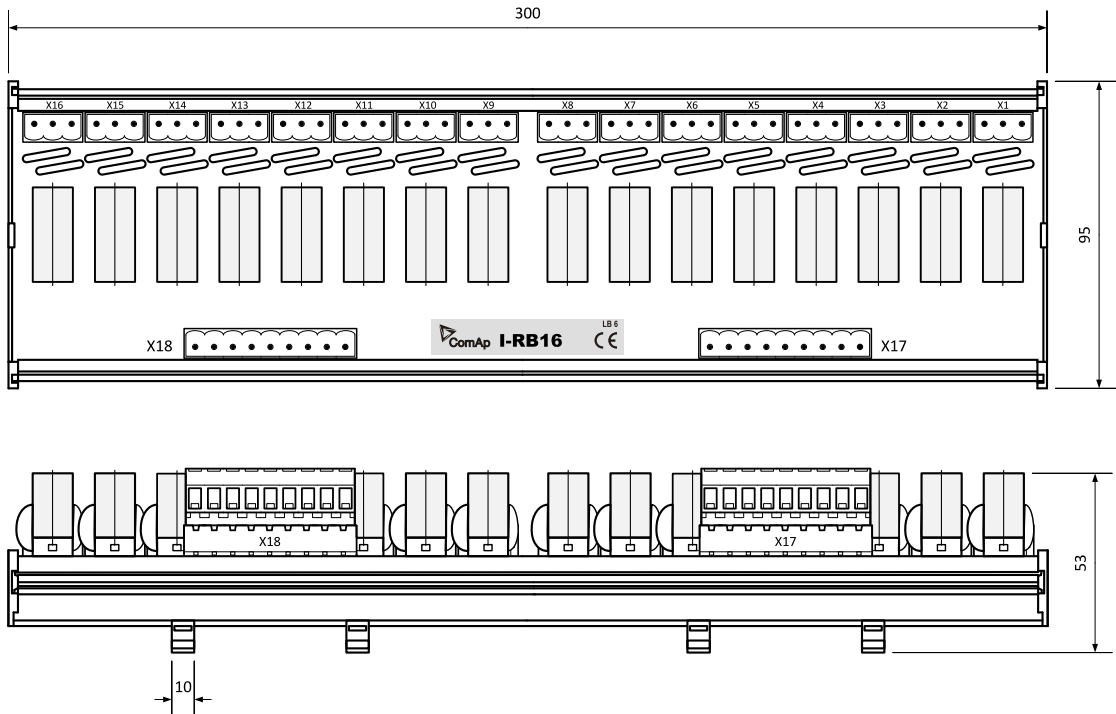


Image 9.33 Dimensions of I-RB16

I-RB16 can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

Note: I-RB contains two separate boards, 8 relays on each. It can be ordered as I-RB8 as well.

I-CR CAN Repeater

I-CR module enables to extend CAN bus line of

- > extension modules CAN1 to more than 200 meters
- > intercontroller CAN2 to more than 200/900 meters (in 32C/8C mode)

More application details are in separate manual "[Extending the CAN bus](#)" and in the chapter **Communication** (page 269).

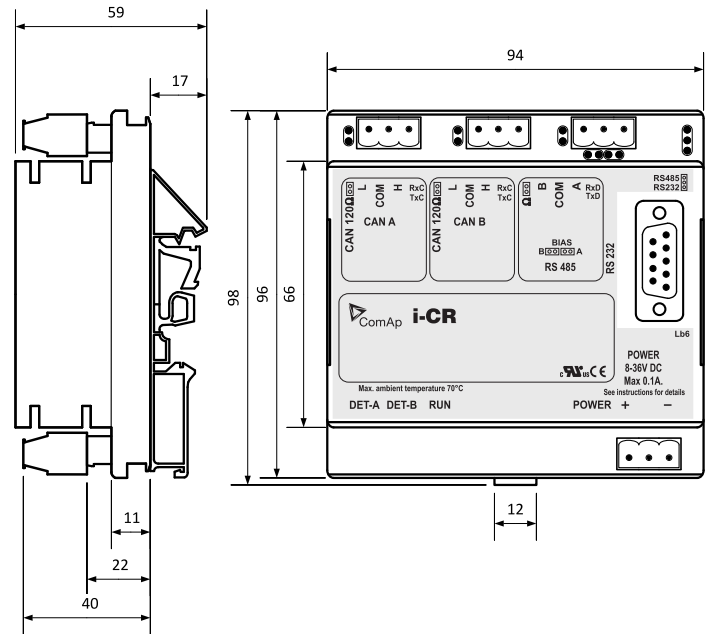


Image 9.34 Dimensions of I-CR

I-CR unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

I-LBA

For the connections with 12 VDC power supply an I-LBA module can be connected to controller power terminals in order to allow the controller to continue operation during cranking if the battery voltage dip occurs. Controllers which may be supplied from I-LBA module.

Controller	IG-NT or IG-NTC / IG-NT-BB or IG-NTC-BB	IS- NT- BB / IS- NTC-BB	IS-NT	IG-CU	IS-CU	IL-CU/ IL-NT
Connection applicable	YES	YES	NO	YES	NO	YES

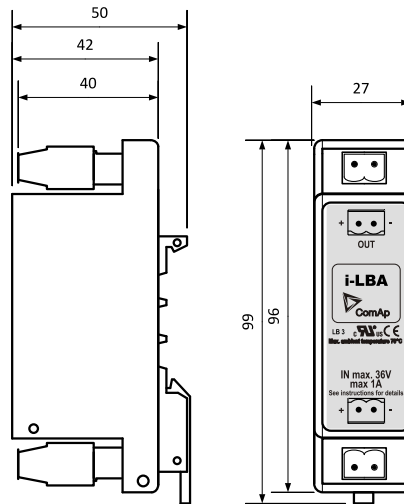


Table 9.2 Dimensions of I-LBA

I-LBA unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

The I-LBA unit is intended to supply one controller unit only at the same time.

It is not recommended to use +PWR BOUT outputs on the controller as a source for relays, as their consumption would exhaust I-LBA capacitors very fast.

It is also not recommended to supply any kind of above controllers with LT (Low Temperature) display because of the high current consumption of the LT display.

See also chapter **Power supply fusing (page 44)**.

9.4.3 Extension modules

IG-AVRi and IG-AVRi TRANS

Primary terminals

230-277 VAC / 400- 480 VAC

Freq: 50-60 – 400 Hz

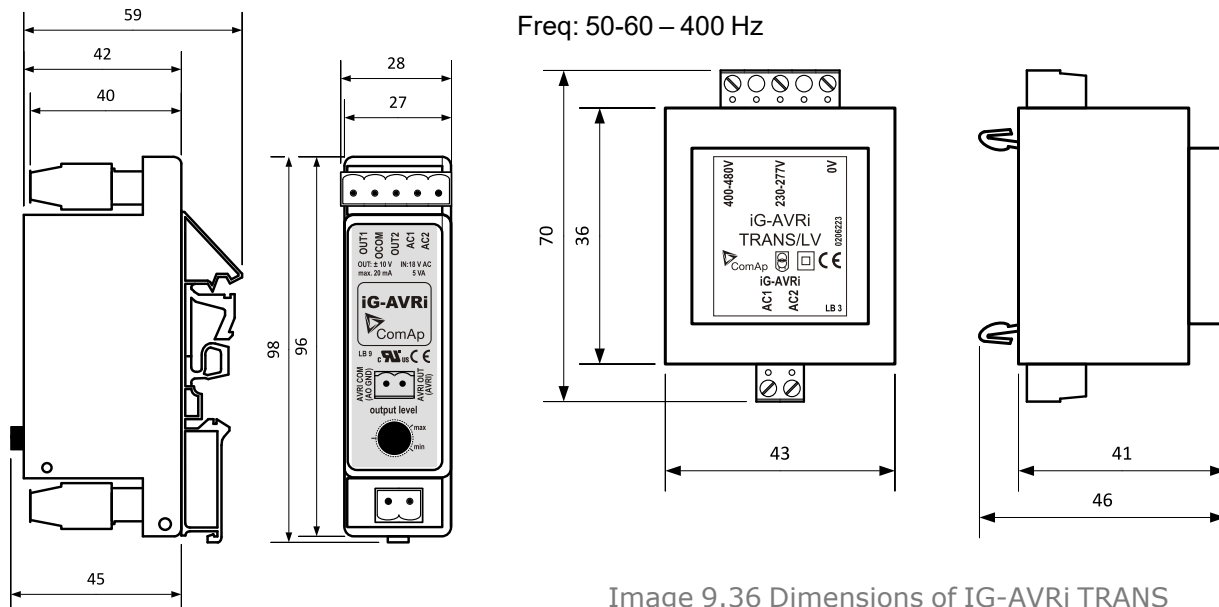


Image 9.36 Dimensions of IG-AVRi TRANS

Secondary terminals

18 VAC

Both units can be mounted on DIN rail (35 mm).

Image 9.35 Dimensions of IG-AVRi

Note: All dimensions are in millimeters.

Intel AIN8

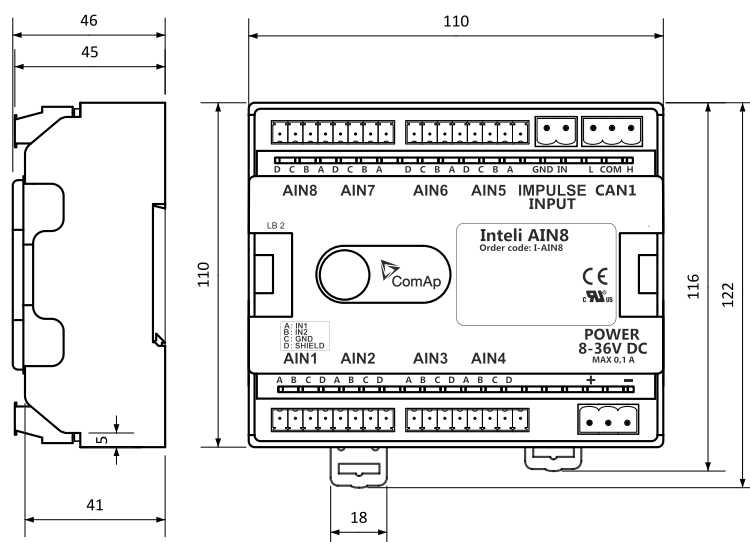


Image 9.37 Dimensions of Intel AIN8

Inteli AIN8 unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

Intel AIN8TC

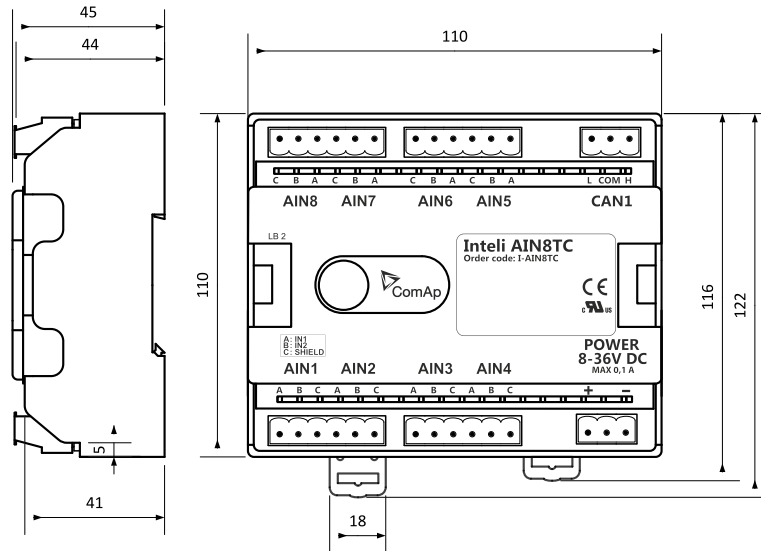


Image 9.38 Dimensions of Intel AIN8TC

Intel AIN8TC unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

Intel IO8/8 (can be switched to IO16/0)

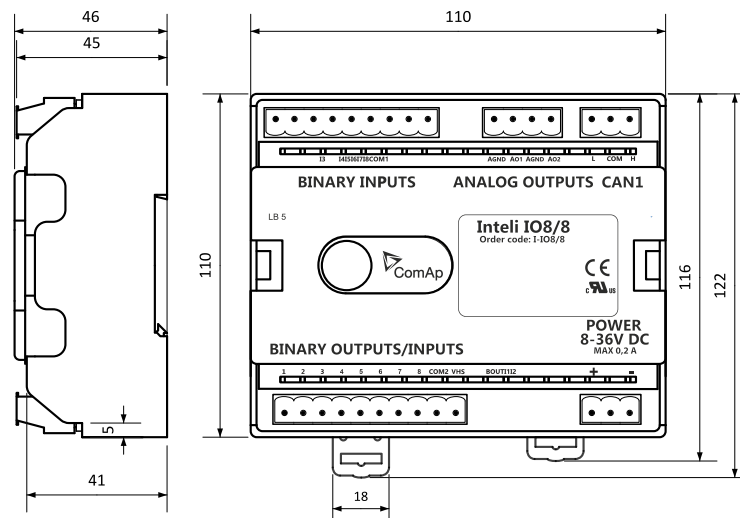


Image 9.39 Dimensions of Intel IO8/8

Intel IO8/8 unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

IS-BIN 16/8

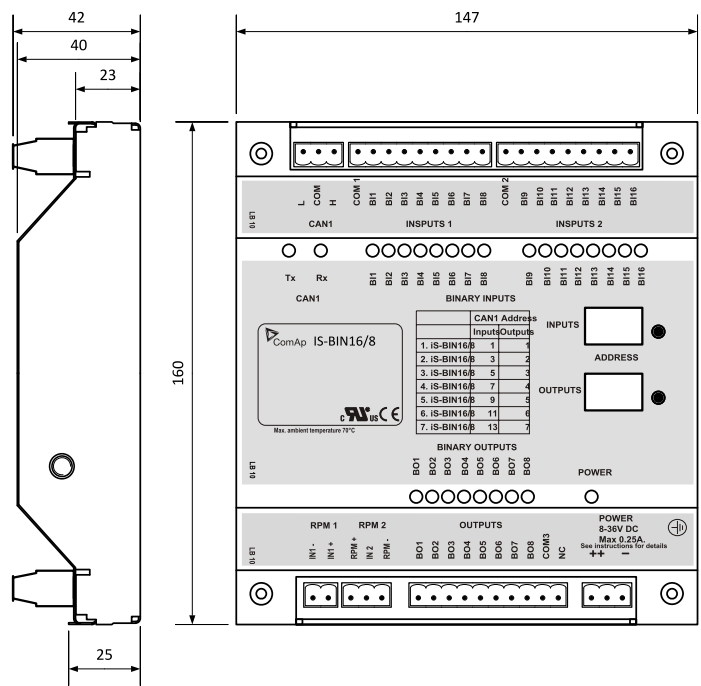


Image 9.40 Dimensions of IS-BIN 16/8

IS-BIN 16/8 unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

IS-AIN8

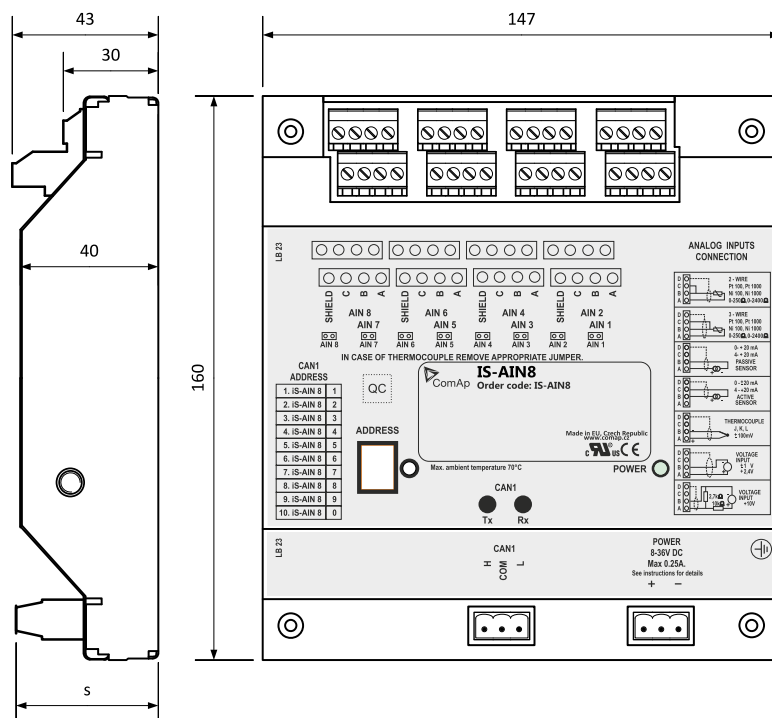


Image 9.41 Dimensions of IS-AIN8

IS-AIN8 unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

IGL-RA15 Remote annunciator

Remote (CAN bus, up to 200 meters) 15 LED states indicator. IGL-RA15 unit can be connected to controller via CAN as Binary output group with addresses 1+2 or 3+4 or 5+6 or 7+8.

To configure IGL-RA15 use GenConfig ► Modules ► Available modules, selected IGL-RA15 module and add it using Insert button. GenConfig automatically adds IGL-RA15 Binary input to the configuration.

For more information about IGL-RA15 consult manuals on [ComAp webpage](#).

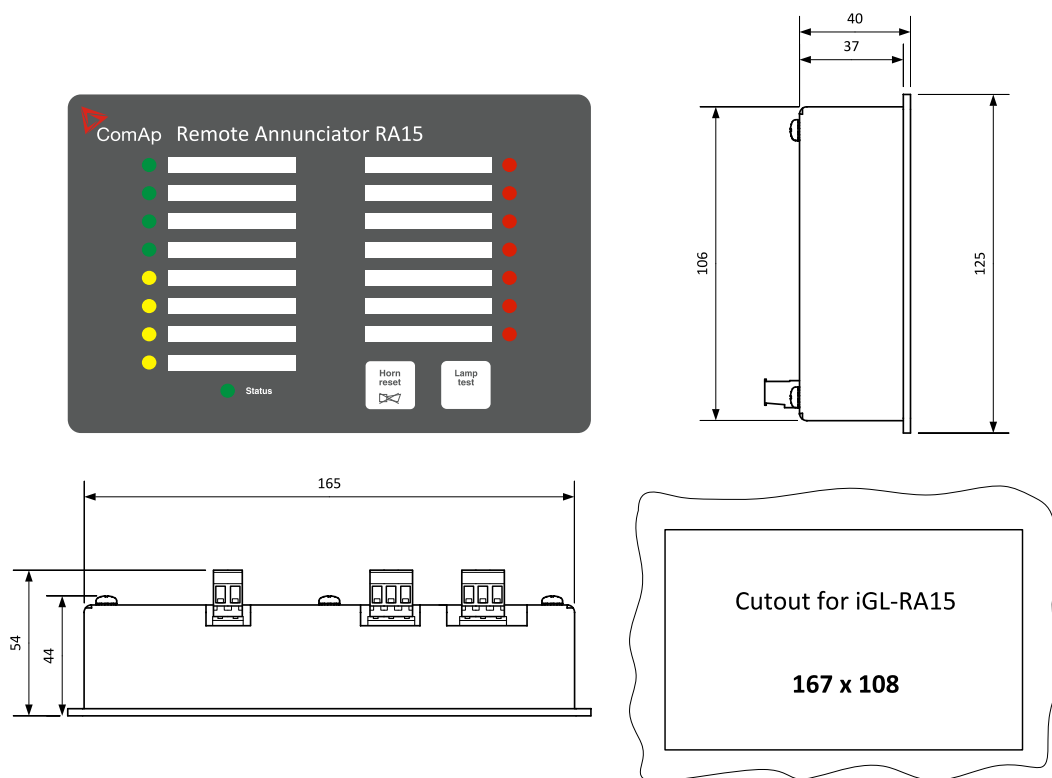


Image 9.42 Dimensions of IGL-RA15

Note: All dimensions are in millimeters.

IGS-PTM

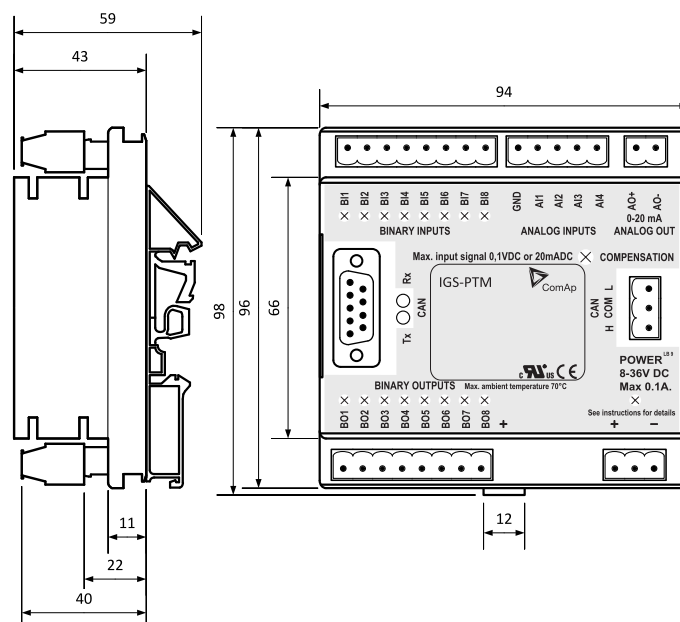


Image 9.43 Dimensions of IGS-PTM

IGS-PTM unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.

I-AOUT8

General Description

I-AOUT8 is an extension unit with 8 Analog outputs. Each analog output can be switched by jumper for.

- 0 to 20 mA
- 0 to 10 VDC
- PWM (Pulse With Modulation on 1.2 kHz)

I-AOUT8 modules is connected on CAN1 (peripheral) bus. 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. Communication fail is indicated in controller Alarm list and by binary output. Use GenConfig PC tool for controller configuration.

It is possible to connect up to four I-AOUT8 units to one controller.

I-AOUT8 unit can be mounted on DIN rail (35 mm).

CAN1 terminating 120 Ω resistor jumper is connected in default. AGND terminals are on the same potential.

Number of analog outputs	8, no galvanic separation	
Type of analog outputs (jumper selectable)	U	0 to 10 VDC $\pm 1\%$, max 5 mA
	I	0 to 20 mA $\pm 1\%$, max 500 Ω
	p	PWM 1200 Hz, 5V level, max 10 mA
Power supply	8 to 36 VDC	
Current consumption	100 ÷ 300 mA at 24 VDC	
Communication interface	CAN1, with jumper selectable address 1 to 4 Jumper selectable terminating resistor 120 Ω	
RS232 interface	TTL, firmware upgrade via AT-link.	
Operating temperature range	-40 °C to +70 °C	
Analog outputs refreshment	Max. 300 ms	

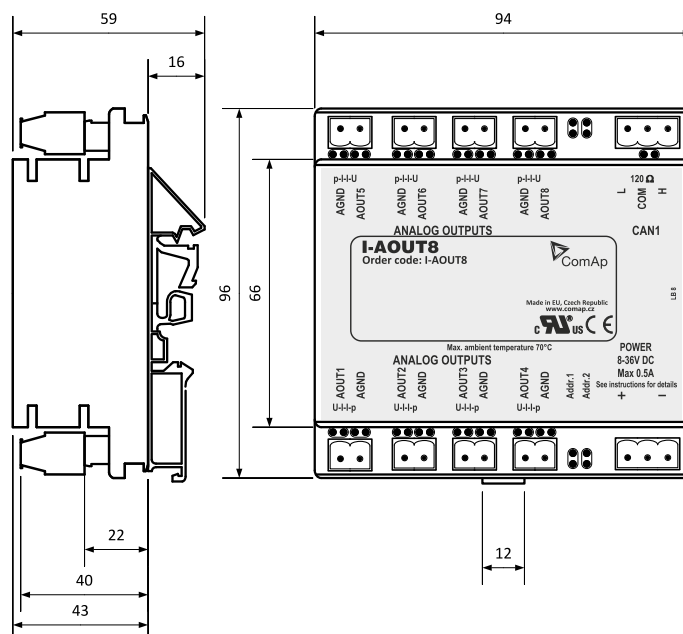


Image 9.44 Dimension of I-AOUT8

I-AOUT8 unit can be mounted on DIN rail (35 mm).

Note: All dimensions are in millimeters.


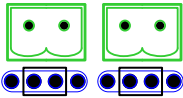

Connection of Multiple Units

Up to four modules can be connected to one controller. Set module CAN address corresponding to configuration according table below.

CAN Address	Jumper 1	Jumper 2
1	No	No
2	Yes	No
3	No	Yes
4	Yes	Yes

Analog outputs Modification (U, I, PWM)

Follow the p-I-I-U symbols on the module sticker. There are two equivalent positions for mA measuring.

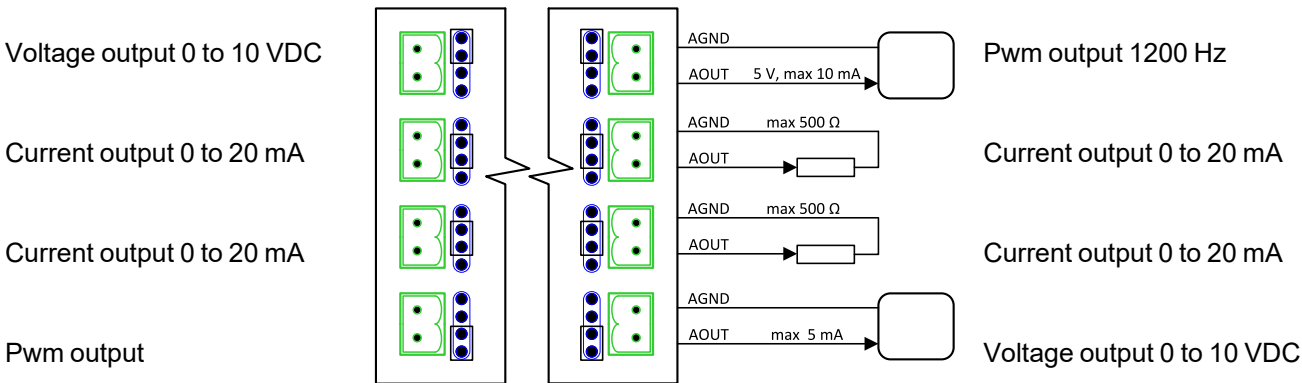
AOUT jumper	Symbol	Function
	p	PWM Pulse – Widht – Modulation
	I	0 to 20 mA
	U	0 to 10 VDC

LED Indication

Green LED is located near the power supply connector.

I-AOUT8 module state	LED Pwr
No power supply	Dark
Memory fail	Fast blink (100/100 ms)
Communication fail	Slow blink (300/300 ms)
Communication fail	Continuous light

Wiring and jumper setting example



[back to Appendix](#)