Compact Controller for Stand-by and Parallel Operating Gen-sets

Inteli New Technology
Modular Gen-set Controller

Bank Controller

IG-NT GC, IG-NTC GC, IS-NT-BB,IG-NT-BB, IG-NTC-BB, IS-NTC-BB

Software version IGS-NT-BC-1.2.0, January 2019

ComAp
LEADER IN GEN–SET
COMMUNICATION SOLUTION

REFERENCE GUIDE

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Document information

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DOCUMENT HISTORY

VERSION NUMBER	RELATED SW. VERSION	DATE
1	1.2.0	31.3.2016
2	1.2.0	4.1.2019

Pressing F1 in the GenConfig and InteliMonitor setpoint, values or configuration window will open the help with the context of currently selected setpoint, value and binary input or output function.

Available related documentation

PDF files	Description
IGS-NT-SPTM-3.1.0 Reference Guide.pdf	General description of SPtM applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, control of power in parallel to mains operation, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-SPI-3.1.0 Reference Guide.pdf	General description of SPI applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, control of power in parallel to mains operation, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-MINT-3.1.0 Reference Guide.pdf	General description of MINT applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, powermanagement, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-Combi-3.1.0 Reference Guide.pdf	General description of Combi applications for InteliGen NT and InteliSys NT. Contains description of engine, and generator control in SPTM, SPI and MINT mode, powermanagement, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-COX-3.1.0 Reference Guide.pdf	General description of COX applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, powermanagement, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT Application Guide 05-2013.pdf	Applications of InteliGen NT, InteliSys NT and InteliMains NT, examples of connection, description of PLC functions, Virtual and Shared peripheries.
IGS-NT Operator Guide 01-2014.pdf	Operator Guide for all hardware variation of InteliGen NT and InteliSys NT, InteliVision 5 and InteliVision 8.
IGS-NT Installation Guide 08-2014.pdf	Thorough description of installation and technical information about InteliGen NT, InteliSys NT and InteliMains NT and related accessories.
IGS-NT Communication Guide 05-2013.pdf	Thorough description of connectivity and communication for InteliGen NT, InteliSys NT and InteliMains NT and related accessories.
IGS-NT Troubleshooting Guide 08-2014.pdf	How to solve most common troubles with InteliGen NT and InteliSys NT controllers. Including the list of alarm massages.
IGS-NT & ID-DCU Accessory Modules 07-2014.pdf	Thorough description of accessory modules for IGS-NT family, technical data, information about installation of the modules, how to connect them to controller and set them properly.

General guidelines

What is described in this manual?

This manual describes „MINT“ software configuration. The software configuration is designed for multiple sets applications with internal load sharer and synchronizer.

What is the purpose of this manual?
This manual provides general information on how to configure and operate the controller.
This manual is intended for use by:

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

!! Warnings !!

The NT controller can be remotely controlled. In the event that maintenance needs to be done to the gen-set, check the following to ensure that the engine cannot be started.

To be sure:

- Disconnect remote control via RS232 line
- Disconnect input REMOTE START/STOP

or

- Disconnect output STARTER and outputs GCB CLOSE/OPEN and MCB CLOSE/OPEN

The controller contains a large number of configurable setpoints, because of this it is impossible to describe all of its functions. These are subject to change from SW version to SW version. This manual only describes the product and is not guaranteed to be set for your application on arrival.

Text

ESC	(Capital letters in the frame) buttons on the front panel
Break Return	(Italic) set points
Generator protections	(Bold) Set point group
Cyan background	Valid for IS-NT only

Conformity declaration

CE

Following described machine complies with the appropriate basic safety and health requirement of the EC Low Voltage Directive No: 73/23 / EEC and EC Electromagnetic Compatibility Directive 89/336 / EEC based on its design and type, as brought into circulation by us.

Note:
ComAp believes that all information provided herein is correct and reliable and reserves the right to update at any time. ComAp does not assume any responsibility for its use unless otherwise expressly undertaken.

WARNING – VERY 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).

Every time you want to disconnect following NT controller terminals:

- Mains voltage measuring and / or
- Binary output for MCB control and / or
- MCB feedback

Be aware that the MCB can be switched off and gen-set can start !!!

Switch the controller to MAN mode and disconnect the Binary outputs Starter and Fuel to avoid unexpected automatic start of gen-set and GCB closing.

!!! CAUTION !!!

Dangerous voltage

The terminals for voltage and current measurement should never be touched.
Properly connect the grounding terminals.
Do not disconnect the CT terminals for any reason.

Adjust set points

All setpoints are preadjusted to their typical values. But the set points in the "**Basic settings**" settings group **!!must!!** be adjusted before the first startup of the gen-set.

!!! WRONG ADJUSTMENT OF BASIC PARAMETERS CAN DESTROY THE GEN-SET !!!

The following instructions are for qualified personnel only. To avoid personal injury do not perform any action not specified in this User guide !!!

Clarification of notation

HINT
This type of paragraph points out details to help user installation/configuration.

NOTE:
This type of paragraph calls readers' attention to a notice or related theme.

CAUTION!
This type of paragraph highlights a procedure, adjustment, etc. which may cause damage or improper functioning of the equipment if not carried out correctly and may not be clear at first sight.

WARNING!
This type of paragraph indicates things, procedures, adjustments, etc. which demand a high level of attention, otherwise personal injury or death may occur.

EXAMPLE:

This type of paragraph indicates examples of usage for illustrational purposes.

Available Firmware and Archive sets

Bank Controller – firmware/hardware/archive compatibility:

Firmware (*.mhx)

InteliSys NT BaseBox InteliSys NTC BaseBox
IS-NT-BC-1.2.0.mhx

Archives (*.ant)

InteliSys NT BaseBox InteliSys NTC BaseBox
IS-BC-MINT-1.2.0.ant

Gen-set Controller – firmware/hardware/archive compatibility:

The subordinated Gen-set controller has to be loaded with appropriate FW, IGS-NT-3.3.0 and higher. The special “XXX-MINT-BC” archive must be used.

Firmware (*.mhx)

For IG-NT-GC and IG-NTC-GC	For IG-NT-BB and IG-NTC-BB	For IS-NT-BB and IS-NTC-BB
IG-NT-GC-3.3.0	IG-NT-BB-3.3.0	IS-NT-3.3.0

Archives (*.ant)

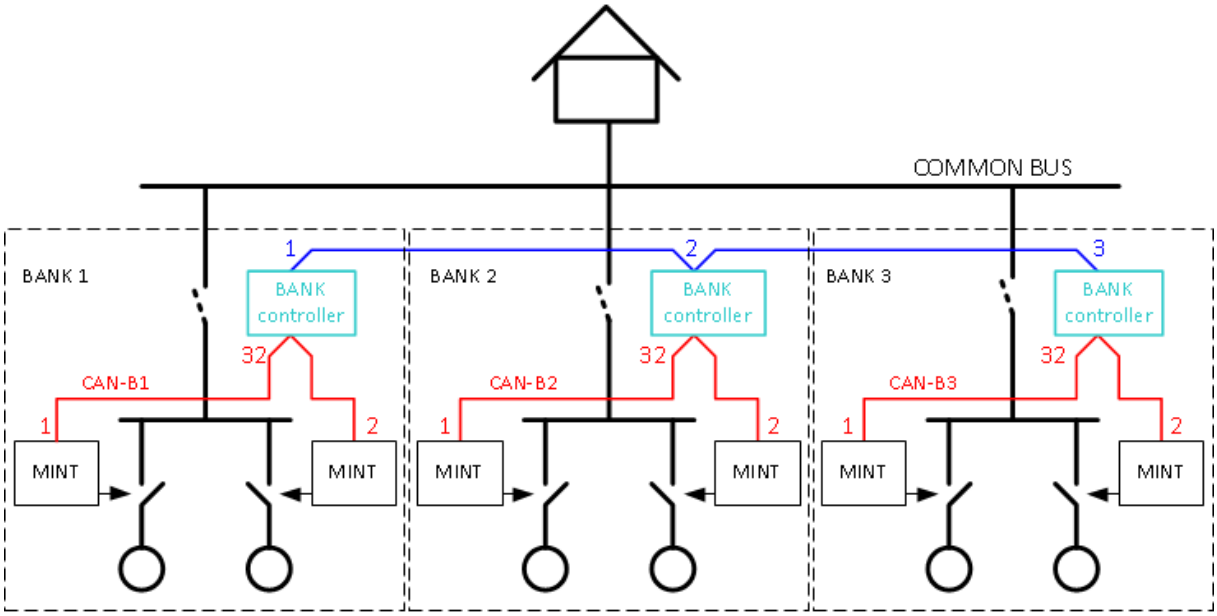
For IG-NT(C) GC	For IG-NT-BB and IG-NTC-BB	For IS-NT-BB and IS-NTC-BB
IG-GC-MINT-BC-3.3.0	IG-BB-MINT-BC-3.3.0	IS-MINT-BC-3.3.0

General description of system with Bank Controller

NOTE:
The "Bank controller" is a firmware branch for InteliSys NT controllers (any of it's hardware modification). For more details about the available Firmware, Hardware and Archive file consult this chapter.

NOTE:
In the role of "MINT" controller the InteliGen NT or InteliSys NT controller with appropriate Firmware and Archive must be used. For more details consult this chapter.

The "Bank controller" concentrates group of gen-sets, equipped with IG-NT or IS-NT MINT application, so that from the outside point of view the group behaves as one large gen-set. Bank controllers can be connected together so that large "tree-style" multisites (power stations) can be created. The aim of the Bank controller is to overrride the limit 32 controllers on the CAN-2 bus.



TREE-STYLE POWER STATION

Several important notes to the tree-style structure:

- One bank can contain up to 31 controllers. Address 32 is reserved for the Bank controller itself.
- It is possible to connect up to 32 banks together.
- Load sharing, VAR sharing and shared peripherial modules do work over the whole multisite.
- Power management works among all the gen-sets in the system to ensure the equal run hours and the most efficient combination of running gen-sets to cover the actual load demand and the requested load reserve.

Installation

NOTE:
InteliGen NT or InteliSys NT controller (any of their hardware modification) equipped with the "IGS-NT-LSM-PMS" dongle and programmed with IG-NT-BC or IS-NT-BC firmware must be used at the place of the Bank controller.

NOTE:
It is not possible to monitor the whole multisite using one InteliMonitor. Each CAN bus must be monitored separately.

CAN bus wiring

CAUTION!
Each controller in one segment of the CAN bus must contain unique controller address!

Inter gen-set controller CAN (CAN-B)

The Bank controller is connected with the gen-sets inside the bank via the CAN1 interface. That means although the gen-set controllers are connected to the intrabank bus via their CAN2 interface the bank controller uses CAN1 instead. The bank controller has fixed address 32, so gen-set controllers can use address 1-31. See the *Figure: CAN bus wiring.*

NOTE:
The gen-set controller is never connected directly to the CAN-A but it has to be always subordinated to some BankController.

NOTE:
The request of the Bank Controller to run it´s subordinated gen-sets is distributed internally via CAN-B as internal command Syst start/stop. It is not needed to be configured in the subordinated gen-set.

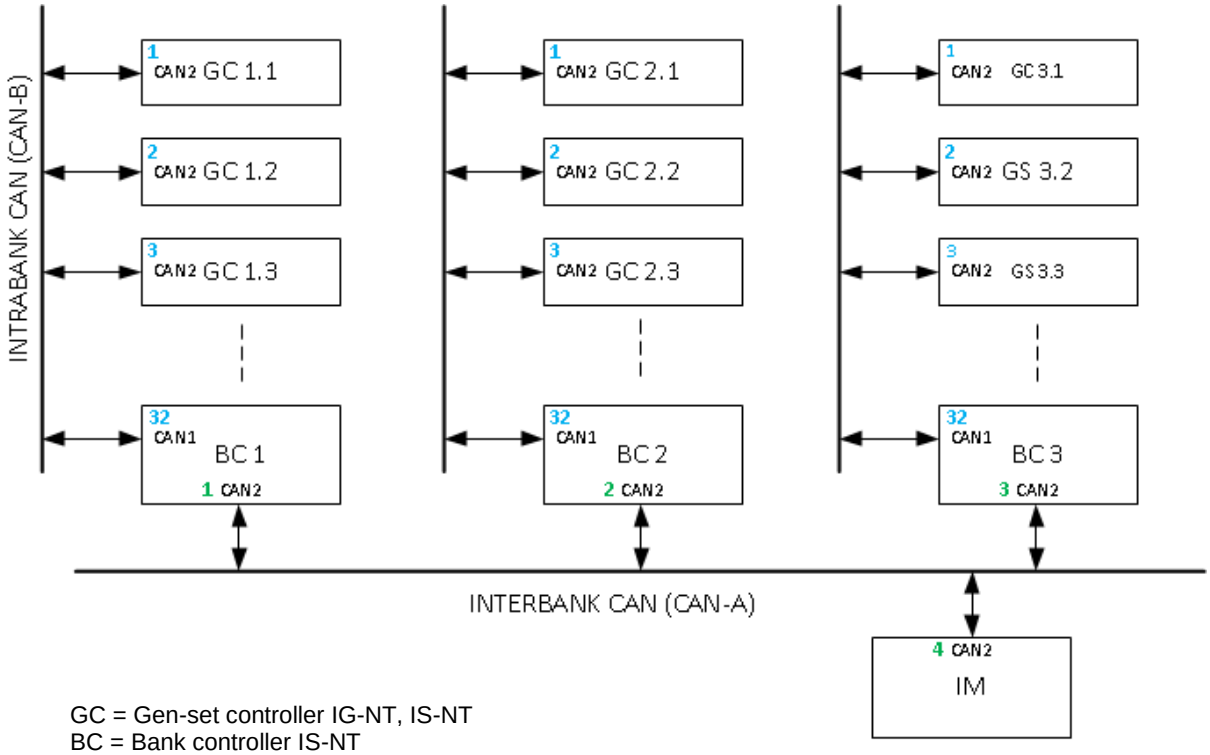
Interbank CAN (CAN-A)

Bank controllers are connected together via their CAN2 bus. The interbank bus can also contain InteliMains-NT controllers. Address of the bank controller is adjusted by the setpoint *Comm Settings: Controller Address*.

NOTE:
It is not possible to use any peripherial module at CAN1 interface of the bank controller.

NOTE:
It is not possible to use InteliMains-NT controllers within the bank. The bank must contain only InteliGen NT or InteliSys NT controllers with standard firmware and special “MINT-BC” archive.

NOTE:
The general rules for CAN bus wiring remain valid, i.e. the total length of the CAN bus must not exceed 200m (250kbps) or 800m (50kbps).



GC = Gen-set controller IG-NT, IS-NT
BC = Bank controller IS-NT
IM = InteliMains-NT

Figure: CAN bus wiring

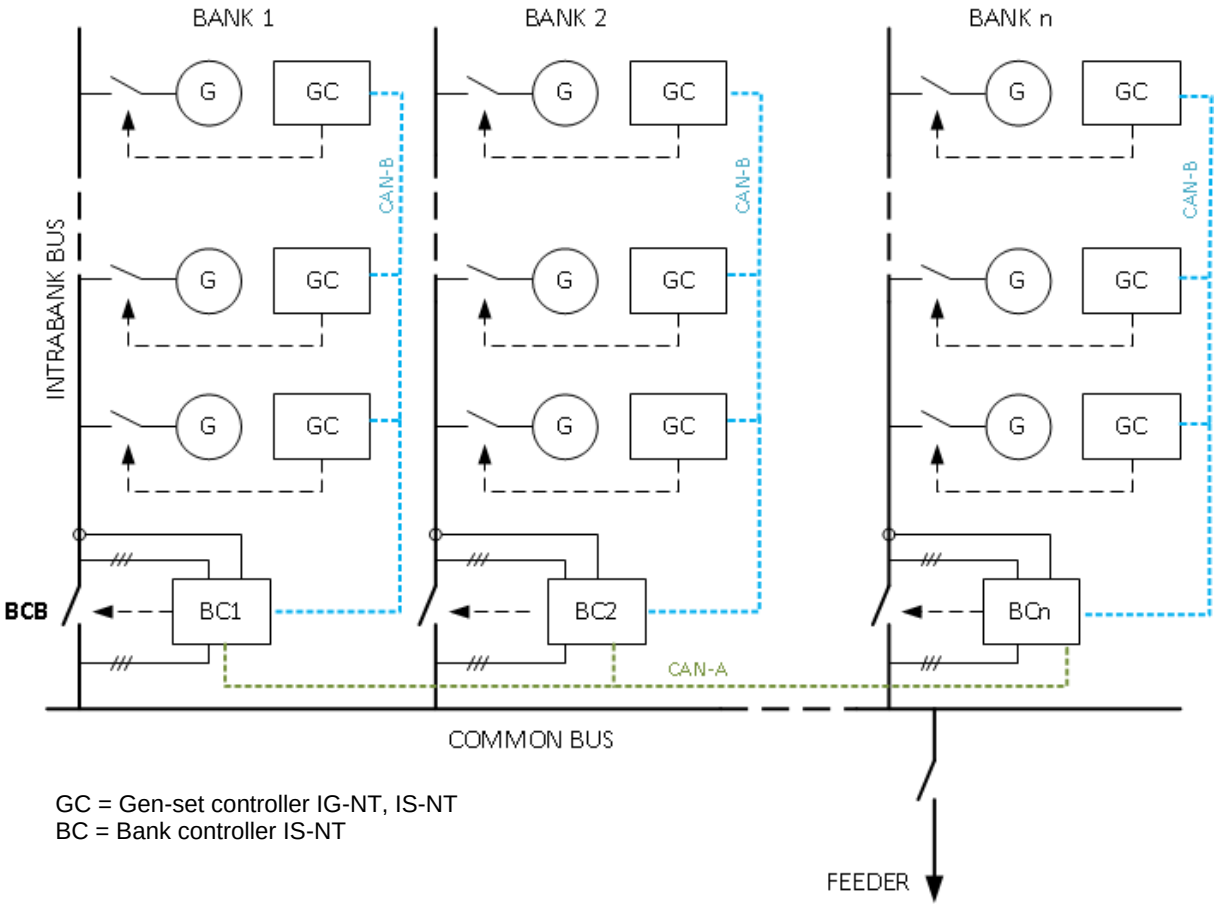
Power lines wiring

The wiring of the power lines can be carried out in two ways.

1. One large common bus to which all gensets connect directly.
2. Separated bank buses connected to the common bus via Bank circuit breakers (BCB). In this case the bank controller first starts the bank and when it is running the bank controller synchronizes the bank to the common bus. **This option is reccommended to be used whenever it is possible.**

CAUTION!
Feeders and/or mains inlets must be connected to the common bus only. There must not be any load connected to the intrabank bus.

If the function *LBI: BCB feedback* is configured at some input the controller assumes the BCB is used. If this function is left unconfigured then connection without BCB is assumed.



GC = Gen-set controller IG-NT, IS-NT
BC = Bank controller IS-NT

Figure: Power line wiring of system with the BCB

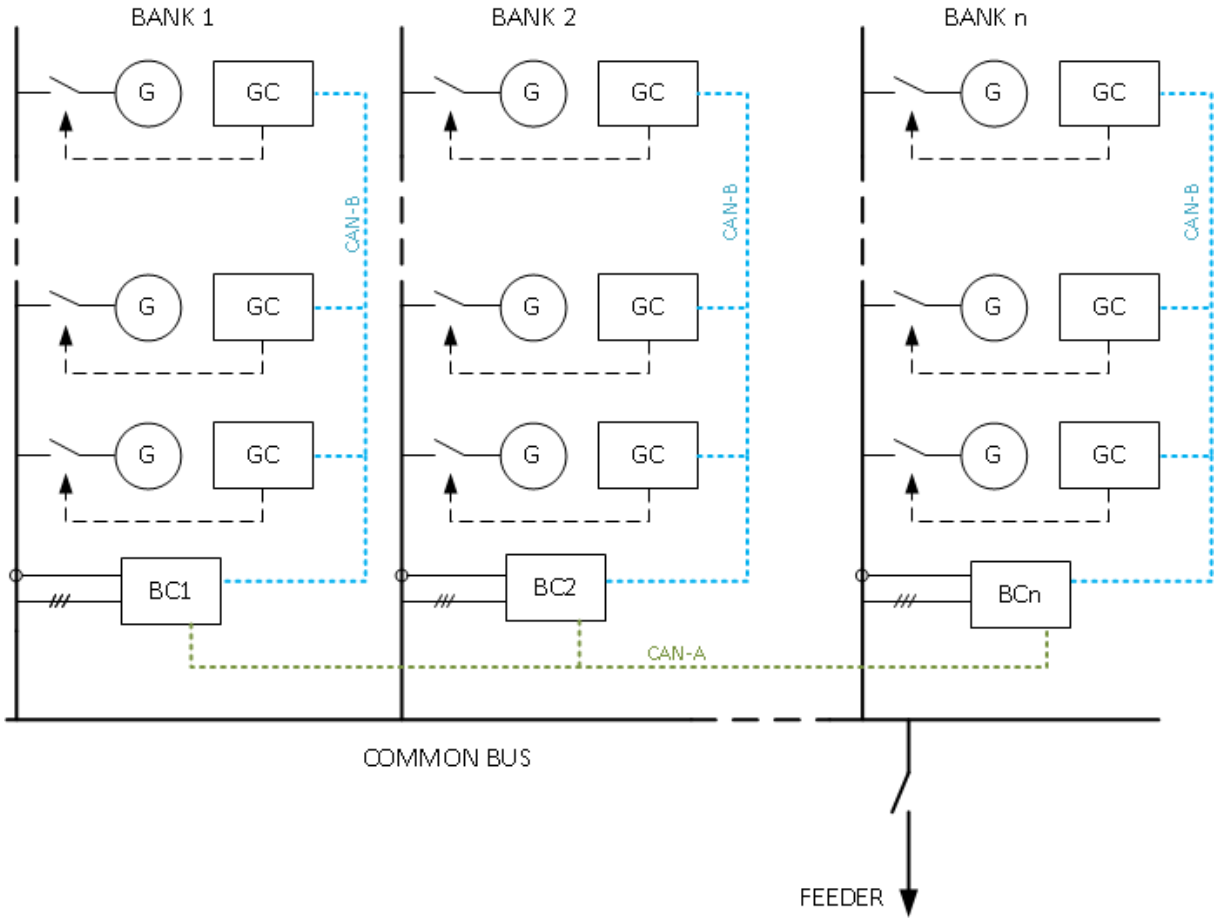


Figure: Power line wiring of system without the BCB

AC measurement

The wiring of AC measurement depends on the type of wiring of the power lines (see Power lines wiring paragraph above). If **BCB is used** following AC values are to be measured:

- Bank bus voltage, 3phase, required
- Common bus voltage, 3phase, required
- Bank current, 3phase, recommended

Following AC values are to be measured in systems **without** BCB:

- Bank bus voltage, 3phase, recommended
- Bank current, 3phase, optional

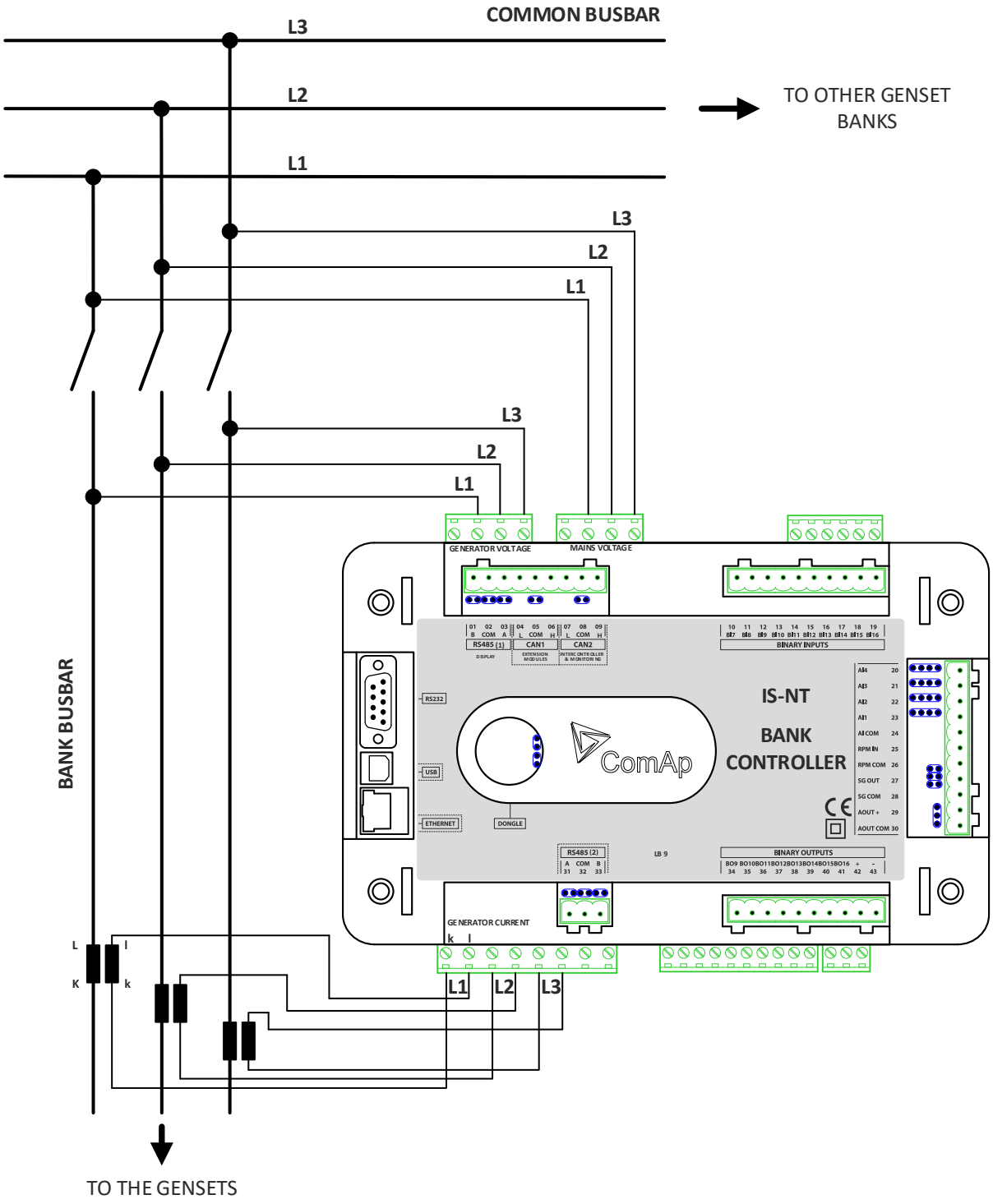


Figure: AC measurement with the BCB

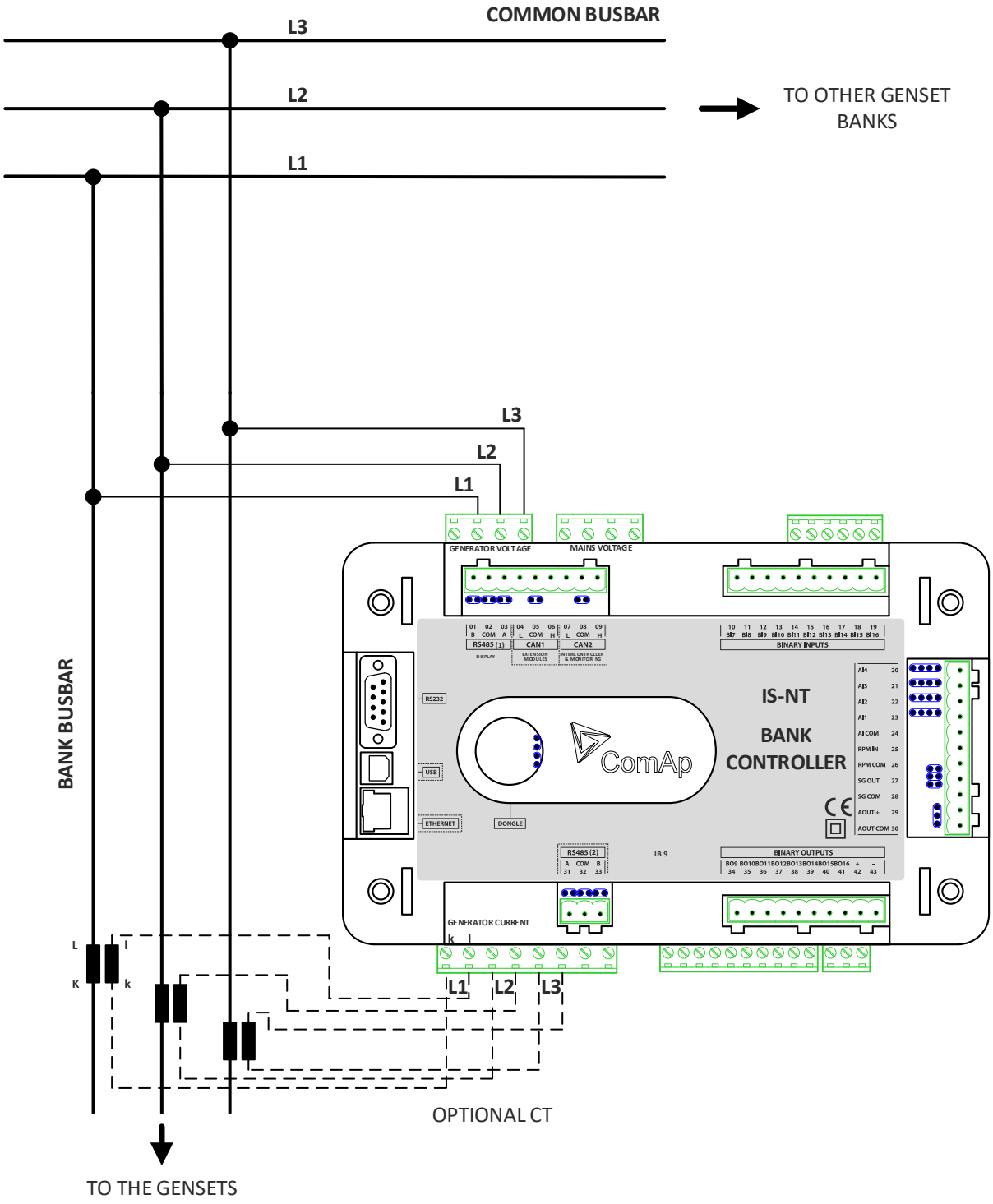


Figure: AC measurement without the BCB

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

BCB control and synchronizing

If the system is equipped with BCB the BCB is controlled by the Bank controller. There is a set of control outputs for various types of the breaker or contactor: *BCB close/open*, *BCB ON coil*, *BCB OFF coil*, *BCB UV coil*. Breaker feedback signal is to be connected to the binary input with logical function *BCB feedback*. If this logical function is not configured on any binary input the bank controller assumes BCB is not used. See the chapter Installation for information about proper wiring of the site with or without BCB.

BCB can be closed to the common bus as soon as all the available gensets in the bank are running. If there is countervoltage on the common bus the breaker is synchronized, otherwise it is closed to the dead bus.

In automatic mode the breaker is controlled automatically, in manual mode by the button on the controller front panel or InteliVision.

Functions

OFF-MAN-AUT mode

OFF mode

The bank (gen-sets inside the bank) cannot be started. If START,STOP,BCB ON/OFF buttons are pressed the controller will not respond.
When the gen-set inside the bank are running it is not possible to switch directly to OFF mode. First you have to stop the bank.

MAN mode

1) START – Activates the internal signal *Sys start/stop* and causes start of the gen-sets inside the bank.
2) GBCB ON/OFF
   If the bank bus bar voltage is out of the limits (adjusted in the setpoint group *Gener protect*) controller does not respond to the BCB ON/OFF
   a) controller closes BCB to dead bus.
   b) controller starts BCB synchronizing when bus voltage is OK and MCB is closed or when other bank provide healthy voltage to the bus. Closes the BCB when synchronized and stays running in parallel (island or mains parallel).
   c) Unloads the bank and opens the BCB if the bank was running in parallel to the mains or to other banks.
3) STOP
   a) When bank is running in parallel to other banks or the mains: transfers the load to the mains or to other banks, opens BCB (internal signal *Sys start/stop* is deactivated and the gen-sets inside the bank are going into cooling state and then are stoped).
   b) When bank is running in single island (or in general there is no mains and no other bank to take over the load to): opens BCB (internal signal *Sys start/stop* is deactivated and the gen-sets inside the bank are going into cooling state and then are stoped).

AUT mode

1) When the LBI: Sys start/stop (at the Bank Controller) is activated, only the subordinated gen-sets necessary to cover the actual load and requested load reserve are started (setpoint *Powermanagement: Pwr management* is set as ENABLED. The power management can be based on kW, kVA or on relative % reserve. The start of the bank is:
   a) 1 sec delayed when MCB FEEDBACK binary input is closed (mains parallel)
   b) delayed #*SysAMFstrt del* when MCB FEEDBACK binary input is opened – start to island parallel (multi AMF) situation
2) The first bank closes the BCB to the dead bus (if the system with BCB is used), the rest are synchronized to the bus as soon as at least subordinated gen-set in the bank closes it´s GCB and energizes the bank powerline.
3) When all necessary gen-sets are connected to the bus and *LoadRes strt* is achieved, SYST RES OK output is closed. Output could be used to close the MGCB (Master GCB).
4) Total load and power factor are shared between parallel operating gen-sets.
5) Close input LOAD RESERVE 2 (or 3 or 4) and use setpoint *LoadRes strt2*(or 3 or 4) to switch to another load reserve setting. E.g. high load reserve during system start to be able to switch-on big devices, then during normal operation lower reserve to save engines (and fuel).
6) If total load increases and selected *LoadRes strt* is no more fulfilled, after a *Next start del* next ready gen-set with the highest priority (lowest priority number) is started and synchronized to the bus.
7) If load decreases and selected *LoadRes stp* is exceeded, after a *Next stop del* the running gen-set with the lowest priority is unloaded, got off line, cooled and stopped.
8) Complete gen-sets group stops when binary input SYS START/STOP opens. If the input MCB FEEDBACK is closed (gen-sets are in parallel to mains) controllers softly transfer the load to the mains. When gen-set is unloaded (see *GCB open level* or *GCB open del*) opens the output GCB CLOSE/OPEN.
9) The Running hours balancing or Load demand engines swap can be activated in power management.

HINT:
It is strictly recommended to operate all Bank Controllers and even all subordinated gen-set controllers in AUT mode to allow all the function like power management to be performed to ensure the moste efficient running of the system and run hours equalization across the whole installation.

NOTE:
If the wiring without the BCB is used the gen-sets are connected or synchronized to the common bus bar (power line) directly like in the standard MINT application.

Active and Reactive Power control in the system with Bank Controller

NOTE:
The active and reactive power of the system is controlled by the Bank Controller (the gen-set controller just take the equal portion of the power to ensure the equal load sharing and VAr sharing.

NOTE:
The power or PF control modes System Base load, System Base power factor, Import-Export, Import/Export power factor can be used when the system is running in parallel operation to mains (*LBI: MCB feedback* is active).

System Base load

Gen-set group is controlled on constant (or adjustable) power. The Baseload value can by changed by setpoint or via analog input.
Important setpoints: **ProcessControl**: *#SysLdCtrlPtM* = BASELOAD; *#SysBaseload*; *SysBaseLdMode.*

System Base power factor

Gen-set group is controlled in mains parallel to keep a constant (or adjustable) power factor.
Important setpoints: **ProcessControl**: *#SysPFCtrlPtM* = BASEPF; *#SysPwrFactor.*

Import-Export

Gen-set group is controlled to keep constant (or adjustable) Import or Export value. The external controller InteliMains NT must be connected on the CAN2 to control gen-set group kW I/E.
Important setpoints: **ProcessControl**: *#SysLdCtrlPtM* = LDSHARING*.*

Import/Export power factor

Gen-set group is controlled to keep constant (or adjustable) Import or Export power factor.
Important setpoints: **ProcessControl**: *#SysLdCtrlPtM* = VSHARING. The external InteliMains NT controller must be connected on the CAN2 to control gen-set group PF I/E.

Local Baseload

Selected gen-set from island or mains parallel running group can be loaded to constant *LocalBaseload* value. This bank with active function Local Baseload is taken out from load sharing and keeps the load of the bank to be equal to the setpoint *ProcessControl: LocalBaseload*. The power of the bank is only reduced when common group actual load is lower than this value, on the other hand is increased if the other banks (gen-sets) running in loadsharing are not able to cover the load themselves. The gen-sets in the group will try to match their *LocalBaseload*s (when more than one are put to local baseload) based on their controller addresses, so the first limited would be the one with the highest CAN address.

Power management in system with Bank Controller

The Power management function in the system with Bank Controller decides how many banks and subordinated gen-sets has to be running to cover the actual load and requested load reserve. On the top of it the system ensures that the most efficient combination of the gen-sets (banks) to cover the load and requested load reserve is running. The run hours equalization of particular gen-sets is also ensured.
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 management:** *#Pwr mgmt mode* 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.

CAUTION!
The function of the controller is designed to handle the maximum sum of nominal power at 32000kW (3200.0kW, 320.00MW 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 2000kW of nominal power. The sum of the nominal power is 40000kW. 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 40MW (it does not exceeds 320.00MW).

In the system with Bank Controller the power management is performed on two lovels, because the system consists of several independent groups of gen-sets (CAN segments). The Bank Controller distributes the data necessary for load sharing and VAr sharing among all the subordinated gen-set groups (CAN segments) to ensure the equal distribution of the load. On the top of it it performs the inter bank powermanagement. In the same time the second level of power management is performed between the subordinated gen-sets inside the bank to provide the requested portion of power and requested load reserve (not oll the gen-sets inside the bank are needed to be running simultaneously.

1. 1. Powermanagement inside the bank

The powermanagement inside the bank (the power management between the subordinated gen-sets) respects the general principles of standard power management in standard MINT application, however it is partly limited on this level, because some functionalities is performed on the level of inter bank powermanagement and would be duplicated.

- The setpoints for setting of load reserves has been removed.
- Relative and kVA mode is not supported.
- Control Groups settings has been removed.

The Powermanagement inside the bank ensures:

- Starting and stopping of subordinated gen-sets according to the system load and the requested load reserve.
- Priority Autoswap function inside the bank in “RUN HOURS EQU”, “LD DEMAND SWAP”, “EFFICIENT” modes to ensure the most efficient combination of the gen-sets inside the bank to be running and equalization of run hours among all the gensets inside the bank.

2. 1. Interbank powermanagement

The interbank power management works the same way like the standard MINT application. Starting and stopping of particular banks is always based on priorities,actual systemload and actual set of load reserves.

- The powermanagement can run in Absolute or Relative mode (like describes in *Figure: Power management based on absolute load reserve* and *Figure: Power management based on relative load reserve*) selectable by the setpoint **Pwr management:** *#Pwr mgmt mode*.
- In the Absolute mode the power management can be evaluated based on the kW or kVA value (setpoint **Pwr management:** *#Pwr mgmt mode*).
- The banks are started or stopped based on priorities (setpoint **Pwr management:** *Priority*) when **Pwr management:** *#PriorAutoSwap = DISABLED*.
- The actual priority of each bank can be changed by the power management to equalize the run hours of the banks **Pwr management:** *#PriorAutoSwap = RUN HOURS EQU*. (each bank counts

it´s run hours as average value of run hours of subordinated gen-sets) or according to the powerbands **Pwr management:** *#PriorAutoSwap = LD DEMAND SWAP*. Then the priority of starting and stopping of particular banks is based on the Value **Pwr management:** *EnginePriority.*

- The power formats (0,1kW/1kW/0,01MW) between the banks and between the ge-sets can be set differently.

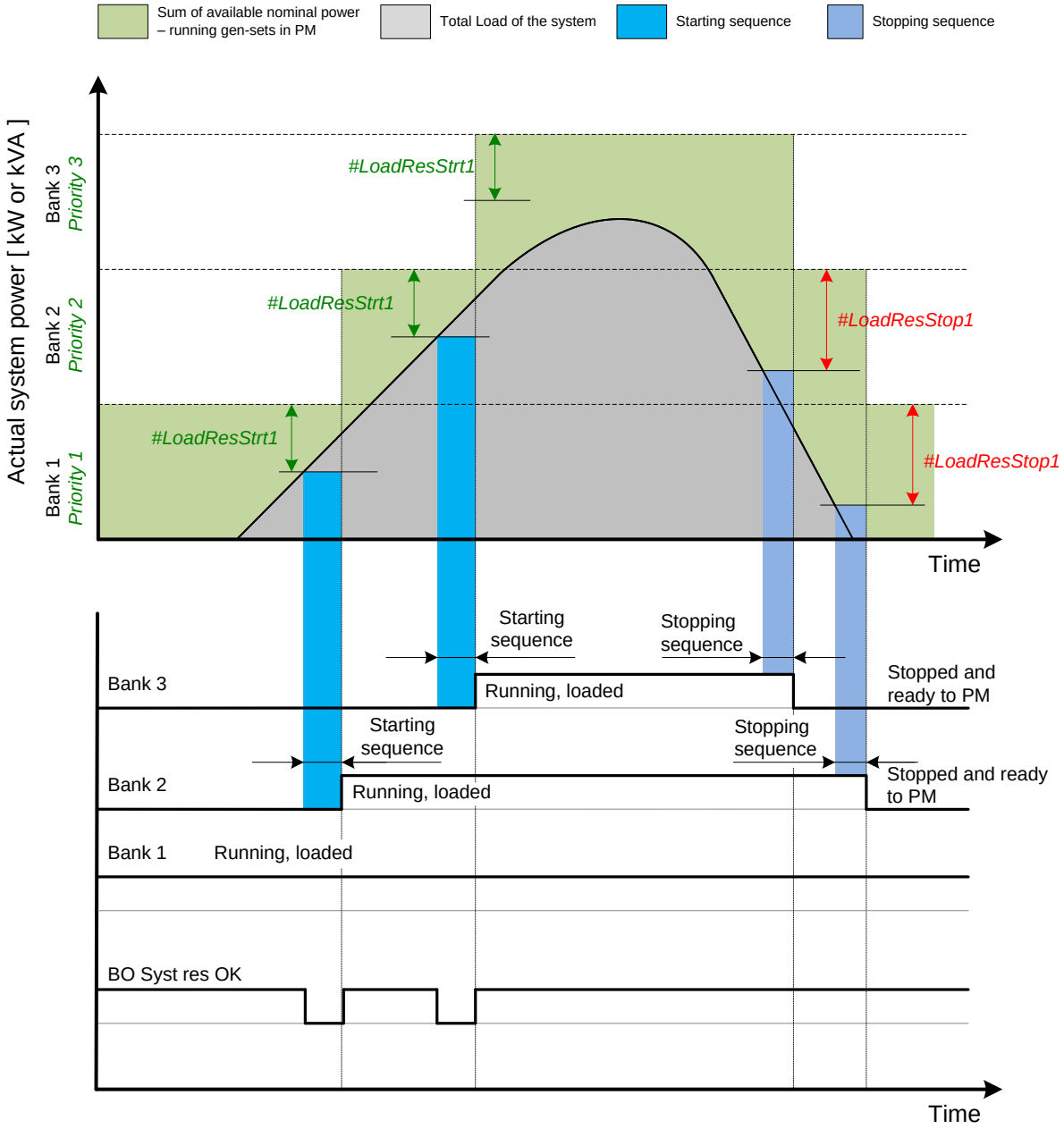


Figure: Power management based on absolute load reserve

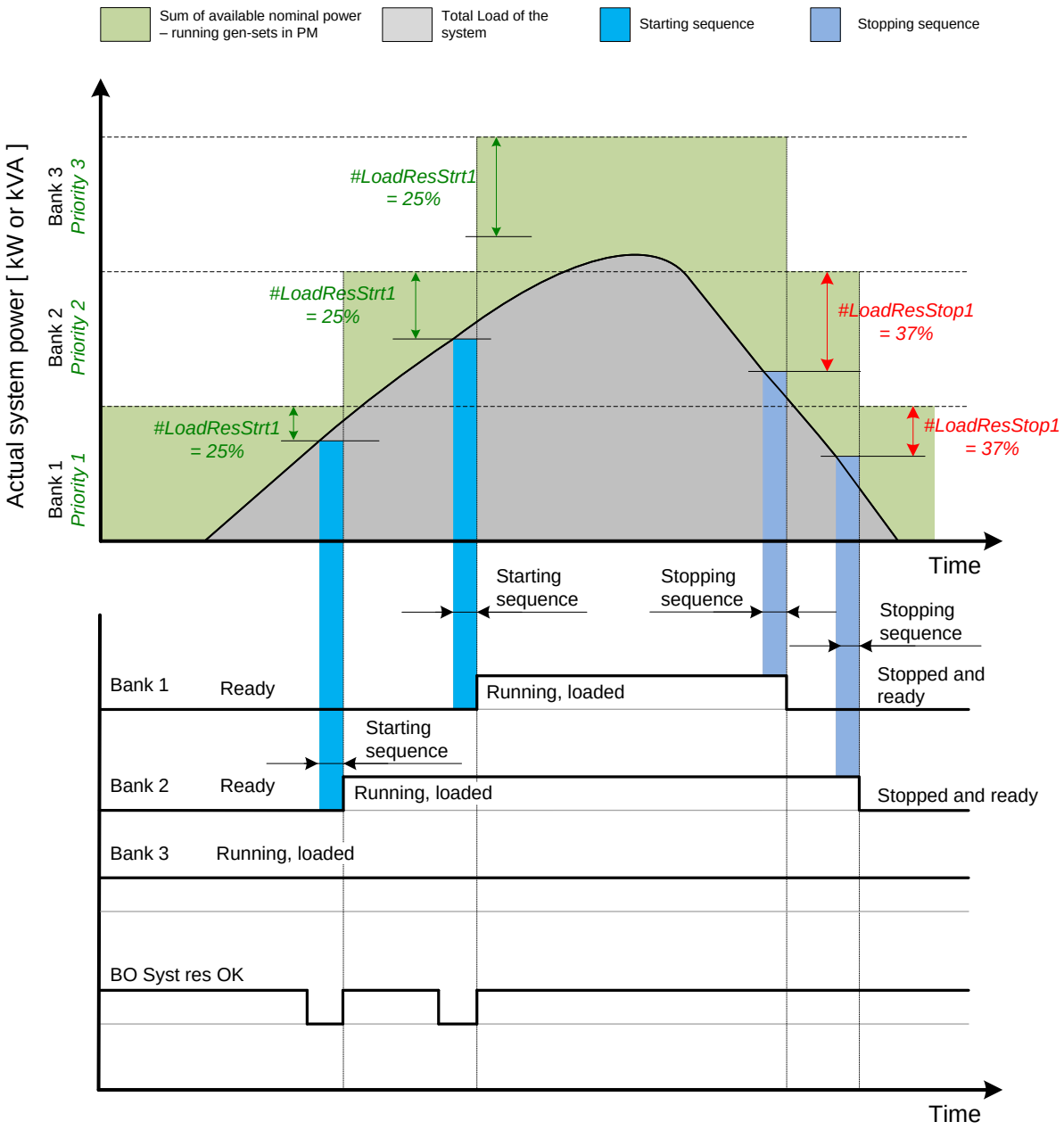


Figure: Power management based on relative load reserve

1.2. Automatic priority swapping between the banks

The Bank 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 Bank Controllers choose the banks to be running with consideration of their average running hours and the actual load. The *Running hours equalization* (RHE) function keeps a constant maximal difference of bank´s running hours. The *Load demand swap* (LDS) function keeps running only the banks with suitable nominal power to avoid inefficient fuel consumption or bank overload.

At least one Bank Controller in the group must be set as the master for priority optimization (**Pwr Management:** *Priority ctrl* = 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: Pwr management: *#PriorAutoSwap*

The Automatic priority swapping function does not change the setpoint **Pwr management:** *Priority*. The function sets the order of banks by virtual values “engine priority”.

1.2.1. Running hours equalization (RHE)

Each particular bank counts it´s run hours as average value of run hours of subordinated gen-sets. This value is used in the function of run hours equalization between the banks.

The bank priorities are automatically swapped to balance engine running hours. In other words, the controllers compare Run hours of each bank and select banks to run in order to maintain constant maximal difference of running hours.

Activation: Pwr management: *#PriorAutoSwap* = RUN HOURS EQU
Important setpoints: *#RunHrsMaxDiff, Priority ctrl, Control group*

The actual values to be considered by the Running Hours Equalization are calculated from the following formula:

1.2.2. Load demand swap (LDS) – different sized banks

If there are banks of different size at the site, it may be required always to run such banks that best fit to the actual load demand. The *Load demand swap* function is intended for this purpose and can control up to 3 banks. Up to three running banks can be swapped based on load demand (e.g. one “small” engine may run on “small” load and swaps to another one, “big” bank that runs when load increases). This function is available **only in combination with absolute power management**.

Activation: **Pwr management:***#PriorAutoSwap = LD DEMAND SWAP*
Important setpoints: *#PwrBandContr1*, *#PwrBandContr2*, *#PwrBandContr3, #PwrBandContr4*, *#PwrBandChngDlUp, #PwrBandChngDlDn, Load reserve setpoints (depending on selected load reserve set), Priority ctrl, Control group.*

The banks must have addresses 1, 2 and 3. There are four power bands; each of them has adjusted specific combination of banks that run within it. Power bands are adjusted by setpoints *#PwrBandContr1, #PwrBandContr2, #PwrBandContr3* and *#PwrBandContr4*. The load levels of the power bands are defined by sum of available nominal powers of banks that are adjusted to run in each particular power band, and the load reserve for start. The combinations of banks 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 banks are ordered to run. In fact there is power band #5, which has fixedly selected all the banks 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 **Pwr management:** *#PwrBnChngDlUp* or **Pwr management:** *#PwrBnChngDlDn* depending on the direction of the change. The banks which are included in the current power band get engine priority 1, the others get priority 32. The setpoint **Pwr management:** *Priority* is not influenced by this function. Virtual values “engine priority” are used.

NOTE:
If the power band change delays (i.e. **Pwr management:** *#PwrBnChngDlUp* and **Pwr management:** *#PwrBnChngDlDn*) are adjusted to higher values than **Pwr management:** *#NextStrt del* and **Pwr management:** *#OverldNextDel* 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.

1.3. Minimum Running Power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running banks (and their subordinated gen-sets). If the function is active, then the gen-sets would not be stopped, although the reserve for stop is fulfilled.

There are 3 different *MinRunPower* setpoints.

- *#MinRunPower 1* considered if LBI *MinRun power 1* activated
- *#MinRunPower 2* considered if LBI *MinRun power 2* activated
- *#MinRunPower 3* considered if LBI *MinRun power 3* 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 banks cooperating together in Power management must have the same Minimal Running Power set selected.

It is possible to use virtual shared peripheries for distribution of the binary signal activating LBI MinRun Power 1,2 or 3 among controllers over the CAN bus.

1.4. Control Groups

The physical group of the banks (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 bank 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 **Pwr management:** *Control group*. 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 input *GroupLink* (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 **Pwr management:** *GroupLinkLeft* and **Pwr management:** *GroupLinkRight*.

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.

- If the "group link" is opened the two groups act as two separated groups. If it is closed the roups act as one large group.

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.

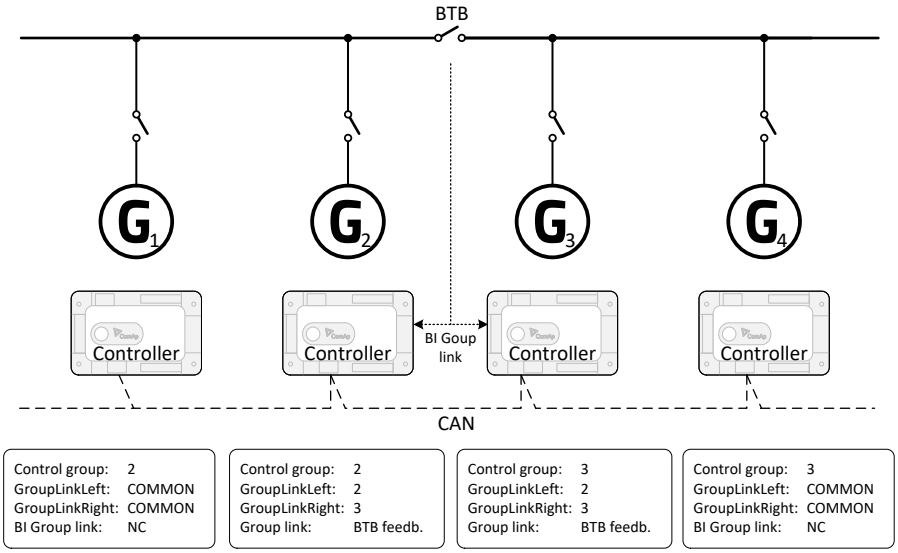


Figure: Example of control groups

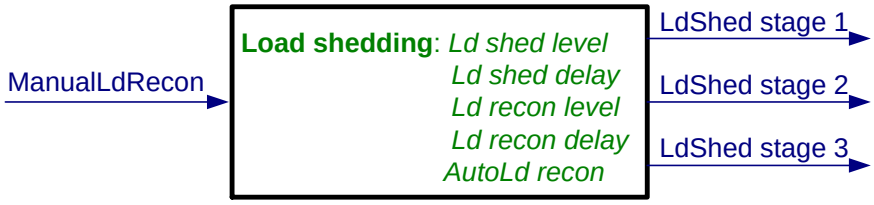
Once the BTB breaker is closed, the control group 2 and 3 become new group 2+3. The closed BTB and the group link function influence the load reserve (i.e. increased by added gen-set of added gen-sets). Load sharing applies for all gen-sets.

Load shedding

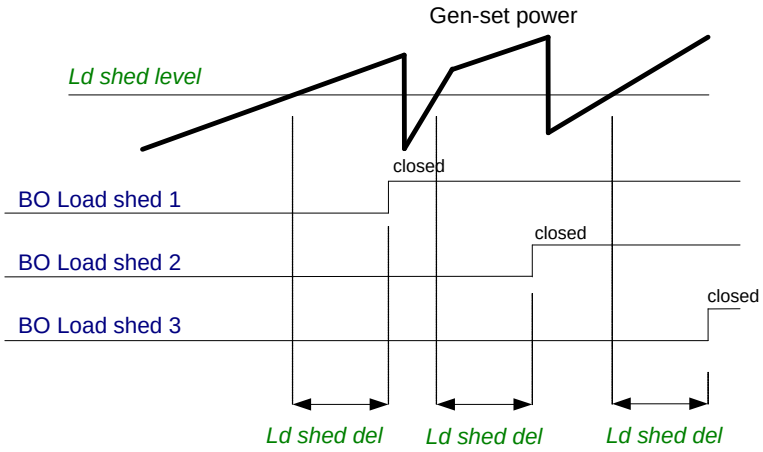
All LOAD SHED outputs are activated (closed) to trip the unessential load when gen-set goes to island:

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

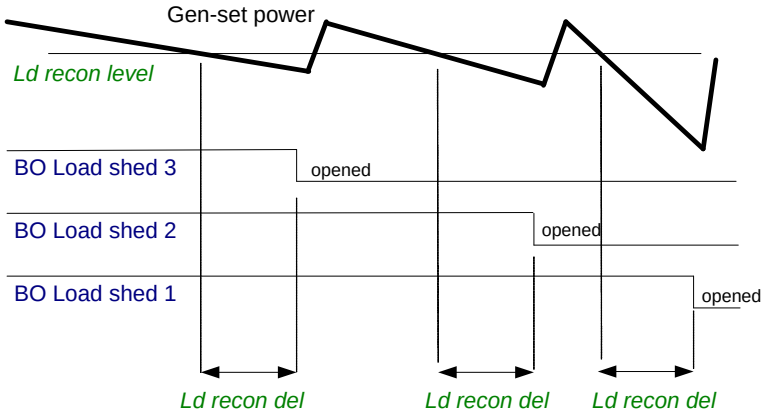
The load shedding function is active in all controller modes except OFF.
Load shedding has three steps and each step is linked with its own Load shed x binary output. There is only one load shed level and delay for all three steps as well as recon level and delay. Load shed can only move from one step 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 setpoint needs to be disabled (*AutoLd recon* = DISABLED) and the MAN load recon binary input needs to be configured.
Rising edge on this input resets the controller to a lower stage, but only if the load is under the *Ld recon level* at that moment.



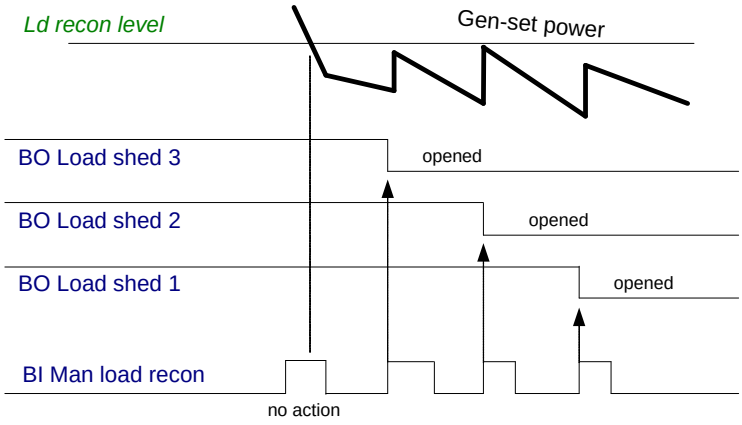
HINT
If no Load Shedding outputs are configured, there is no record to history and no scrren timer indication of the activity of this function.



Load reconnection – automatic -> *AutoLd recon* = ENABLED



Load reconnection – manual -> *AutoLd recon* = DISABLED



Circuit breakers operation sequence, CB fail detection

NOTE:
In the following text, “CB” abbreviation is used for BCB (Bank Circuit Breaker) respectively.

Related binary inputs:

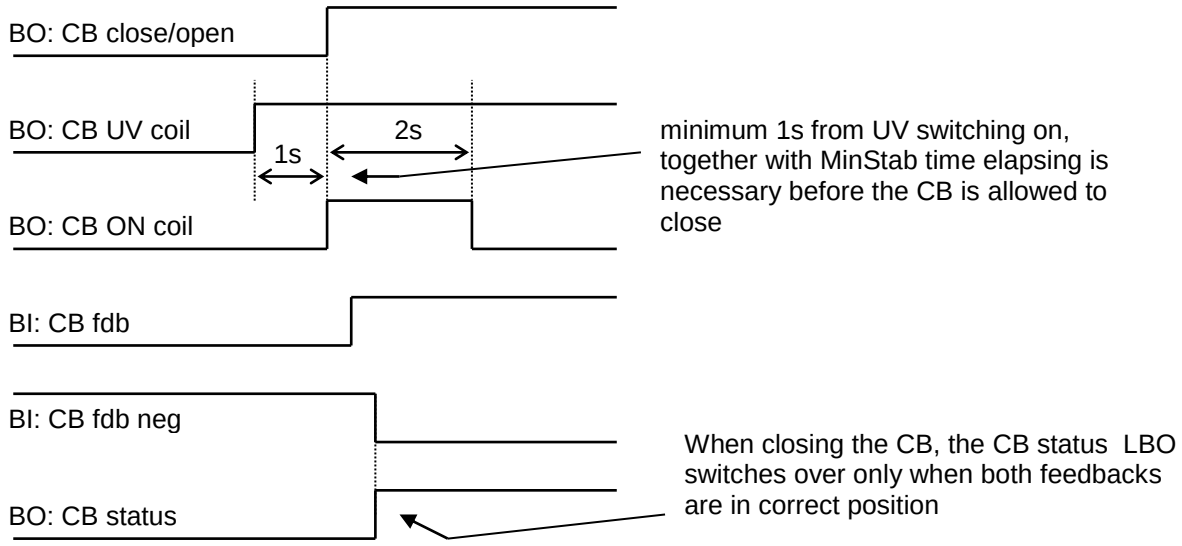
- CB fdb – CB feedback binary input
- CB fdb neg – negative CB feedback binary input. Used for increasing the reliability of CB status evaluated by the controller. In case that it is not configured, negative value of CB fdb is calculated internally within the controller.

Related binary outputs:

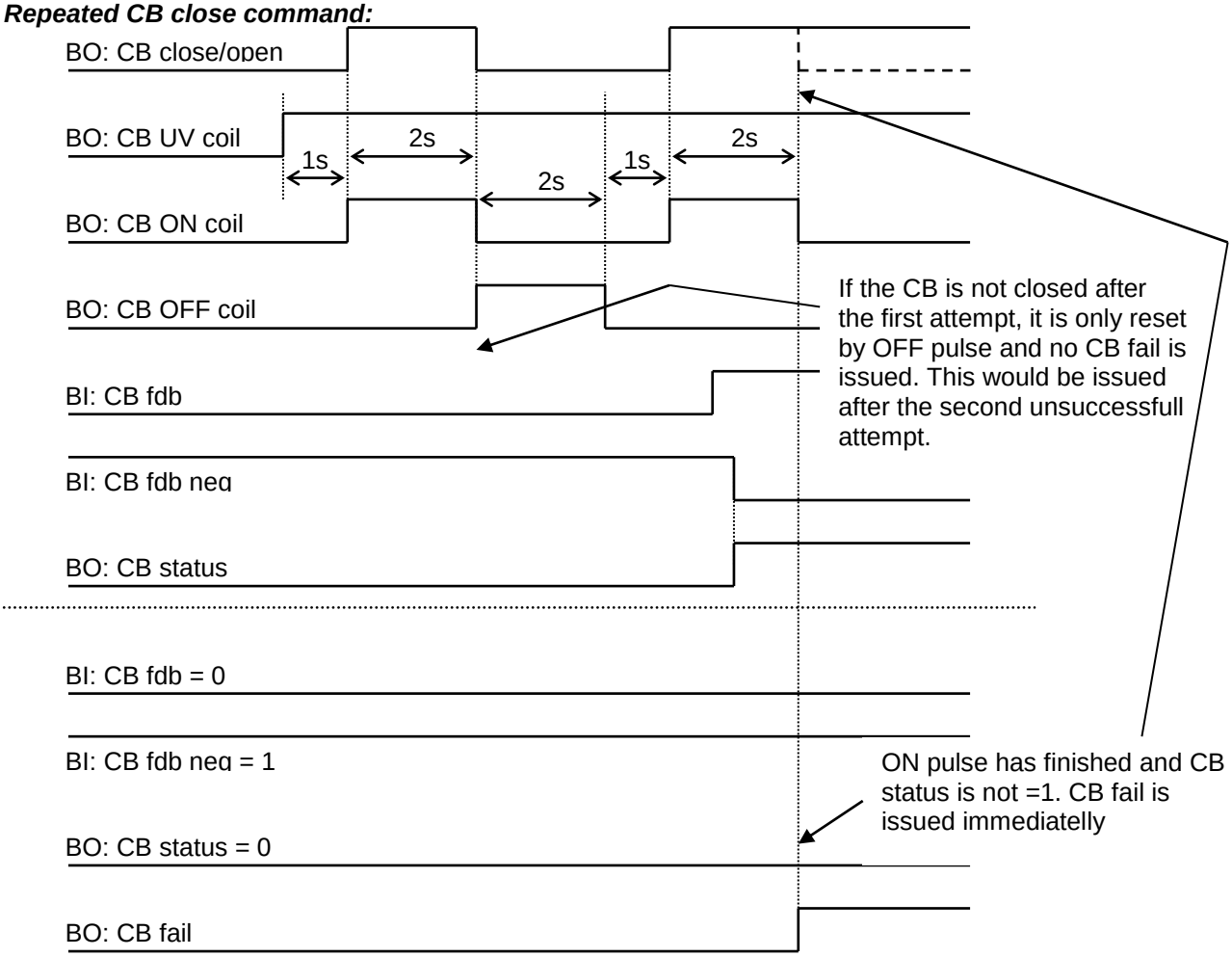
- CB close/open – output for circuit breaker. Equals to 1 during the time when CB is requested o be closed.
- CB ON coil – output for closing coil of the CB. 2s pulse (5s if synchronising is not provided by the particuilar CB) is used for closing the CB.
- CB OFF coil – output for opening coil of the CB. 2s pulse (5s if synchronising is not provided by the particuilar CB) is used for opening the CB.
- CB UV coil – output for undervoltage coil of the CB. Permanently active, 2s negative pulse (5s if synchronising is not provided by the particuilar CB) is used for CB opening request
- CB 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.

Possible CB sequences:

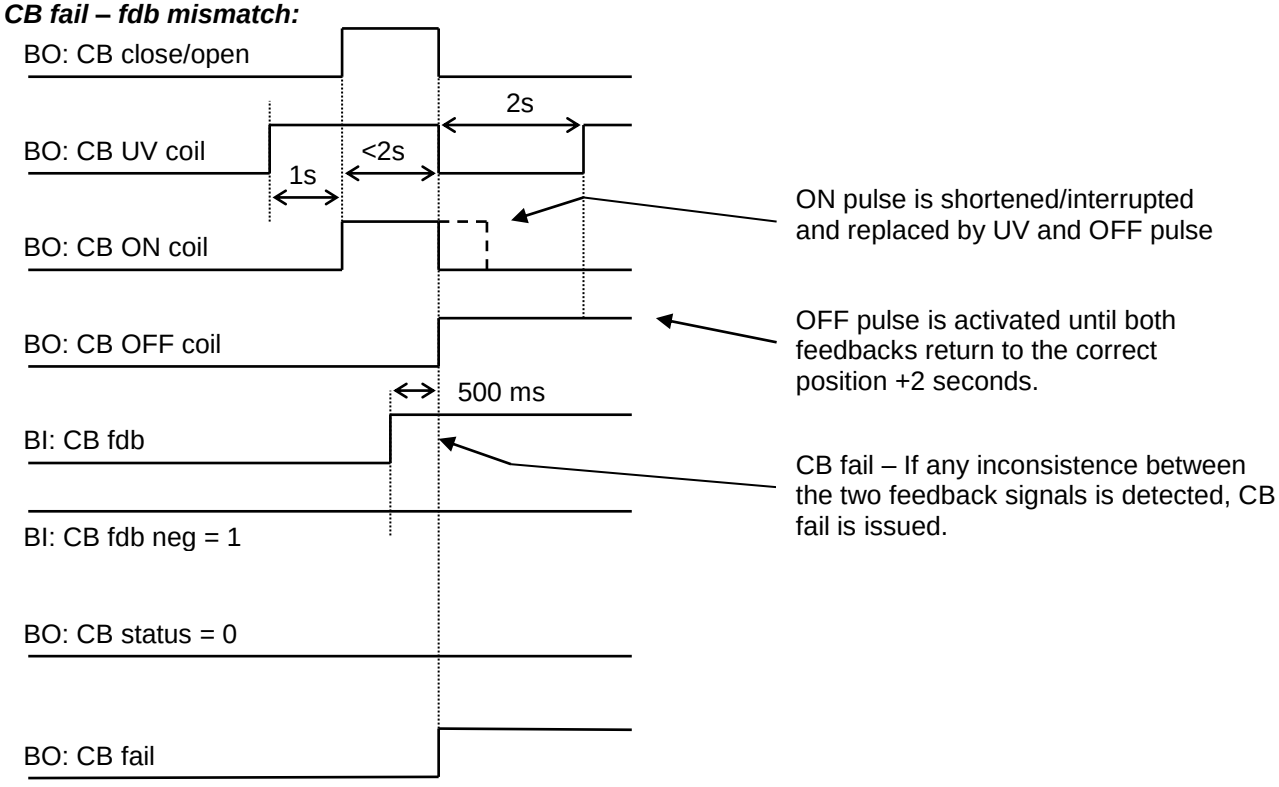
CB close command:



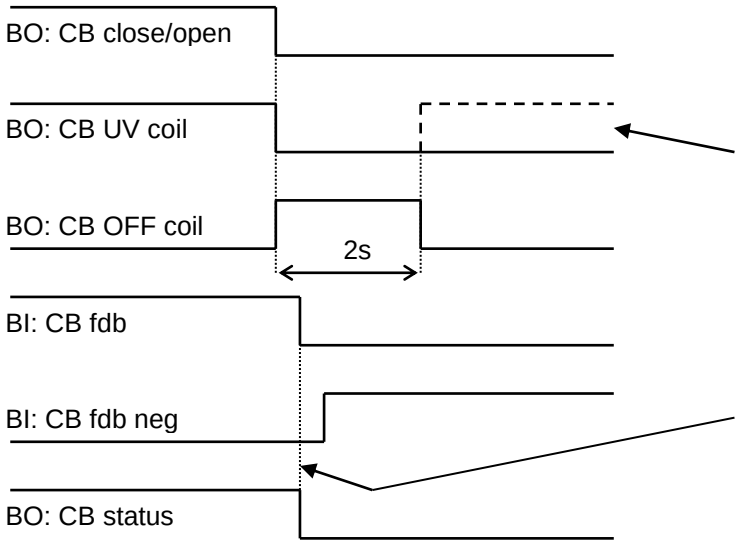
Repeated CB close command:



CB fail – fdb mismatch:



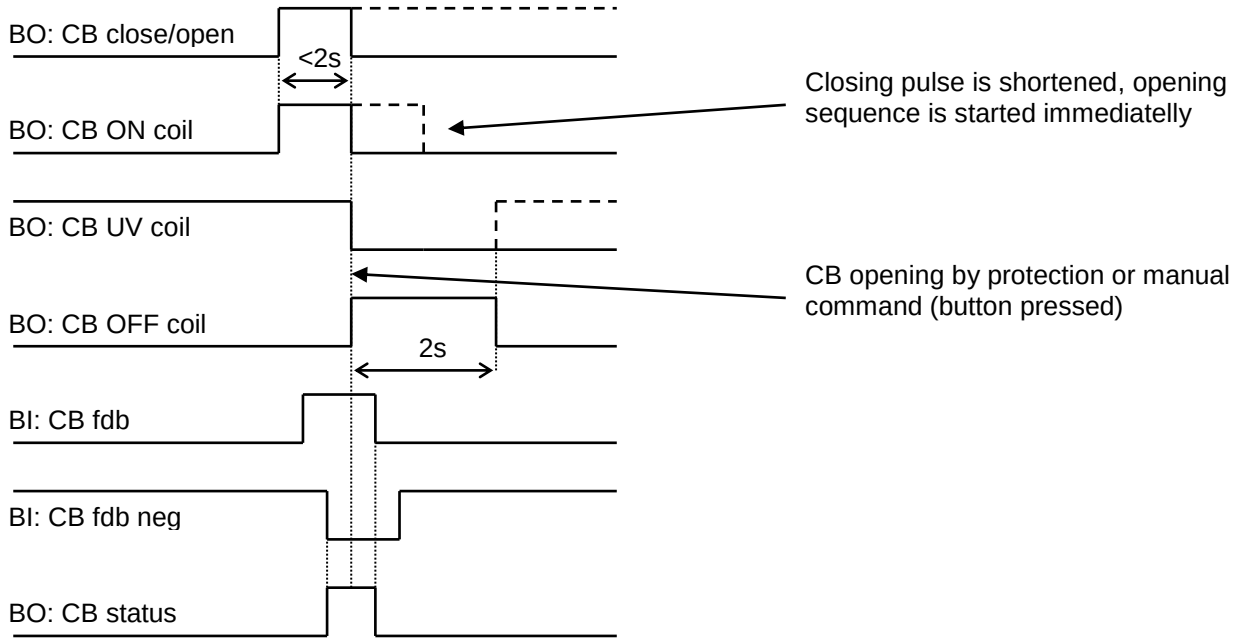
CB open command:



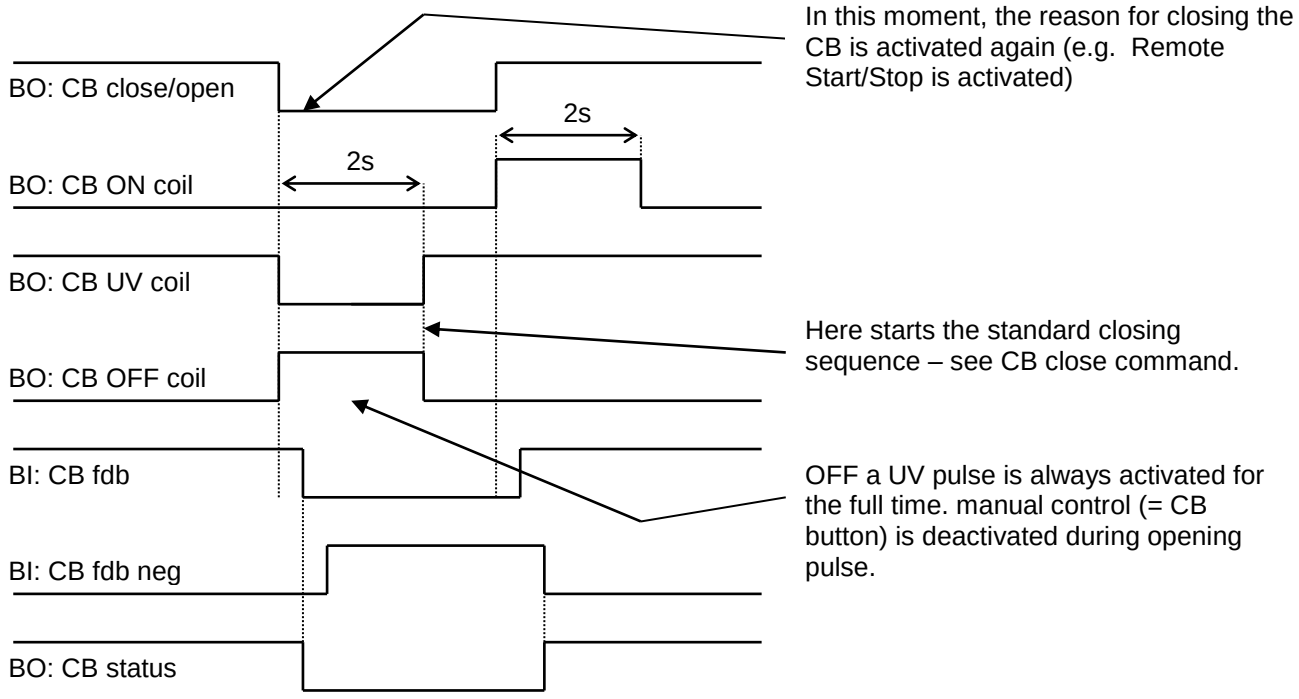
Further behavior of UV output depends on the system status. In case of transition to cooling stays off, if the Cb was opened manually and the engine keeps running, it activates again after timeout elapses.

During CB opening the CB status LBO is deactivated with change of the first feddback status

Transition closing -> opening (opening command is issued during closing pulse):

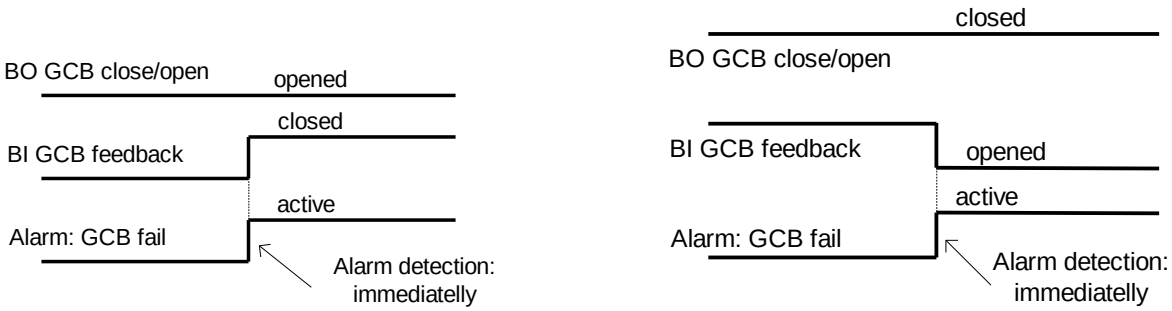


Transition opening -> closing (closing command is issued during opening pulse)



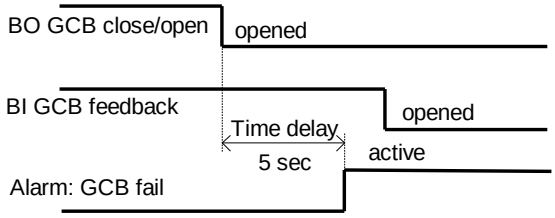
Other CB fail reasons:

– When the BO CB close/open is in steady state and CB feedback is changed, the CB fail is detected immediately (no delay).



– When the BO CB close/open opens, there is 5 resp. 2 sec delay for the breaker to respond before a CB fail is detected. In such case, if CB OFF coil is used for opening the CB and CB fail occurs during opening the CB, the signal CB OFF coil is automatically extended until the breaker opening is detected (evaluated as CB status).

  - 2 sec when the CB is used for synchronizing
  - 5 sec in other cases



– In case that CB fail is detected after switching the controller on (CB is closed), the CB OFF coil output is activated immediatelly.

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.

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 InteliMonitor 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 InteliMonitor 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 InteliMonitor 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 InteliMonitor 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,SMTP user name, SMTP password, SMTP address, Contr mailbox) must be properly adjusted for sending e-mails.

Example of setting

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 emailAddress@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

It is also possible to adjust number of attempts that controller performs in case of not successful Active Call – **Comms settings:***ActCallAttempt*. The language of messages can be changed – **Comms settings:***Acall+SMS lang* (use Translator and Languages tabs in GenConfig to adjust languages). Up to five channels can be used.

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 rendundancy function itself.

CAUTION!
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

It is not possible to use this redundancy system since correct function of the ccontroller depends on CAN bus communication and thus CAN redundancy should be always used.

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 (~100ms) it will take over the system control - it activates the binary output CTRLHBEAT FD, 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 binary input EMERG. MANUAL.
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 **ProcessControl:***Watched Contr* 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.

CAUTION!
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.

Do not use Shared Binary Inputs/Outputs for CTRLHBEAT FD -> EMERG.MANUAL connection since the failed controller may not interpret it correctly!

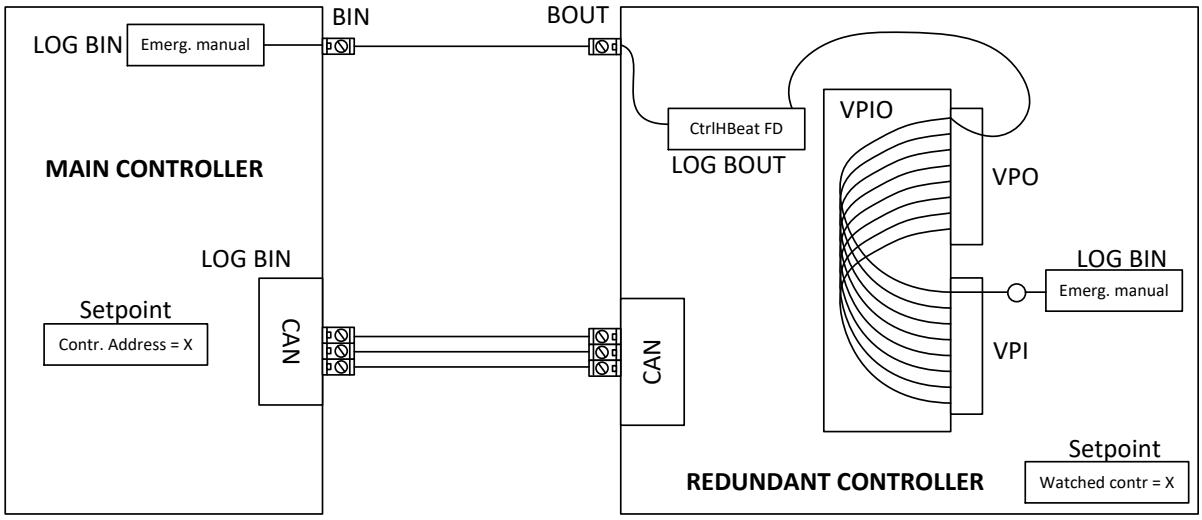


Figure: Example of redundancy function

In the figure above the signal of logical function CtrlHBeat FD 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 about Shared Binary Inputs and Outputs and Virtual Binary Inputs and Outputs.

NOTE:
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.

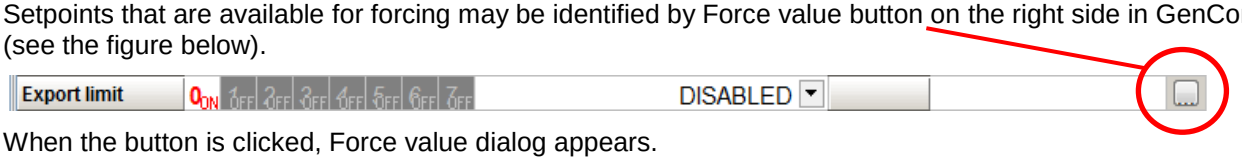
Force value – step by step guide

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).

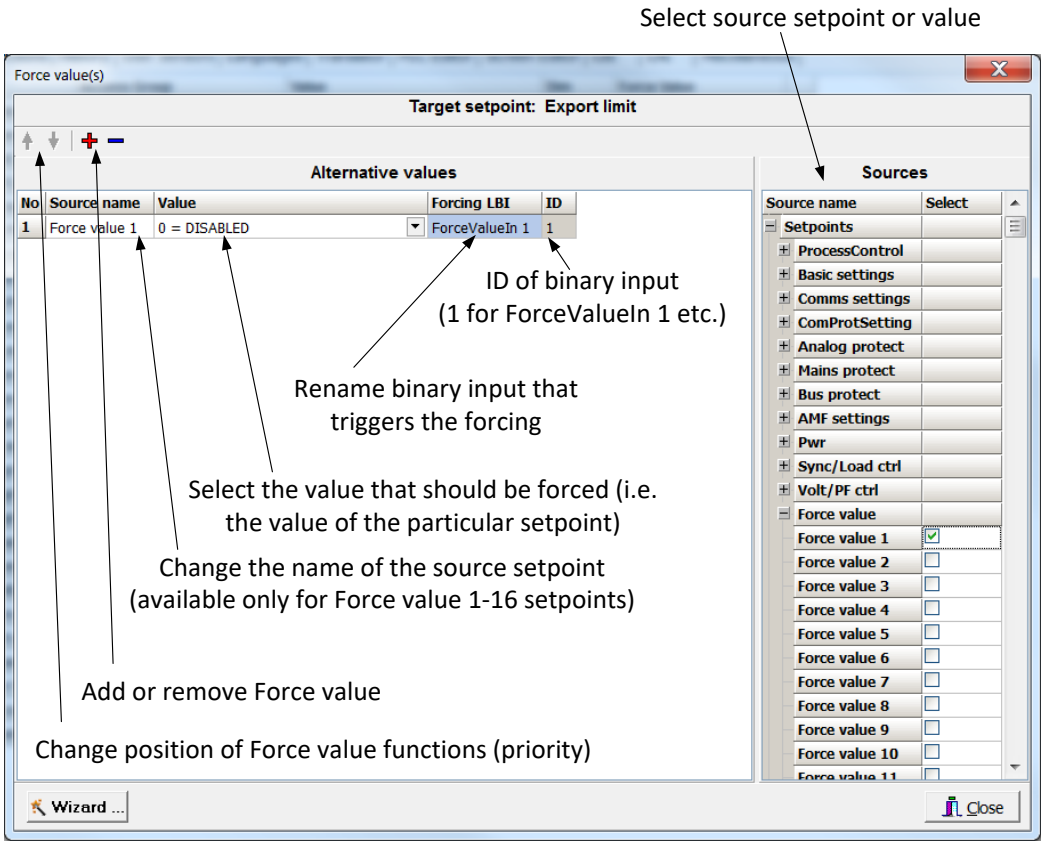
WARNING!

Setpoints must not be written **continuously** (e.g. via Modbus connection)! If continuous change of setpoints is required, combination of External values and Force value function needs to be used. The memory that holds setpoints is designed for up to 10^5 writings. Than memory may be damaged!

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



When the button is clicked, Force value dialog appears.

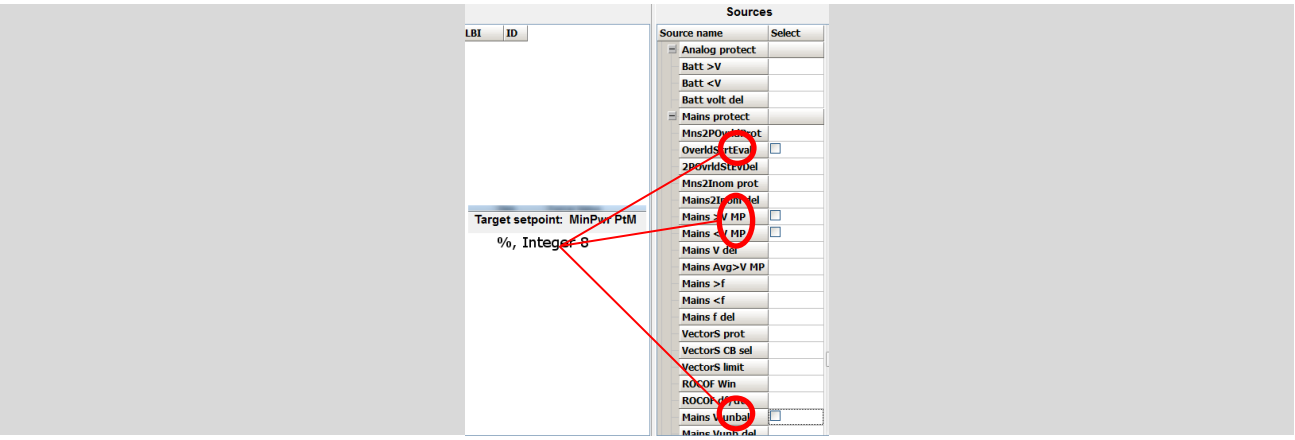


For example if we add **Force value:***Force value 1* to be forced to **ProcessControl:***Export limit* as value 0 (DISABLED) by Binary Input FORCEVALUEIN 1 we can change the function of Export limit from ENABLED to DISABLED by activation of FORCEVALUEIN 1. It is possible to rename the setpoint to e.g. **Force value:***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.



Values for continuous writing from external sources

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

WARNING!
Setpoints must not be written **continuously** (e.g. via Modbus connection)! If continuous change of setpoints is required, combination of External values and Force value function needs to be used. The memory that holds setpoints is designed for up to 10^5 writings. Than memory may be damaged!

It is possible to use up to four 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 *ExtValueX* (by Binary Inputs EXTVALUEX UP and EXTVALUEX DOWN) can be adjusted as well as high and low limit of the value.
There are two way, 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 (**note: NOT WRITTEN**) by the value of ExtValueX. This way internal memory is safe and no damage may occur.
External values are reverted back to their default (initial) value (given by corresponding setpoint) when Binary Input 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.
Note also that when the controller is reset (powered down and up again), all external values are reverted back to their default (initial) values.

HINT
For information on how to write (or read) objects from controller via Modbus, please refer to the latest Communication guide for InteliGen and InteliSys.

General Purpose Timers

There is 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*, *TIMERACT 5-8*, *TIMERACT 9-12* AND *TIMERACT 13-16*.
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 disconection of the mains etc. Each timer channel can be activated only once within a single day. The activation time and duration of each channel is adjustable (both as hh:mm).

Timer modes

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 preriod.

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

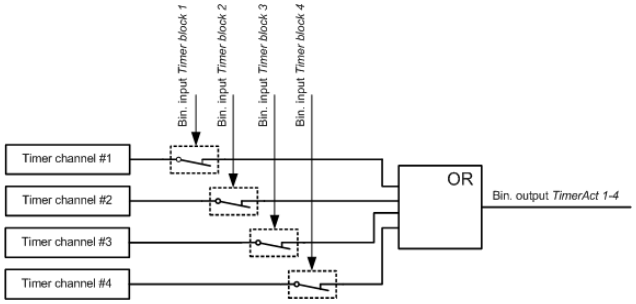
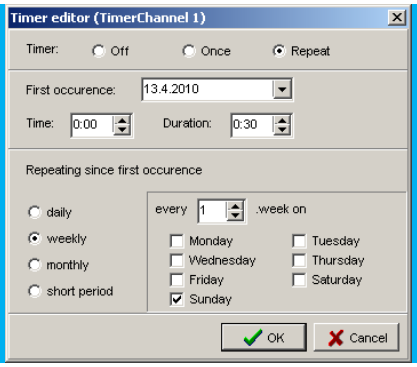


Figure: Principial scheme of one block containing 4 timers

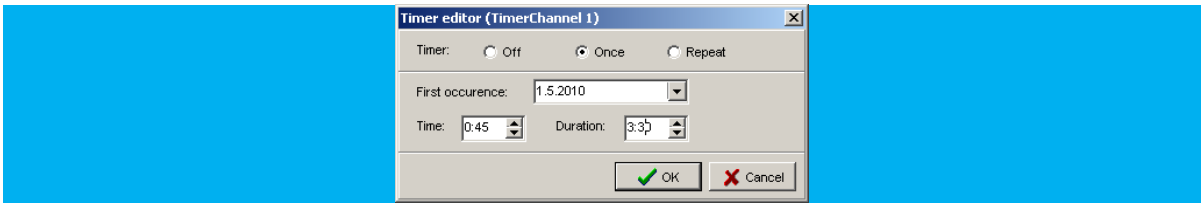
EXAMPLE:

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



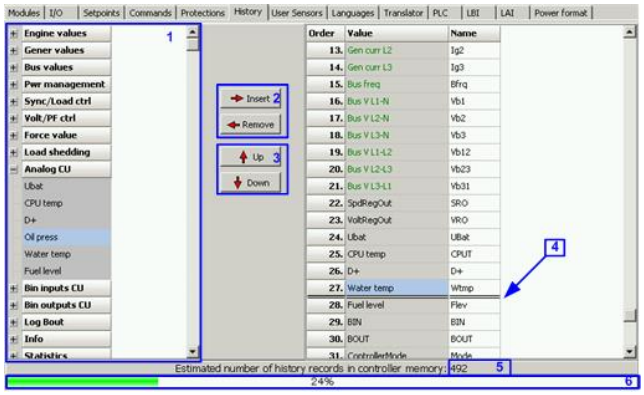
3. The setpoint **Timer settings:***TimerChannel 2* is adjusted to "once" mode, starting date/time 1.5.2010 at 01:00, timer duration 3:00 hrs.



History Related functions

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. 100ms. 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 recomended to be placed in the fast part.
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 activation of logical Binary Input function (TIME STAMP ACT) or it may be enabled always.
Period of time stamping may be adjusted from 1 to 240 minutes.

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

Time and Date Intercontroller Sharing

Time and Date are used mainly for History records. These 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

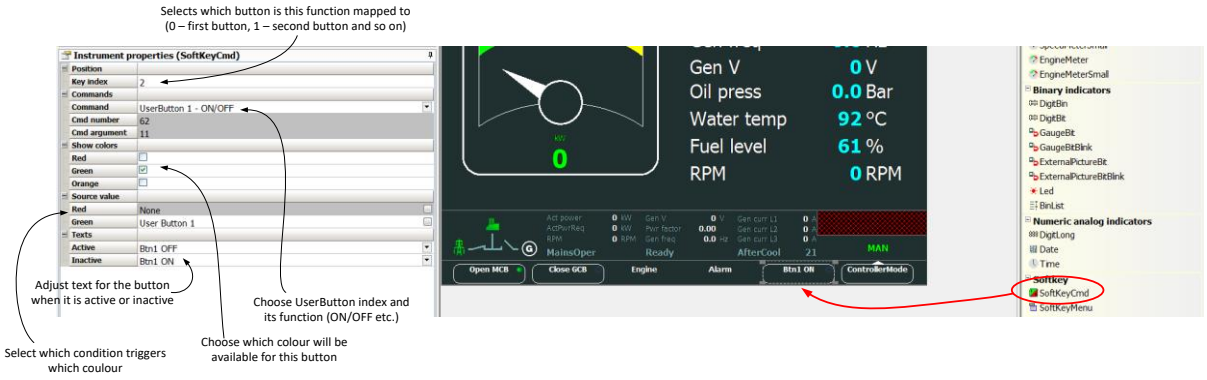
Summer Time Mode function may be enabled and disabled by user. It is possible to set if the controller is located in the northern or southern hemisphere as well.
SummerTimeMode implemented in ComAp controllers is based on CET summer time which means:

- 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 Octorber

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

User Buttons

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



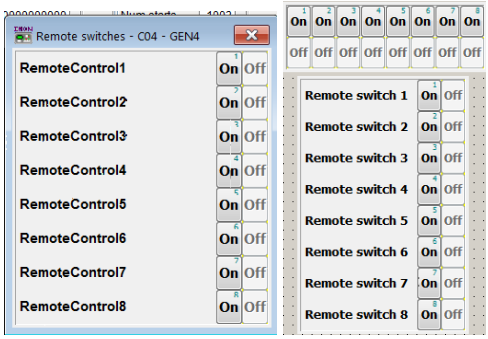
Available functions for soft buttons are listed in the following table.

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	Pressing the button issues log. Binary Output USER BUTTON X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing other puls of length of one second to be generated from the moment of button pushing.

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

Remote Control Function

It is possible to remotely control several Binary Outputs in the controller. You can either use Remote Switches tool in InteliMonitor (select Remote switches in menu for corresponding controller), import Remote Switches tool to a SCADA diagram in Line Diagram Editor or use external device via Modbus (register #46361 and command #26 (1A hex), for more information on Modbus please refer to the InteliGen/InteliSys 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.



1A	Set binary output RemoteSwitch1-8 (RemoteControl1-8)	00200000
	Reset binary output RemoteSwitch1-8 (RemoteControl1-8)	00100000

Figure: Remote Switches tool in InteliMonitor, Remote Switches tools in Line Diagram Editor and Mobus commands

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.

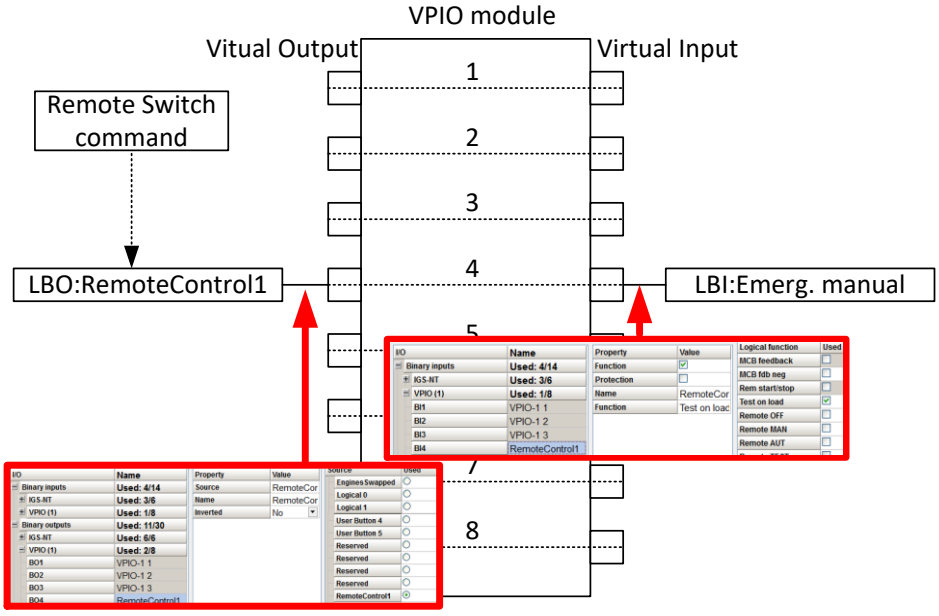


Figure: Using of Remote Switches to trigger logical binary inputs

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 usefull 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.

Shared 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.

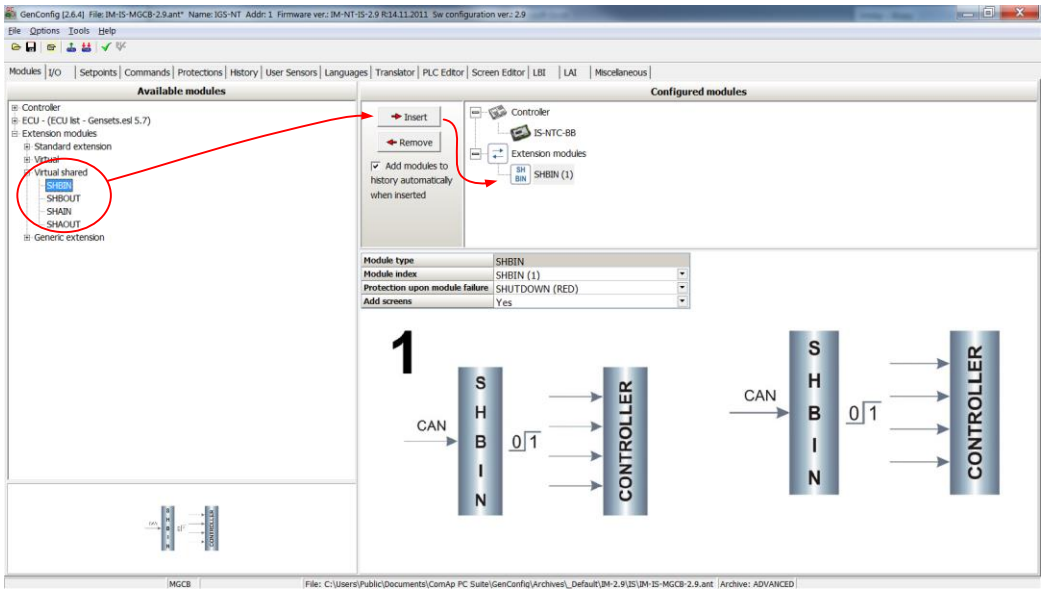


Figure: Adding of various modules

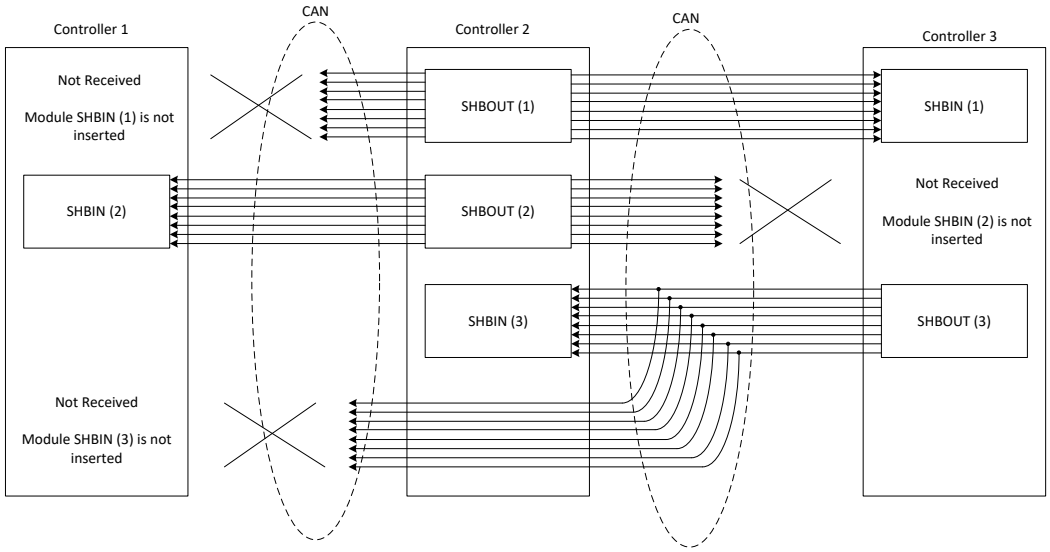


Figure: Principal Scheme (same for shared Binary I/O and shared Analogue I/O

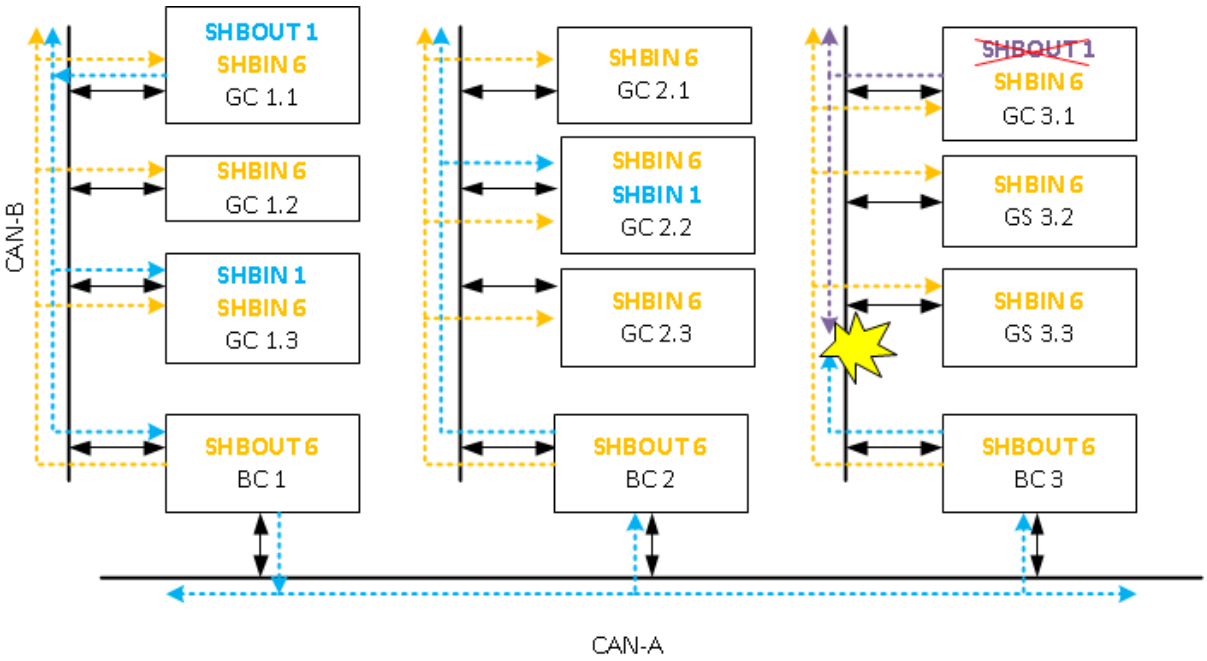


Figure: Virtual shared signals in the system with bank controller

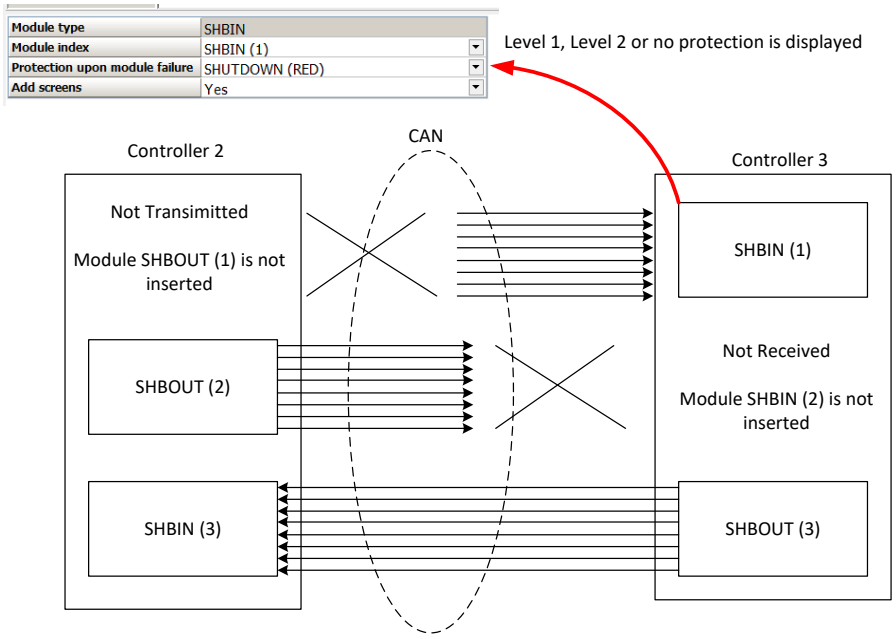
Shared Binary Inputs and Outputs may be used exactly in the same way as standard physical Inputs and Outputs. If SHBIN or SHAIN modules are configured, at least one corresponding module of SHBOUT or SHAOUT (respectively) is needed. If it is not configured, corresponding protection appears because SHBIN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

NOTE:
The group SHBOUT 6 is always dedicated for bank controller to share control signals towards to it´s subordinated gen-set controllers. All other groups SHBOUT 1-5 are free to use in the whole system (can be used only once to prevent the signal collision) and are distributed among all controller in the system (including all controllers connected to CAN-A or CAN-B (like described by the ***Figure:*** *Virtual shared signals in the system with bank controller.*

NOTE:
The group SHAOUT 2 is always dedicated for bank controller to share control signals towards to it´s subordinated gen-set controllers. The other group SHAOUT 1 is free to use in the whole system (can be used only once to prevent the signal collision) and is distributed among all controller in the system (including all controllers connected to CAN-A or CAN-B.

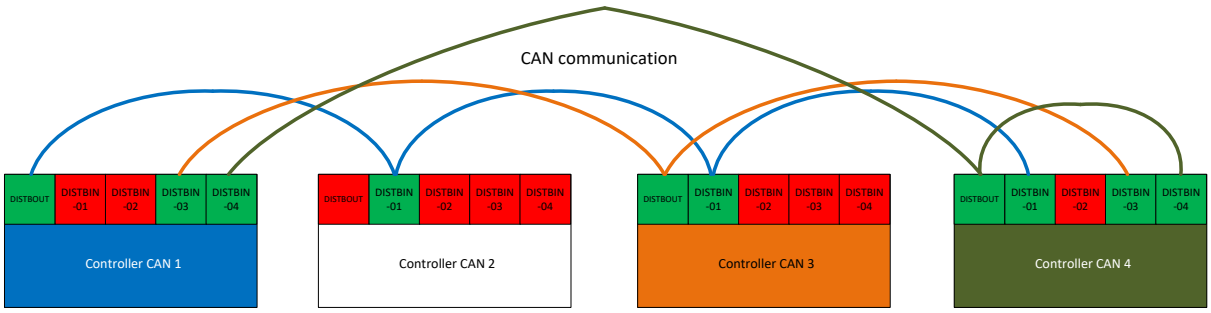
CAUTION!
For proper function of Shared Binary and Analog Inputs and Outputs, only one source of Shared Binary or Analog Outputs must be configured (i.e. it is not possible to configure in one controller SHBOUT1 and to another one as well SHBOUT1).

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



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.



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

NOTE:
The DISTBIN/DISTBOUT signals are not distributed between the CAN-A (interbank CAN) and CAN-B (interGen-set CAN). It means that these signal can be distributed either between the bank controllers and other controller connected to CAN-A or between all the gen-set controllers connected to CAN-B.

NOTE:
DISTBIN and DISTBOUT function is conditioned by IGS-NT-LSM+PMS dongle.

Modbus Reading and Writing

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.

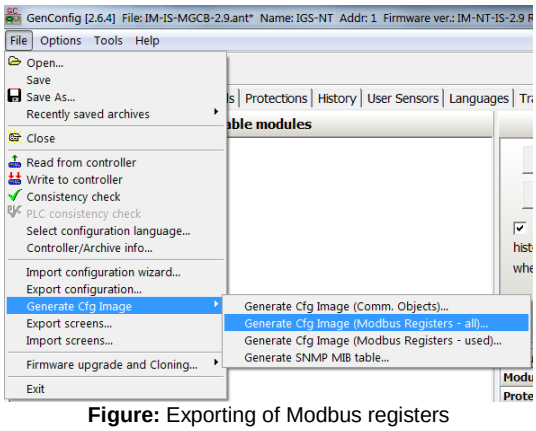
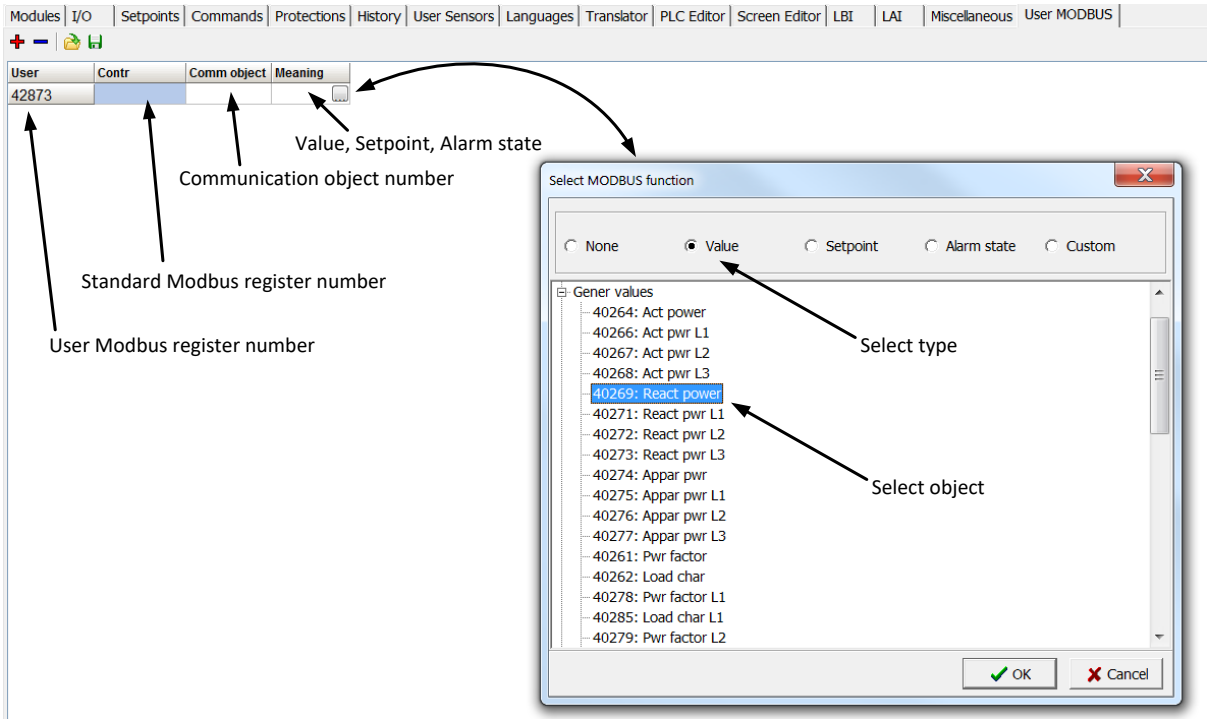


Figure: Exporting of Modbus registers

If Modbus Master function is required extension module I-CB/Modbus connected via CAN1 can be used. For more information on how to use this module please refer to InteliGen/InteliSys Communication Guide and to I-CBEdit manual.

User MODBUS

Users can define Modbus registers from 42873 to 43000. Values, setpoints and Alarm states can be specified for these new Modbus registers to prepare the Modbus protocol for batch reading and writing or to standardize Modbus protocol between FW versions or branches.



NOTE:
User MODBUS function is not available for IM-NT-GC controller.

Modbus Switches

The “Modbus Switches” contains of two groups of LBOs named “ModbusSw1” and “ModbusSw2”. 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
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548

NOTE:
The LSB of ModbusSw1 (46337) corresponds with LBO “ModbusSw1”
The LSB of ModbusSw2 (46338) corresponds with LBO “ModbusSw17”
The Values ModbusSw1 and ModbusSw2 have the position of LSB opposite-wise.

Examples:

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
ModbusSw2 (46338)	F000 HEX	1111 0000 0000 0000

Analog Input Sensors and User 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.

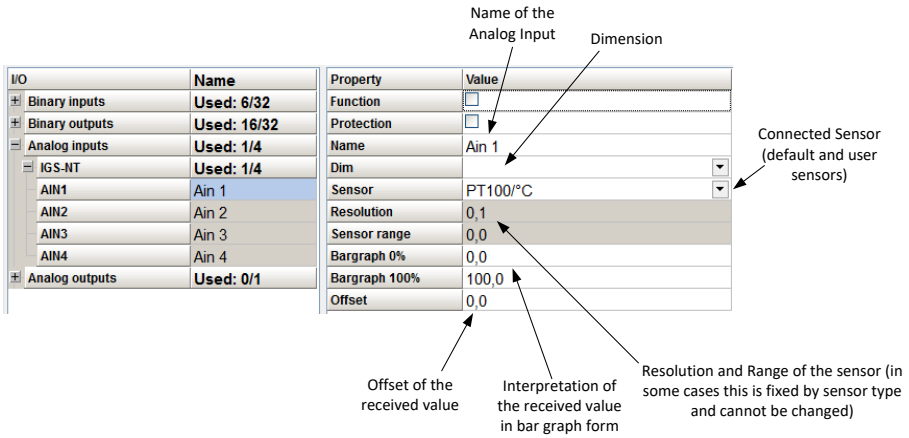


Figure: Sensor adjustment in GenConfig

Default sensors: PT100/°C, PT1000/°C, NI1000/°C, PT100/°F, PT1000/°F, NI1000/°F, 4-20mA active, 0-2400ohm, 0-2.4V, Tristate

HINT
There is “electronic” type of sensor available for Shared Analog Inputs which can be used to interpret shared data over CAN bus.

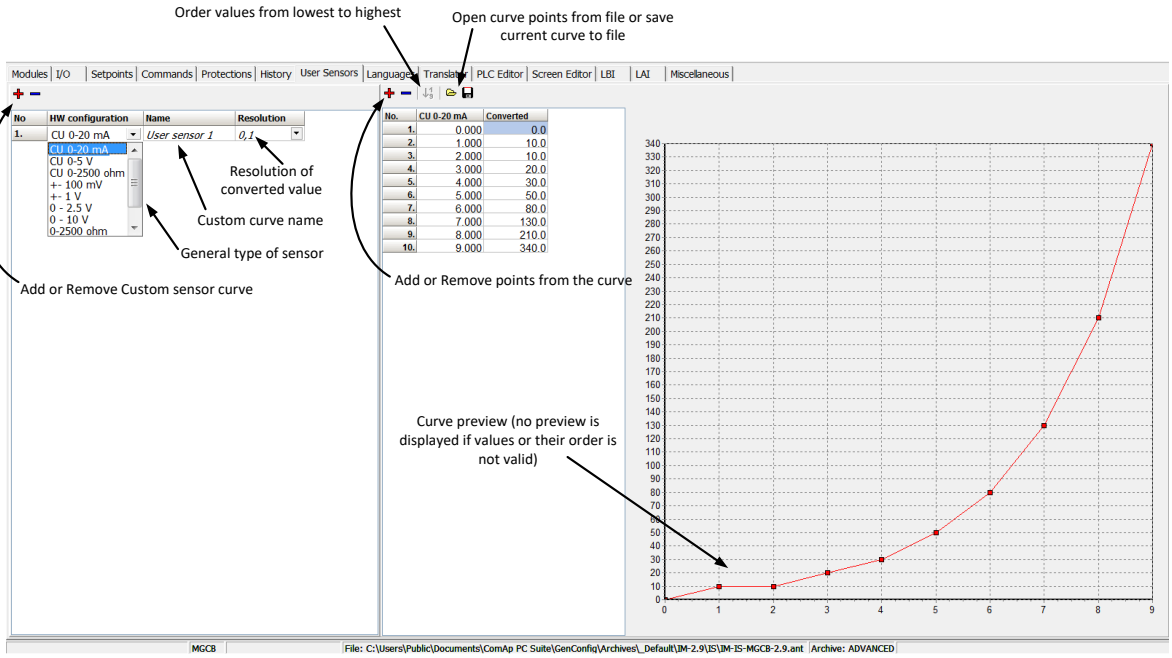


Figure: User Sensor definition

Languages and Translator tool in GenConfig

For detailed description of Languages and Translator tool please refer to GenConfig interactive help (press F1 when in corresponding tab or open Help -> GenConfig Help).

Power Formats

IGS-NT family allows user 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 instalations. High voltage is then interpreted in Volts (e.g. 33256V instead of 33kV).
Last two Power Formats can be used in combination on one CAN bus.

System Start/Stop

For proper function of the system, System start and stop signal needs to be used properly. Below there is scheme that shows how to use the Binary Output SYS START/STOP in the system using just CAN wiring (no physical wiring is needed to share the starting and stoping signal into all controllers in the system).

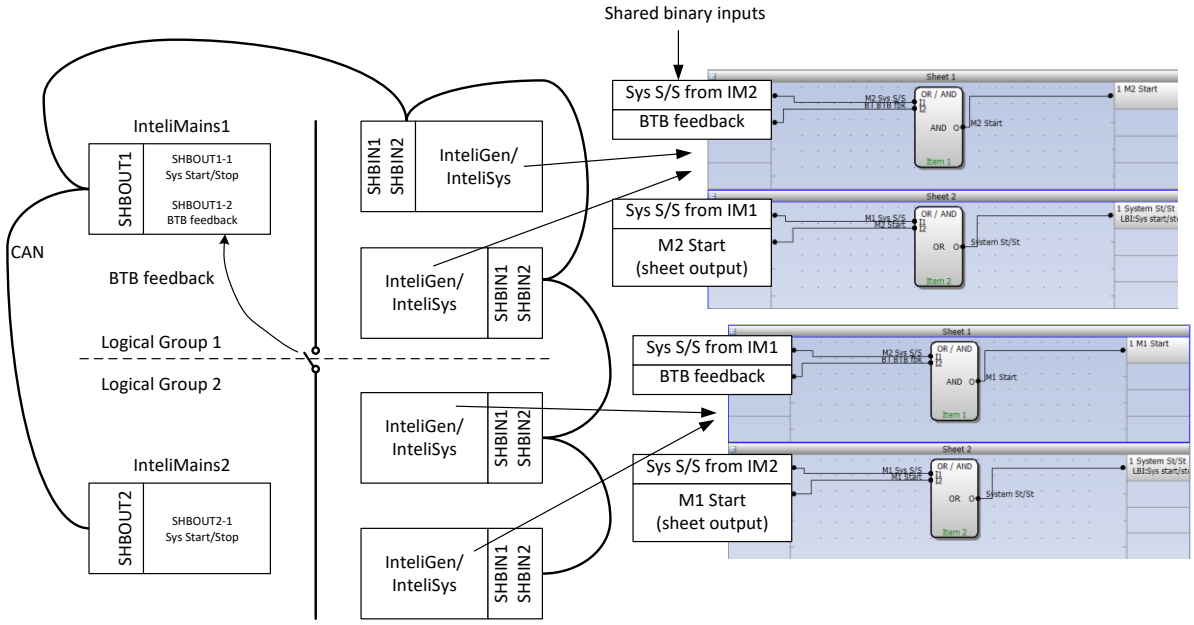
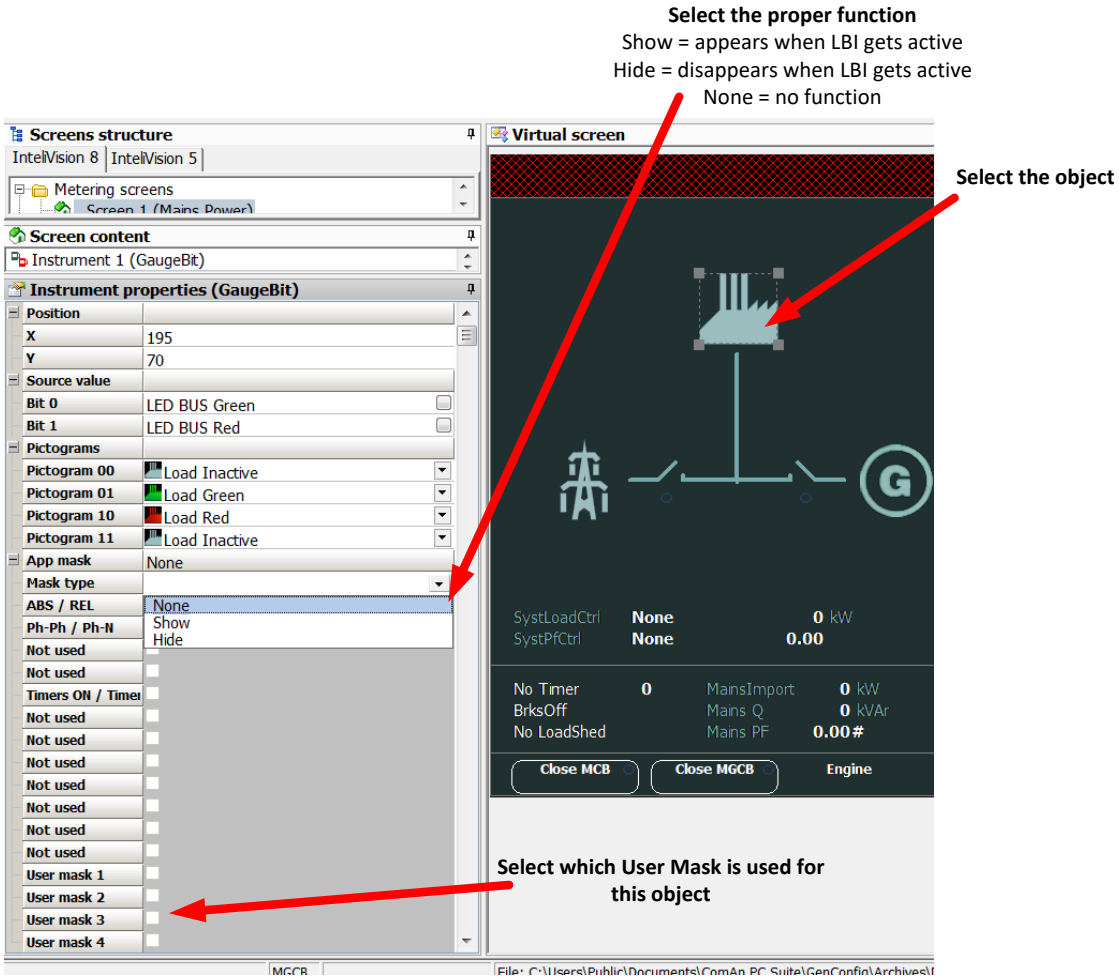


Figure: Preparation of correct system start/stop function for two logical groups

User Mask function

In GenConfig you can easily set any object in Screen Editor to show or hide based on activation of particular Logical Binary Input available for users. Below, there is diagram showing the setup of User Mask function in Screen Editor.



NOTE:
Masking of screens in InteliVision 5 supports only Show function
Use also other masking functions (masking can react on several internal states, e.g. activation of Timers).

PLC functions

See description in IGS-NT-Application Guide 05-2013.pdf.

Multi language support

NT family controllers support up to five Languages that is possible to switch during controller duty. Every terminal (i.e. Remote display or PC-InteliMonitor) can be switched to different language. Use PC-GenConfig - Translator tool to translate texts to another language.
Default application archives contain all texts in English only.

ECU interface customizing

The list of available ECU interfaces can be found in GenConfig / Modules / ECU list.

Binary selector

This function enables to change the following CAN values transmitted to ECU via J1939 or binary output only. The change can be provided by setpoint or via Binary input. There are four Bin selector channels available.

J1939 value	ECU command
Governor mode	Isochronous - Droop
Idle Speed select	Idle – Nominal

Frequency select	1500 – 1800
Preheat request	Yes – No
Protection override	Yes – No

Protections and Alarm management

ComAp gen-set controllers provide following range of generator protections.

For each protection adjustable limit and time delay are available.

ANSI CODE	PROTECTION	IG-NT, IG-NTC, IG-NT-BB, IG-NTC-BB	IS-NT-BB, IS-NTC-BB
25	Synchronism Check	•	•
27	Undervoltage	•	•
32	Overload	•	•
32R	Reverse Power	•	•
37	Undercurrent	•@	•@
40	Excitation Loss	•	•
46	Current Unbalance	•	•
47	Voltage Assymetry	•	•
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	•	•
81H	Overfrequency	•	•
81L	Underfrequency	•	•

Note: – - excluded; • - included

@ - can be created using universal protections

Protection groups

There are two groups of protections in the controller: fix and universal (configurable)

PROTECTION GROUP	CONFIGURABILITY	SETTINGS
Analogu protection	Configurable	Analog protect
Generator protection	Configurable	Gener protect
Fix protections	Fix	Engine params, Gener protect, Mains protect, Analog protect

Alarm types

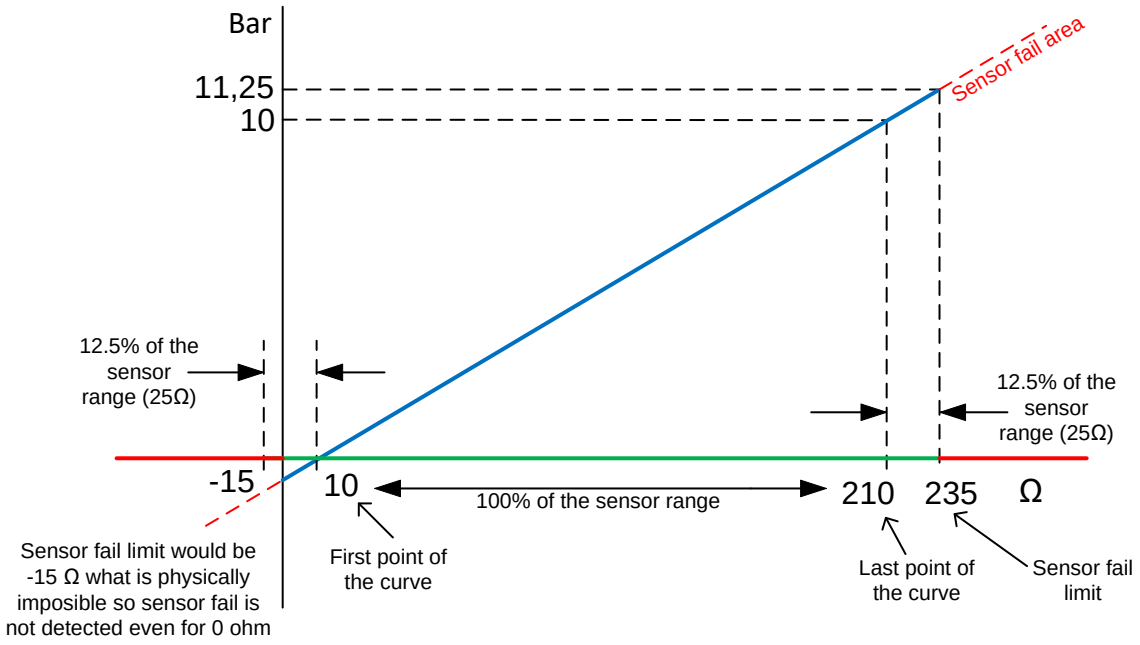
ALARM/EVENT KIND	LEVEL	DESCRIPTION
Warning	1	The alarm appears in the Alarmlist and is recorded into the history log. Activates the output Common Wrn as well as the standard alarm outputs.
Alarm Only	1	The alarm appears only in the Alarmlist. Activates the output Common Al as well as the standard alarm outputs.
HistRecOnly	1	The event is recorded into the history. Activates the output Common Hst for one second. Standard alarm outputs are not activated.
AL indication	1	The event is only indicated in the Alarmlist. It disappear for the alarmist automatically as soon as the cause disappears. Standard alarm outputs are not activated.
A+H indication	1	The event is only indicated in the Alarmlist and recorded into the history log. It disappear for the alarmist automatically as soon as the cause disappears. Standard alarm outputs are not activated.
Shutdown	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the banks (the internal signal Sys start/stop to subordinated gen-sets is deactivated). The bank can't be started again while there is a Shutdown alarm in the Alarmlist. Activates the output Common Sd as well as the standard alarm outputs.
Slow Stop	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes stop of the bank by the standard stop sequence. The bank can't be started again while there is a Slow stop alarm in the Alarmlist. Activates the output Common Stp as well as the standard alarm outputs.
Off Load	2	The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, diappears by itself. It causes immediate opening of the BCB if used. In AUT mode the bank remains running for 60 seconds and then it is stopped by the standard stop sequence. In MAN mode the bank remains running until the operator changes it's operational state manually. If the controller is in AUT or SEM mode and all previously active Off load alarms disappeared the bank is automatically started back and connected to the load if the condition for the bank to be running persists (e.g. Rem start/stop is active ..). This event is used to put the gen-set temporarily off the load for any reason. Activates the output Common OfL.

Low Power	2	In InteliSys NTC BaseBox HW only. The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, diappears by itself. It causes reduction of the required bank load to the Min Power PtM during parallel-to-mains operation or local baseload operation. If all previously active Low power alarms disappeared 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) in PtM operation. Activates the output Common LoP. This alarm type is not overriden by the input Sd Override.
BrkOpen&CoolDn	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the banks (the internal signal Sys start/stop to subordinated gen-sets is deactivated). The gen-set can't be started again while there is a BOC alarm in the Alarmlist. Activates the output Common BOC as well as the standard alarm outputs.
Sd Override	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the banks (the internal signal Sys start/stop to subordinated gen-sets is deactivated). The gen-set can't be started again while there is a Sd override alarm in the Alarmlist. Activates the standard alarm outputs. This alarm type is not overriden by the input Sd Override.

HINT
The Standard alarm outputs are Alarm and Horn.

Sensor fail detection (FLS)

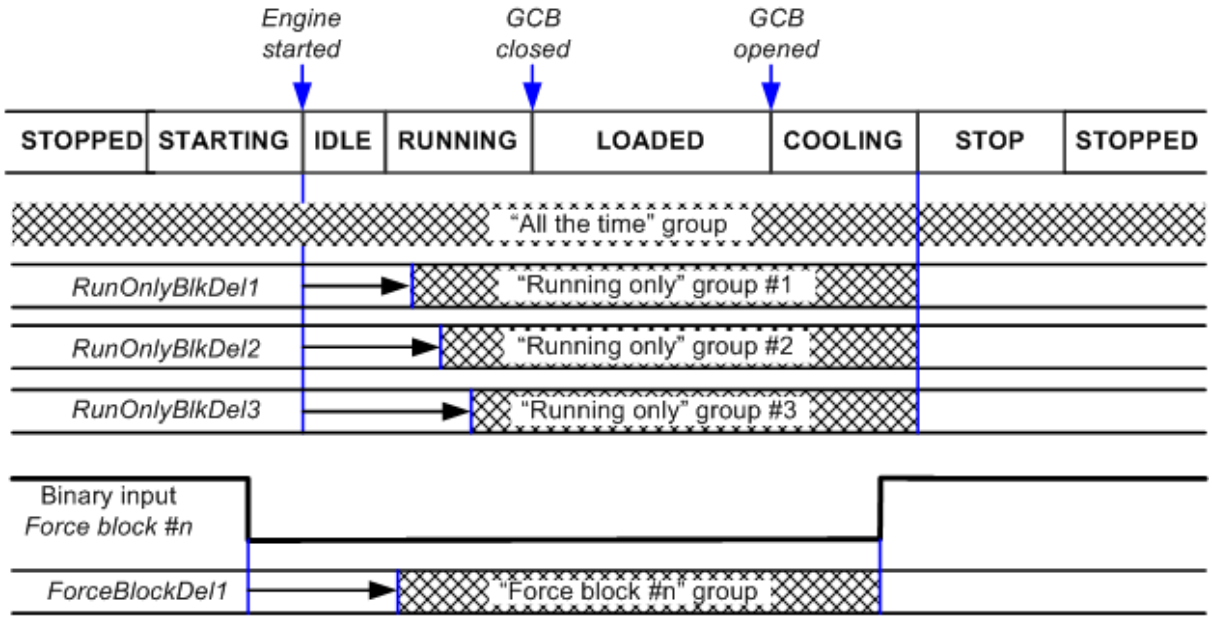
If the measured resistance, voltage or current on an analog input gets out of valid range, the sensor fail will be detected and a sensor fail message will appear in the alarmlist. The valid range is defined by the most-left (R_L) and most-right (R_H) points of the sensor characteristic ±12.5% from R_H-R_L.



HINT
The sensor fail alarm does not influence the gen-set operation

Blocking types

BLOCKING TYPE	DESCRIPTION
All the time	The alarms are beeing evaluated all the time the controller is switched on.
Force block 1	The alarms are beeing evaluated while the input *Force block 1* is not active. The evaluation begins *ForceBlockDel1* seconds after the input has been deactivated.
Force block 2	The alarms are beeing evaluated while the input *Force block 2* is not active. The evaluation begins *ForceBlockDel2* seconds after the input has been deactivated.
Force block 3	The alarms are beeing evaluated while the input *Force block 3* is not active. The evaluation begins *ForceBlockDel3* seconds after the input has been deactivated.
El. prot	The alarms are beeing evaluated while the generator is expected to provide correct voltage and frequency. That means the alarms start to be evaluated after transition form *Idle* to *Running* phase when the period of *Max stab time* has already elapsed, remain beeing evaluated while the gen-set is running at nominal speed (regardless of GCB position) and stop to be evaluated by transition to the *Cooling* phase.

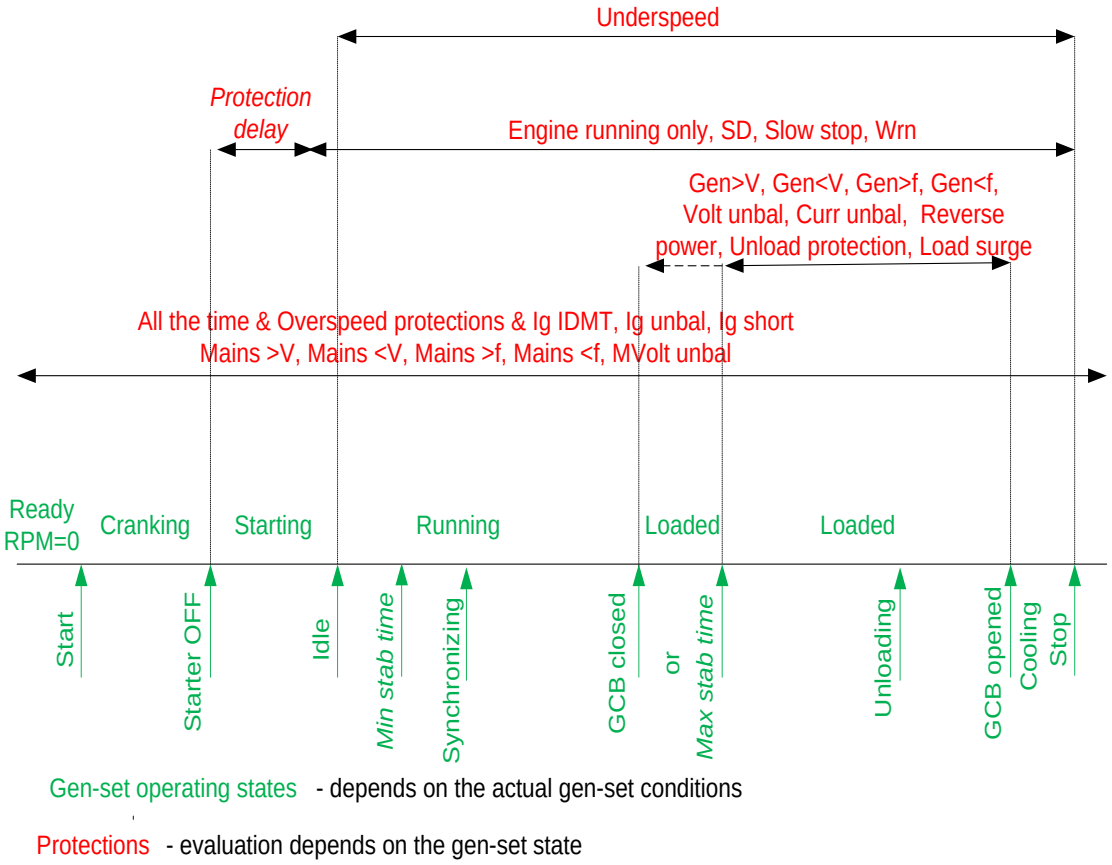


Shutdown override

If the Binary input shutdown override (Sd override) is closed, all 2nd level protections are disabled to allow engine run in an emergency situation, e.g. sprinkler devices power supply.
All protections are shown in Alarmlist and recorded into History, but the controller doesn't 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.

HINT
All 2nd level protections are locked out, except of these:
- Emergency stop
- Overspeed
- Underspeed (only if *Fuel solenoid* = GAS ENGINE)
- 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 can not be overriden (blocked) by the *Sd override* input.

Alarm time chart



Gen-set operating states - depends on the actual gen-set conditions

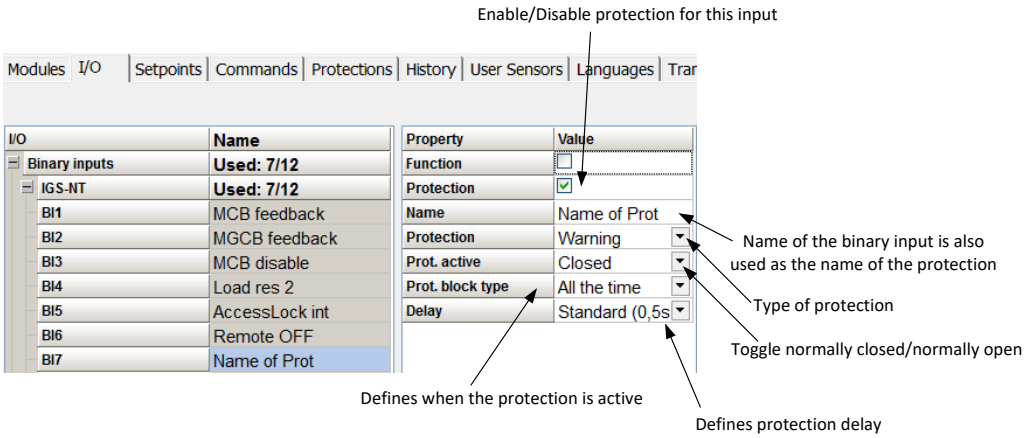
Protections - evaluation depends on the gen-set state

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.

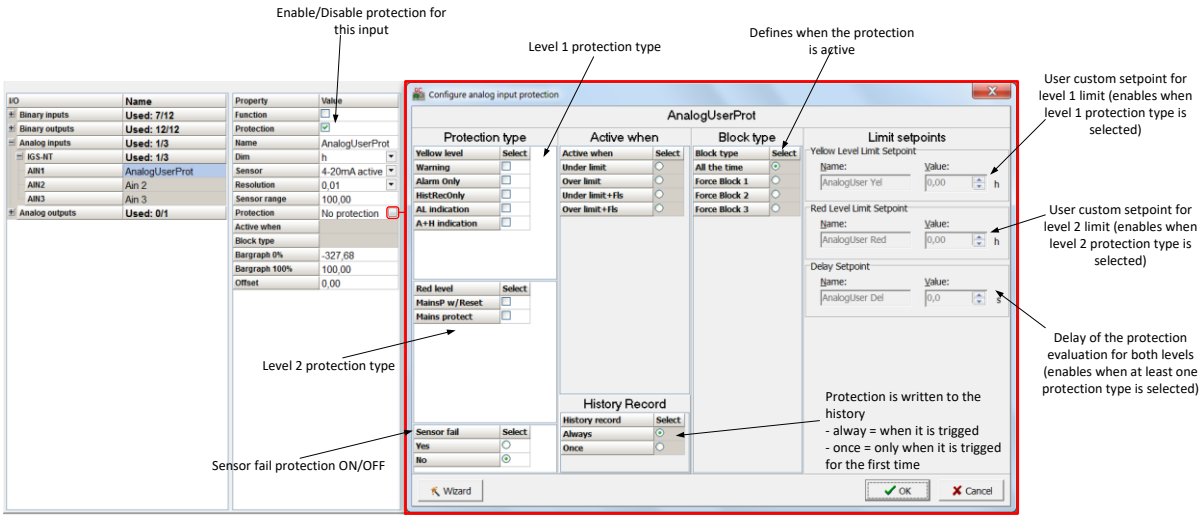
Binary Input protection configuration

Open I/O tab in GenCofig and adjust parameters that are described below.



Analog Input protection configuration

Open I/O tab in GenCofig and adjust parameters that are described below.

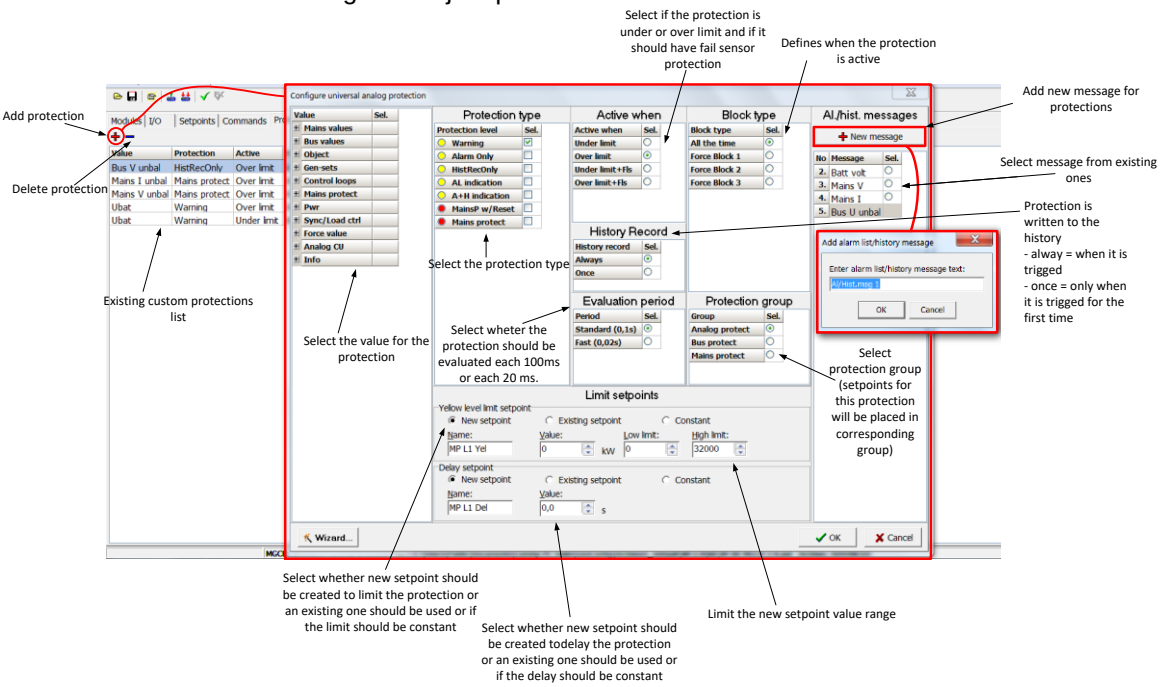


HINT

Fail Sensor protection (when activated) does not affect the function of the system itself. If you adjust "Active when" to Under limit + Fls or Over limit + Fls the protection will considered the value that is out of range (failed sensor) to be under or over limit (depending on the setting) and it will issue corresponding alarm after the delay of the protection. This can be used for example when the function of the particular sensor connected to an analog input is crucial for the operation of the system and its failure requires the system to be affected (open breakers etc.).

Custom configurable protection

Open Protections tab in GenCofig and adjust parameters that are described below.



HINT

You need to prepare two separate protections for level 1 and level 2.

Select the value for protection first and then use Wizard – it will take you through all the steps and help you adjust them correctly.

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 ComProtSetting:ResetActAlarms.

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.

Inputs and Outputs

Virtual and physical modules

Number of I/O can be extended and project wiring can be reduced using the following extension and virtual modules.

Module name	BIN	BOUT	AIN	AOUT	IMPULSE	Note
IGS-NT controller	x	x	x	x		Number of I/O depends on type.
IGS-PTM	8	8	4	1	-	Standard I/O extension module.
IS-AIN8	-	-	8	-	-	Standard I/O extension module.
IS-AIN8TC	-	-	8	-	-	8 thermocouple inputs
IS-BIN16/8	16	8	-	-	-	Standard I/O extension module.
InteliAIN8	-	-	8	-	2	
InteliAIN8TC	-	-	8	-	-	
InteliIO8/8	8	8	-	2	-	
InteliIO16/0	16	0	-	2	-	
I-CB	x	x	x	x	-	Configurable communication bridge.
IGL-RA15	-	15	-	-	-	15 Green, Red, Yellow LED panel.
I-AOUT8	-	-	-	8	-	8 Analog outputs
VPIO	8	8	-	-	-	Virtual periphery I/O module.
SHBIN	8	-	-	-	-	SHared (virtual) Binary INput module
SHBOUT	-	8	-	-	-	SHared (virtual) Binary OUTput module
SHAIN	-	-	8	-	-	Shared (virtual) Analog INput module
SHAOUT	-	-	-	8	-	Shared (virtual) Analog OUTput module
PLC	x	x	x	x	-	Programmable (internal) logic module.

HINT
For more details about Virtual peripherals (Shared and Internal virtual I/O periphery and PLC) see IGS-NT-Application guide-2.4.pdf.

CAUTION!
Usage of any 3rd-party peripheral modules in cooperation with ComAp controller is not recommended. ComAp can't guarantee the proper function of controller with none-ComAp peripheral modules.

Setpoints

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

Password protection

Any setpoint can be password protected - 7 levels of protection are available. There can be up to 8 users defined, each one with different access rights (levels of protection). Every user has it's own password. The password is a four-digit number. Only setpoints protected by the protection level that is covered by currently logged-in user's access rights can be modified.
If a user logs in from a particular terminal (e.g. the controller front panel), this does not unlock the other terminals for him, e.g. InteliMonitor connected directly or via modem.
Setpoints opened from front panel are automatically closed 15 minutes (return to measurement screens) after the last setpoint change or when wrong value of password is set.
System administrator (User 0 – always present in the system) can reset the password for any other user.
The controller programming (configuration) requires the highest - password 7 level, so only User 0 is able to modify the controller configuration or firmware.

Continuous internal evaluation of setpoints validity

In case of detection of Setpoints checksum (validity) evaluation error, the Shutdown alarm "Setpoint CS error" is issued to prevent the controller to run the engine with incorrect setting. The evaluation is provided at controller startup and continuously during the standard operation. I.e. in case of detection of such error, the engine is shut down immediatelly.

Setpoint synchronization

Setpoints, that are marked with "#" sign at the begin of their names, are synchronized with other controllers present on the CAN bus line, i.e. the system will ensure that the respective setpoint will have identical value in each connected controller. If the setpoint is changed in one controller, the same change will occur in all other controllers. This function is necessary especially for MINT application, where the system of Power management is based on fact that the respective setpoints are identical in all controllers.

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

List of possible events

The complete list is available in Troubleshooting guide.

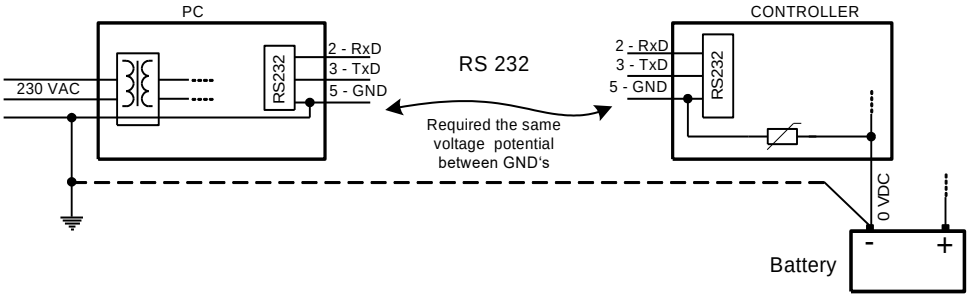
Controller configuration and monitoring

IGS-NT istallation pack contains separate PC software tools: GenConfig (GC) and InteliMonitor (IM). GC and IM are based on Windows 95/98/NT/ME/2000/XP or higher platform and require approximately 30 Mbyte of hard disc free space.

Direct connection to the PC

IGS-NT controller can be connected directly with PC via RS232 or USB interface. Use the crossed RS232 or USB cable to connect PC with controller.

HINT
Make sure the grounding system on controller and PC – COM port (negative of the PC DC supply) are identical – before the first direct connection. There must not be any voltage between these two points otherwise the internal PTC protection activates and interrupts RS232 communication. In such case disconnect RS232 line wait a minute for PTC recovery and try again. The simple solution is to assure, that the PC supply 240/20V is ground free (GND terminal is not connected).



GenConfig functions

- Extension modules addressing
- All I/O function or protection configuration
- Setpoints adjusting
- Sensor characteristics modification
- History record modification
- Password level protection modification (password value must be changed in DriveMonitor)
- Controller firmware (mhx file) upgrade
- Controller application file Up/Down load
- Language translator enables
  - Create Dictionary between two languages (Dictionary can be used repeatedly)
  - Translate current text in Controller (in any language)
  - Add new language (up to five)

Configuration steps

Following configuration steps are available in GenConfig software:

- Select Extension modules when more inputs and outputs are required
- Configure J1939 interface when Electronic engine is connected
- Configure Binary inputs as Protection or Function
- Configure Binary outputs
- Configure Analog inputs as Protection or Function
- Define user sensors
- Configure History record
- Configure password protection
- Add/Translate the language

InteliMonitor

Functions

- On-line direct, Modem or Internet single or multiple engine monitoring
- Active Modem or Internet call from the controller to PC (activated by selected Alarm)
- On-line or Off-line History record listing
- Setpoints listing and adjusting (password protected)
- Statistics value (e.g. Running hours) Set/Reset
- Password and Access code change

Modbus protocol

Standard protocol enables receive/transmit any data or command from a Master system:

- Direct connection: RS232, RS422, RS485
- Modem connection
- 9600, 19200, 38400 or 57600 bps, 8 data bits, 1 stop bit, no parity
- Transfer mode RTU
- Function 3 (Read Multiply Registers)
- Function 6 (Write Single Register)
- Function 16 (Write Multiply Registers)
- The response to an incoming message depends on the communication speed. The delay is not shorter than the time needed to send/receive 3 and ½ characters.

The complete description of Modbus communication protocol can be found in *Modbus Protocol Reference Guide PI-MBUS-300* and *Open Modbus Specification Release 1.0*. Both documents are available from web site at http://www.modicon.com/openmbus/ .

HINT
Detail Modbus command description see in ComAp InteliCommunication guide.

Value and setpoint codes

HINT
It is possible to export actual values, setpoints and history file on-line from the controller or off-line from the archive using InteliMonitor – Monitor – Export data… function.

Technical data

HINT
Technical data of the controller and extension modules find in the IGS-NT-Installation guide-x.y.pdf.

Language support

IG-NT from display firmware version 1.4 supports following language code pages:

Code page	Language	Windows code
0	West European languages	Windows 1252
134	Chinese	GB 2312
162	Turkish	Windows 1254
129	Korean	Windows 1258
204	Russian	Windows 1251
238	East European languages	Windows 1250

IS-NT display from firmware version 1.5 supports following language code pages:

Code page	Language	Windows code
0	West European languages	Windows 1252
134	Chinese	GB 2312
162	Turkish	Windows 1254
129	Korean	Windows 1258
136	Thailand	GB 2312
204	Russian	Windows 1251
238	East European languages	Windows 1250

APPENDIX

Setpoint groups

CAUTION!
Do not perform repeated writing of setpoints (e.g. power control from a PLC by repeated writing of baseload setpoint via Modbus) The setpoints are stored in EEPROM memory, which can be overwritten more than 10^5 times without risk of damage or data loss, but it may become damaged, when allowed number of writing cycles is exceeded!

HINT
The descriptions of all available setpoints, values logical binary inputs and logical binary outputs that you can find in next chapters are common for standard gen-set in MINT application and the Bank Controller. For the purpose of this document, please consider the term “gen-set” as “Bank Controller”.

Table of setpoints

Group: ProcessControl

Setpoint: #SysBaseLoad

Group	Process Control
Range [units]	0 .. 65000 [kW]
Related FW	3.0
Description	This setpoint is used to adjust the **requested load for the whole gen-set group** in *system baseload* mode (i.e. *#SysLdCtrl PtM* = BASELOAD). Each gen-set takes proprtionally equal part of this total required value. The number of running gen-sets is resolved by the power management function according to the requested total load, gen-sets nominal power and adjusted reserves.

Setpoint: LocalBaseload

Group	Process control
Range [units]	OFF, 1 .. *Nomin power* [kW]
Related FW	3.0
Force value	YES

possible	
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 Local baseload.

Setpoint: #SysPwrFactor

Group	Process Control
Range [units]	0.60 .. 1.20 [-]
Related FW	3.0
Description	The setpoint is used for adjusting the requested gen-set power factor during the parallel-to-mains operation if *#SysPFCtrl PtM* = BASEPF and also during the local baseload 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). **NOTE:** # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.

Setpoint: #SysLdCtrl PtM

Group	Process Control
Range [units]	BASELOAD, LDSHARING [-]
Related FW	3.0
Description	This setpoint is used to adjust the power control mode in parallel-to-mains operation. • 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*). 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 InteliMains, where the InteliMains controls the power of the group via the load sharing line (e.g. in Import/Export mode).

Setpoint: #SysPFCtrl PtM

Group	Process Control
Range [units]	BASEPF, VSHARING [-]
Related FW	3.0
Description	This setpoint is used to adjust the power factor control mode in parallel-to-mains operation.

	• BASEPF: The gen-set power factor is controlled to a preadjusted level *#SysPwrFactor*. • VSHARING: The power factor is equalized with other gen-sets according to the actual reactive load. **NOTE:** If the power factor control mode is switched to VSHARING the *load control mode* must be switched to LDSHARING.

Setpoint: SysBaseLdMode

Group	Process control
Range [units]	INTERNAL, EXTERNAL [-]
Related FW	3.0
Force value possible	YES
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* = BASELOAD). **INTERNAL**: The baseload is adjusted by the setpoint *#SysBaseLoad*. **EXTERNAL**: The baseload is adjusted by the logical (functional) analog input *MLC:AnExSysBld*. **NOTE:** If the external source is selected the logical analog input must be configured at each gen-set to the identical source. The *shared peripherial 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* is configured onto this physical input. But the value is also beeing 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* is configured onto these shared inputs. • The transmitting controller must be always switched on!

Setpoint: SysBasePFMode

Group	Process control
Range [units]	INTERNAL, EXTERNAL [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint selects from where the System Power Factor value is taken if the PF

	control mode in parallel-to-mains operation is switched to BasePF (i.e. *#SysPFCtrl PtM* = BASEPF). **INTERNAL** — The required power factor is adjusted by the setpoint *#SysPwrFactor*. **EXTERNAL** — The baseload is adjusted by the logical (functional) analog input *MPF:AnExSysBPF*. **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*.

Setpoint: Derating1 strt

Group	Process control
Range [units]	-32000 .. +32000 [x]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the starting point of the *Power derating 1* function, where the gen-set nominal power is still 100% of the setpoint *Nomin power*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating1* is assigned.

Setpoint: Derating1 end

Group	Process control
Range [units]	-32000 .. +32000 [x]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the end point of the *Power derating 1* function, where the gen-set nominal power is reduced to the value adjusted by setpoint *Derated1 pwr*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating1* is assigned.

Setpoint: Derated1 pwr

Group	Process control
Range [units]	0 .. 100 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the final power level for the *Power derating 1* function. The nominal power is not reduced below this setpoint even if the respective analog input increases further. See the chapter Power derating for details.

Setpoint: Derating2 strt

Group	Process control
Range [units]	-32000 .. +32000 [x]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the starting point of the *Power derating 2* function, where the gen-set nominal power is still 100% of the setpoint *Nomin power*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating2* is assigned.

Setpoint: Derating2 end

Group	Process control
Range [units]	-32000 .. +32000 [x]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the end point of the *Power derating 2* function, where the gen-set nominal power is reduced to the value adjusted by setpoint *Derated2 pwr*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating1* is assigned.

Setpoint: Derated2 pwr

Group	Process control
Range [units]	0 .. 100 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the final power level for the *Power derating 2* function. The nominal power is not reduced below this setpoint even if the respective analog input increases further. See the chapter Power derating for details.

Setpoint: Synchro enable

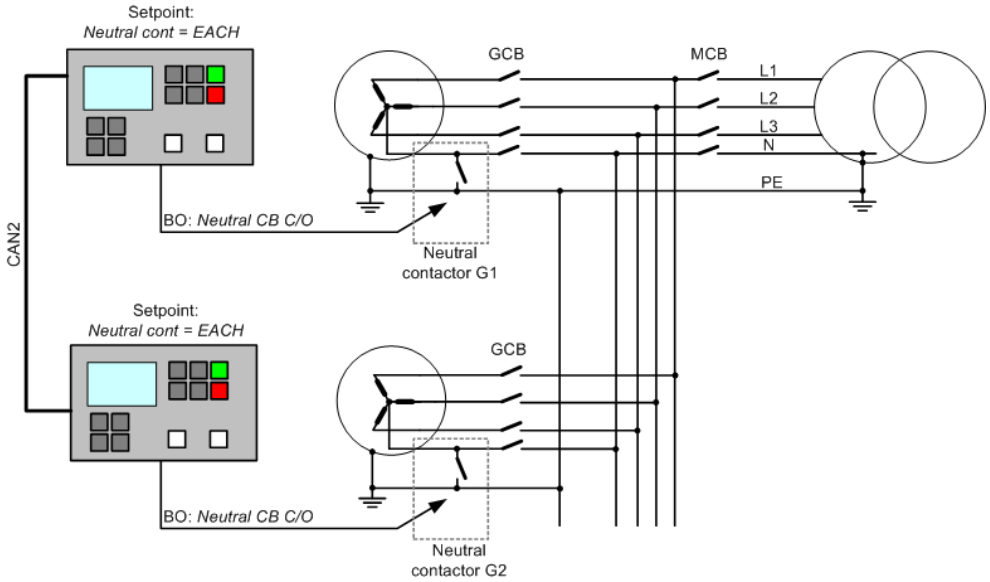
Group	Process Control
Range [units]	NONE, FORWARD, REVERSE, BOTH [-]
Related FW	3.0
Force value possible	YES
Description	The setpoint is used for enable/disable forward and reverse synchronization. • NONE: No synchronizing is enabled. • FORWARD: GCB synchronizing is enabled. • REVERSE: MCB synchronizing 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 *MFStart enable*.

Setpoint: #Neutral cont

Group	Process control
Range [units]	EACH, COMMON [-]
Related FW	3.0
Description	The setpoint is used for adjusting the behavior of the *Neutral CB C/O* 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.

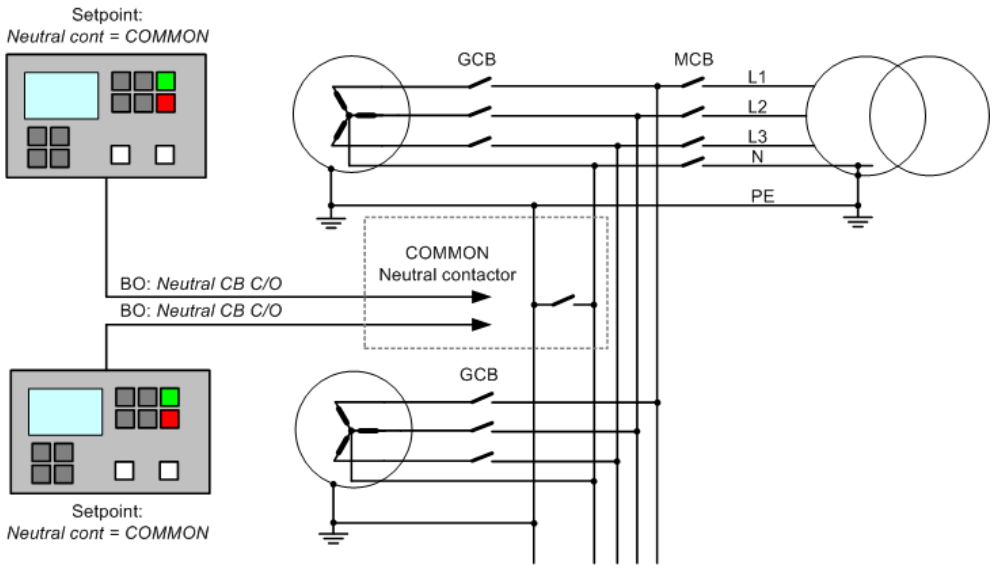


PRINCIPIAL SCHEME OF A SITE IF NEUTRAL CONT = EACH

The **COMMON** option should be used if there is one common neutral contactor for the whole site. The outputs *Neutral CB C/O* 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.



PRINCIPIAL 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.

Setpoint: WatchedContr

Group	Process Control
Range [units]	0 .. 16 [min]
Related FW	3.0
Description	This setpoint is used at redundant controller to specify the address of the related main controller in CAN-based rendundant systems. Adjust this setpoint to 0 if the controller is not used as redundant or if wired rendundancy system is used.

Group: Basic settings

Setpoint: Nomin current

Group	Basic Settings
Range [units]	1 .. 10000 [A]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting the generator nominal current. The nominal current is used as the basis (100%) for generator thermal-overcurrent protection (*2Inom del*), and for short current protection (*Ishort*). **NOTE:** The setpoints *CT ratio prim* and *CT ratio sec* must be adjusted properly to obtain

	correct generator current readings. **CAUTION!** The maximum measurable input current to the controller current terminals is 11A. **WARNING!** Do not discconnect the CT terminals from the controller while there is nonzero current in the CT primary circuit!

Setpoint: CT ratio prim

Group	Basic Settings
Range [units]	1 .. 15000 [A]
Related FW	3.0
Description	Nominal current of the **primary side** of the generator current transformers. The secondary side is adjusted by setpoint *CT ratio sec*.

Setpoint: CT ratio sec

Group	Basic settings
Range [units]	/5A, /1A [-]
Related FW	3.0
Description	Nominal current of the **secondary side** of the generator current transformers. The primary side is adjusted by setpoint *CT ratio prim*. **NOTE:** The CT secondary nominal current is adjustable only in IG-NTC and IS-NT. The IG-NT has the CT secondary nominal current adjusted fixedly to 5A regardless of this setpoint.

Setpoint: EarthFltCurCTp

Group	Basic settings
Range [units]	1 .. 15000 [A]
Related FW	3.0
Description	Nominal current of the **primary side** of the current transformer connected to the controller terminals labeled *IN*. The secondary side is adjusted by setpoint *EarthFltCurCTs*. **NOTE:** The *IN* terminals are used for measurement of earth fault current.

Setpoint: Im3/ErFlCurCTs

Group	Basic settings

Range [units]	/5, /1 [A]
Related FW	3.0
Description	Nominal current of the **secondary side** of the current transformer connected to the controller terminals labeled *IN*. The primary side is adjusted by setpoint *Im3/ErFlCurCTp*. **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*. **NOTE:** The CT secondary nominal current is adjustable only in IG-NTC and IS-NT. The IG-NT has the CT secondary nominal current adjusted fixedly to 5A regardless of this setpoint.

Setpoint: VT ratio

Group	Basic Settings
Range [units]	0.1 .. 500.0 [V/V]
Related FW	3.0
Description	The setpoint is used to adjust the generator voltage transformers ratio. **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. **NOTE:** Example: if you have transformers with ratio 6000/100V adjust the setpoint to the value of **60.0**. **NOTE:** The range of the generator voltage inputs must be adjusted properly. See the setpoint *Vg InpRangeSel*.

Setpoint: Vg InpRangeSel

Group	Basic settings
Range [units]	277V, 120V [-]
Related FW	3.0
Description	This setpoint selects the range of the generator voltage terminals. The 120V range is available only in IG-NTC and IS-NT. The IG-NT has the range adjusted fixedly to 277V regardless of this setpoint. **NOTE:** The 277V range is suitable for both European (230V) and American (277V) measurement. The range 120V is intended for high-voltage applications where voltage transformers with 100V secondary range are used or for alternative American (120V) measurement.

Setpoint: Vb VT ratio

Group	Basic Settings
Range [units]	0.1 .. 500.0 [V/V]
Related FW	3.0
Description	The setpoint is used to adjust the bus voltage transformers ratio. **NOTE:** See all notes mentioned above.

Setpoint: Vm InpRangeSel

Group	Basic settings
Range [units]	277V, 120V [-]
Related FW	3.0
Description	This setpoint selects the range of the mains voltage terminals. The 120V range is available only in IG-NTC and IS-NT. The IG-NT has the range adjusted fixedly to 277V regardless of this setpoint. **NOTE:** The 277V range is suitable for both European (230V) and American (277V) measurement. The range 120V is intended for high-voltage applications where voltage transformers with 100V secondary range are used or for alternative American (120V) measurement.

Setpoint: Vb InpRangeSel

Group	Basic settings
Range [units]	277V, 120V [-]
Related FW	3.0
Description	This setpoint selects the range of the bus voltage terminals. The 120V range is available only in IG-NTC and IS-NT. The IG-NT has the range adjusted fixedly to 277V regardless of this setpoint. **NOTE:** See all notes mentioned above.

Setpoint: BankNomV

Group	Basic Settings
Range [units]	10 .. 34641 [V]
Related FW	3.0
Force value possible	YES
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*. 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 (*BusNomV* 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 assymetrically. 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* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: BankNomVph-ph

Group	Basic Settings
Range [units]	17 .. 60000 [V]
Related FW	3.0
Description	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 *BankNomV* is changed. 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. **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 (*BankNomVph-ph* and *BusNomVph-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. In this case both setpoints need to be adjusted to 400 V and setpoints of corresponding protections for Bus/Mains need to be set assymetrically. 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* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: BusNomV

Group	Basic Settings
Range [units]	10 .. 34641 [V]

Related FW	3.0
Description	This setpoint is used to adjust the nominal bus voltage (phase to neutral). If you do not know the phase-neutral nominal voltage, you can adjust the phase-phase nominal voltage *BusNomVph-ph*. 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 (*BusNomV* 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 assymetrically. 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* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: BusNomVph-ph

Group	Basic settings
Range [units]	17 .. 60000 [V]
Related FW	3.0
Description	**In application MINT and COX.** This setpoint is used to adjust the nominal bus voltage (phase to phase). This setpoint is also recalculated automatically when the phase-neutral nominal voltage *BusNomV* is changed. 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. **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 (*BankNomVph-ph* and *BusNomVph-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. In this case both setpoints need to be adjusted to 400 V and setpoints of corresponding protections for Bus/Mains need to be set assymetrically. 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* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: FixVoltProtSel

Group	Basic settings
Range [units]	PHASE-NEUTRAL, PHASE-PHASE [-]
Related FW	3.0
Description	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%. **NOTE:** Both options require different settings of protection levels to achieve identical results. **EXAMPLE:** Phase-nominal voltage is 231V, actual voltages are L1N = 231V, L2N = 231V, L3N = 219.5V => 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 400V, measured voltages are L12 = 400V, L23 = 390V, L31 = 390V => 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%.

Setpoint: Nominal Freq

Group	Basic Settings
Range [units]	45 Hz .. 65 Hz
Related FW	3.0
Force value possible	YES
Description	The setpoint adjusts nominal system frequency. frequency. The value *Nominal Freq* 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* is set to ALL THE TIME.

Setpoint: ControllerMode

Group	Basic Settings
Range [units]	OFF, MAN, SEM, AUT, TEST [-]
Related FW	3.0
Description	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.

NOTE:
If any of the mode forcing inputs *Remote OFF*, *Remote MAN*, *Remote AUT* or *Remote TEST* is active, then the currenly active mode can be different than the mode selected by the setpoint (resp. panel buttons).

OFF	The GCB is opened and the engine is immediately stopped in this mode without unloading and cooling. After that the controller is in *Not ready* state and can not be started any way. The MCB is closed permanently (*MCB Opens On* = GENRUN) or is open or closed according to the mains is present or not (*MCB Opens On* = MAINSFAIL).
MAN	The engine can be started and stopped manually using START and STOP buttons (or external buttons wired to appropiate binary inputs) in MAN mode. When the engine is running, GCB can be closed to a dead bus or synchronizing can be started by the GCB button. Also MCB can be closed and opened manually using the MCB button, regardless the mains is present or not. No autostart is performed. No reaction to the inputs *Sys Start/Stop* or *Rem Start/Stop*.
SEM	(IS-NT only) - The gen-set is started and stopped only manually using START and STOP buttons (or external buttons wired to appropiate 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.
AUT	This is fully automatic operation. The engine is started and stopped by: • Binary input *Rem Start/Stop* (SPtM, SPI, COMBI) • Mains import dependent autostart function (peak start/stop) (SPtM, SPI, Combi) • AMF function (SPtM, Combi) • Power management (MINT, Combi) 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. **WARNING!** 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 *FltRes GoToMAN* to the ENABLED position.
TEST	(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.

Setpoint: FltRes GoToMAN

Group	Basic Settings

Range [units]	DISABLED,ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint can be used to aviod 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. **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 *Remote AUT* or *Remote TEST*.

Setpoint: Local buttons

Group	Basic settings
Range [units]	PANEL, EXTBUTTONS, BOTH [-]
Related FW	3.0
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. • First section deals with the case of IGS-NT with built-in monochrome display. • Second section deals with the case of IGS-NT-BB with IV5 display. • Third section deals with the case of IGS-NT-BB with IV8. **NOTE:** If you have IGS-NT (built-in display) and you use additional IV display all the sections may be relevant (depending on the type of additional displays). **IGS-NT (built-in monochrome display)** **PANEL** – The built-in buttons on the controller front panel (IG-NT) or terminal #1 (IS-NT) are enabled, the binary inputs for external buttons are disabled. **EXTBUTTONS** – The built-in buttons are disabled and the binary inputs for external buttons are enabled. **BOTH** – Both built-in buttons and binary inputs for external buttons are enabled.

NOTE:
In case that additional IV display is connected to a controller it behaves in the way described below.

NOTE:
The binary inputs for external buttons may be the following: GCBButton, MCBButton, FaultResButton, HornResButton, StartButton, StopButton etc.

IGS-NT-BB with IV-5 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.
- The binary inputs for external buttons are affected in the same way as in the case of IGS-NT (built-in monochrome display) by this setpoint.

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 buttonst may be the following (depending on used application): *GCBButton*, *MCBButton*, *MGCBButton*, *FDRButton*, *BTBButton*, *FaultResButton*, *HornResButton*, *StartButton*, *StopButton* etc.

IGS-NT-BB with IV-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.
- The binary inputs for external buttons are affected in the same way as in the case of IGS-NT (built-in monochrome display) by this setpoint.

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 buttonst may be the following (depending on used application): *GCBButton*, *MCBButton*, *MGCBButton*, *FDRButton*, *BTBButton*, *FaultResButton*, *HornResButton*, *StartButton*, *StopButton* etc.

Setpoint: DispBaklightTO

Group	Basic settings
Range [units]	OFF, 1-240 min, NO TIMEOUT [min]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts timeout after which the display (internal display or IS display

	#1) backlight is switched off. **NOTE:** When IntelliVision is used this setpoint does not adjust its behavior. Its backlight is adjusted by internal IntelliVision "setpoint". **OFF** — The backlight is off all the time **NO TIMEOUT** — The backlight is on all the time

Setpoint: DispBklStrtOff

Group	Basic settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	If this setpoint is in ENABLED position the display backlight is temporarily switched off during gen-set start.

Setpoint: ConvCoefPulse1

Group	Engine Params
Range [units]	1 .. 6500 [-]
Related FW	3.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #1 module. The module counts pulses at the input *PulseCounter 1* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 1* (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.

Setpoint: ConvCoefPulse2

Group	Basic settings
Range [units]	1 .. 6500 [-]
Related FW	3.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #2 module. The module counts pulses at the input *PulseCounter 2* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 2* (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.

Setpoint: ConvCoefPulse3

Group	Basic settings

Range [units]	1 .. 6500 [-]
Related FW	3.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #3 module. The module counts pulses at the input *PulseCounter 3* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 3* (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.

Setpoint: ConvCoefPulse4

Group	Basic settings
Range [units]	1 .. 6500 [-]
Related FW	3.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #4 module. The module counts pulses at the input *PulseCounter 4* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 4* (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.

Group: Comms settings

Setpoint: Gen-set name

Group	Comms settings
Range [units]	[-]
Related FW	3.0
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. The setpoint can't be modified via the IG-NT built-in terminal.

Setpoint: Contr. address

Group	Comms settings
Range [units]	1 .. 32 [-]
Related FW	3.0
Description	This setpoint adjusts the address of the particular controller at the CAN2 and/or RS485 bus. Each gen-set connected to the same bus **must have unique address**. If the setpoint *CANnegotiation* (**COMBI application only**) is in AUT position, the address is assigned automatically. The setpoint *Contr. addr* is preffered then, however if it is in conflict with other controller present on the CAN2 bus other address will be assigned to aviod address collision. **NOTE:**

	Address 1 is reccommended for standalone gen-sets. **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.) **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.

Setpoint: RS232(1) mode

Group	Comms settings
Range [units]	DIRECT, MODEM (HW), MODEM (SW), MODBUS-DIRECT, MODBUS-MDM(HW), ECU LINK [-]
Related FW	3.0
Description	This setpoint selects the connection type for the serial port COM1. • Available as RS232 in all controller types. • Available also as RS485 in the IG-NT if the external display bus is not used. Selectable by the setpoint *RS485(1) conv.* (not available in IG-NT-BB, IG-NTC-BB, IS-NTC-BB and IS-NT - see *RS485(1) conv.*). See the diagram of all related terminals in the chapter Communication.

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.*
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.*, the communication speed is adjustable by the setpoint *RS232(1)MBCSpd*. See the latest communication guide for more information about 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*. See the latest communication guide for more information about 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.

Setpoint: RS232(2) mode

Group	Comms settings
Range [units]	DIRECT, MODEM (HW), MODEM (SW), MODBUS-DIRECT, MODBUS-MDM(HW), ECU LINK [-]
Related FW	3.0
Description	This setpoint selects the connection type for the serial port COM2. • Available as RS232 or RS485 in the IG-NTC and IS-NT controllers. Selectable by the setpoint *RS485(2) conv.*. • Available only as RS485 in the IG-NTC-BB and IS-NTC-BB controllers. • Not available in IG-NT. See the diagram of all related terminals in the chapter Communication.

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.*
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 communication speed is adjustable by the setpoint *RS232(2)MBCSpd*. See the latest communication guide for more information about 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*. See the latest communication guide for more information about 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 COM2 prot is not available in the basic IG-NT version.

	NOTE: The RS232 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.

Setpoint: RS232(1)MBCSpd

Group	Comms settings
Range [units]	9600, 19200, 38400, 57600 [bps]
Related FW	3.0
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*.

Setpoint: RS232(2)MBCSpd

Group	Comms settings
Range [units]	9600, 19200, 38400, 57600 [bps]
Related FW	3.0
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*.

Setpoint: RS232(1)MdmIni

Group	Comms settings
Range [units]	[-]
Related FW	3.0
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. The setpoint can't be modified via the IG-NT built-in terminal.

Setpoint: RS485(1) conv.

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
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*.

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.

Setpoint: RS232(2)MdmIni

Group	Comms settings
Range [units]	[-]
Related FW	3.0
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. The setpoint can't be modified via the IG-NT built-in terminal. Using a modem at the COM2 port is not supported since the hardware version 2.0. For modem use the COM1 port instead.

Setpoint: RS485(2) conv.

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Description	This setpoint selects function of the built-in RS485(2) converter.

ENABLED	The communication port COM2 is redirected to the integrated RS485(2) converter. The RS232(2) connector has no function.
DISABLED	The communication port COM2 is present at the RS232(2) connector.

NOTE:
The redirection is applied only for DIRECT, MODBUS and ECU-LINK modes. See the setpoint *RS232(2) mode*.

NOTE:

	This setpoint has no function for IG-NT(C)-BB and IS-NTC-BB as this controller modifications do not provide the RS232 connector at the COM2 port. The port is redirected to the RS485 interface all the time regardless of this setpoint.

Setpoint: CAN-A bus mode

Group	Comms settings
Range [units]	32C,8C [-]
Related FW	3.0
Description	CAN bus speed selection. • 32C: High speed CAN (250 kbps) applicable up to 32 controllers, CAN bus length limited up to 200 meters. • 8C: Low speed CAN (50 kbps) applicable up to 8 controllers, CAN bus length limited up to 900 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.

Setpoint: CAN-A emptyDet

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	Enables the detection of missing other controllers on the CAN-A bus. If the setpoint is in ENABLED position and there aren't any other controllers detected on the CAN-A bus (the complete bus, not only within the logical group) the alarm *CAN-A Empty* is issued.

Setpoint: CAN-B emptyDet

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Force value possible	YES

Description	Enables the detection of missing other controllers on the CAN-B bus. If the setpoint is in ENABLED position and there aren't any other controllers detected on the CAN-B bus (the complete bus, not only within the logical group) the alarm *CAN-B Empty* is issued.

Setpoint: LB/UART Log

Group	Comms settings
Range [units]	DISABLED, ENABLED
Related FW	3.0
Force value possible	YES
Force value possible	YES
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. **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.

Setpoint: CANAddrSwitch1

Group	Comms settings
Range [units]	[-]
Related FW	3.0
Description	The setpoint selects function of the terminal address 122 at the (CAN-A) line. See the latest communication guide for details about this topic. **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.

Setpoint: CANAddrSwitch2

Group	Comms settings
Range [units]	[-]
Related FW	3.0
Description	The setpoint selects function of the terminal address 125 at the (CAN-A) line. See the latest communication guide for details about this topic.

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

Setpoint: IP address

Group	Comms settings
Range [units]	[-]
Related FW	3.0
Description	• In *fixed settings mode* 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. • In *Automatic settings mode* 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).

Setpoint: IP Addr mode

Group	Comms settings
Range [units]	[-]
Related FW	3.0
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*, *Net mask*, *Gateway IP*, *DNS IP*. .
	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*, *Net mask*, *Gateway IP* and *DNS IP*). If the process of obtaining the settings from DHCP server is not successful the value *000.000.000.000* is copied to the setpoint *IP address* 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.

	CAUTION! If you need to use fixed ethernet settings you should consult the proper setting with your IT specialist.

Setpoint: Net mask

Group	Comms settings
Range [units]	[-]
Related FW	3.0
Description	• In *fixed settings mode* this setpoint is used to adjust the network mask of the network segment where the controller is connected. • In *Automatic settings mode* 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).

Setpoint: Gateway IP

Group	Comms settings
Range [units]	[-]
Related FW	3.0
Description	• In *fixed settings mode* this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected. • In *Automatic settings mode* 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). A gateway is a device which connects the respective segment with the other segments and/or Internet.

Setpoint: ComApProtoPort

Group	Comms settings
Range [units]	1 .. 255 [-]
Related FW	3.0
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. InteliMonitor, 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.

Setpoint: AirGate

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
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 addr*.

Setpoint: AirGate IP

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.0
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 *airgate.comap.cz* if your company does not operate it's own AirGate server.

Setpoint: SMTP authent

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Description	Switch this setpoint to ENABLED position if your *SMTP server* requires authentificated access. You have also adjust *SMTP user name* and *SMTP password*. Ask your internet provider or IT manager for this information. **NOTE:** Most of public free SMTP servers require authentification. You will get instructions when you register to the freemail service.

Setpoint: SMTP user name

Group	Comms settings
Range [units]	max. 32 characters [-]

Related FW	3.0
Description	Use this setpoint to enter the user name for the SMTP server if *SMTP authentification* is enabled.

Setpoint: SMTP password

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.0
Description	Use this setpoint to enter the password for the SMTP server if *SMTP authentification* is enabled.

Setpoint: SMTP address

Group	Comms settings
Range [units]	max. 32 characters
Related FW	3.0
Description	**CAUTION!** Proper setting of SMTP-related setpoints as well as controller mailbox are essential for sending alerts via e-mails. This setpoint is used for entering the domain name (e.g. *smtp.yourprovider.com*) or IP address (e.g. 74.125.39.109) of the SMTP server. Please ask your internet provider or IT manager for this information. **NOTE:** You may also use one of free SMTP servers, e.g. *smtp.gmail.com*. However, please note that some free SMTP servers may cause delays (in hours..) when sending e-mails. **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.

Setpoint: Contr mailbox

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.0
Description	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*, *AcallCH2-Addr* and *AcallCH3-Addr*. **NOTE:** Most of SMTP server will reject sending e-mails that contain nonexisting address in the sender address field.

Setpoint: Time zone

Group	Comms settings
Range [units]	- [-]
Related FW	3.0
Description	This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the the windows task bar) if you are not sure about your time zone. **NOTE:** If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occured.

Setpoint: DNS IP

Group	Comms settings
Range [units]	[-]
Related FW	3.0
Description	• In *fixed settings mode* this setpoint is used to adjust the domain name server (DNS), which is needed to traslate domain names in e-mail addresses and server names into correct IP addresses. • In *Automatic settings mode* 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).

Setpoint: ECU Diag

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
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 *ECU Diag disabled* is displayed in the alarm list while ECU diagnostics is disabled.

Setpoint: SHxOcol detect

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Description	This setpoint is used to enable/disable evaluation of collisions of virtual shared peripherial 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.

Group: ComProtSettings

Setpoint: Bin selector 1

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 1*.

Setpoint: Bin selector 2

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 2*.

Setpoint: Bin selector 3

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 3*.

Setpoint: Bin selector 4

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 4*.

Setpoint: Horn Timeout

Group	Engine Protect
Range [units]	OFF, 1s - 3600s, NO TIMEOUT [-]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts time after which the *Horn* 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.

Setpoint: BinInp delay 1

Group	Engine protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.0
Description	This setpoint adjusts the delay #1 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.

Setpoint: BinInp delay 2

Group	Engine protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.0
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.

Setpoint: BinInp delay 3

Group	Engine protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.0
Force value possible	YES
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.

Setpoint: ForceBlockDel1

Group	Engine protect
Range [units]	0.0 .. 60.0 [s]
Related FW	3.0
Description	This setpoint adjusts the delay after the binary input *Force block 1* has been deactivated, when the alarms configured as *Force block #1* are started to be evaluated.

Setpoint: ForceBlockDel2

Group	Engine protect
Range [units]	0.0 .. 60.0 [s]
Related FW	3.0
Description	This setpoint adjusts the delay after the binary input *Force block 2* has been deactivated, when the alarms configured as *Force block #2* are started to be evaluated.

Setpoint: ForceBlockDel3

Group	Engine protect
Range [units]	0.0 .. 60.0 [s]
Related FW	3.0

Force value possible	YES
Description	This setpoint adjusts the delay after the binary input *Force block 3* has been deactivated, when the alarms configured as *Force block #3* are started to be evaluated.

Setpoint: ResetActAlarms

Group	Engine protect
Range [units]	[-]
Related FW	3.0
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. **NOTE:** ENABLED position corresponds to the method how the IG-classic and IS-classic controllers handled the alarms.

Group: Analog protect

Setpoint: Batt >V

Group	Analog protect
Range [units]	8.0 .. 40.0 [V]
Related FW	3.0
Description	This setpoint adjusts the warning level for battery overvoltage alarm.

Setpoint: Batt <V

Group	Analog protect
Range [units]	8.0 .. 40.0 [V]
Related FW	3.0
Description	This setpoint adjusts the warning level for battery undervoltage alarm.

Setpoint: Batt volt del

Group	Analog protect
Range [units]	0 .. 600 [s]
Related FW	3.0
Description	This setpoint adjusts the delay for battery *overvoltage* and *undervoltage* alarms.

Group: Bank protect

Setpoint: Min Power PtM

Group	Bank protect
Range [units]	1 .. 100 [%]
Related FW	3.0
Force value possible	YES
Description	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. The only situation, where the *Min Power PtM* is ignored, is the warming procedure after the gen-set is synchronized to the mains, i.e. the *Warming load* can be adjusted also below the sepoint *Min Power PtM*. This setpoint is also used as the requested load level if a protection of *Low power* type is active. **NOTE:** Note that if InteliMains is used and it is in active control mode (i.e. the *SysLdCtrl PtM* is set to LDSHARING) this setpoint is not considered and minimal power in parallel to Mains operation is given by **ProcessControl***MinPwr PtM* is used to determine minimal power of each gen-set in the group in percentage of its nominal power.

Setpoint: Ishort

Group	Bank protect
Range [units]	100 .. 500 [%]
Related FW	3.0
Description	This setpoint adjusts the threshold level (in % of the *nominal current*) for the generator fast overcurent protection. The protection is activated (alarm *Ishort* is issued) when the generator current in at least one phase exceeds the threshold limit for time longer than *Ishort del*. **NOTE:** The protection type is *Breaker open and cool down* (BOC).

Setpoint: Ishort del

Group	Bank protect
Range [units]	0.00 .. 10.00 [s]
Related FW	3.0
Description	This setpoint adjust the delay for generator fast overcurrent protection. The limit for the protection is adjusted by the setpoint *Ishort*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: 2Inom del

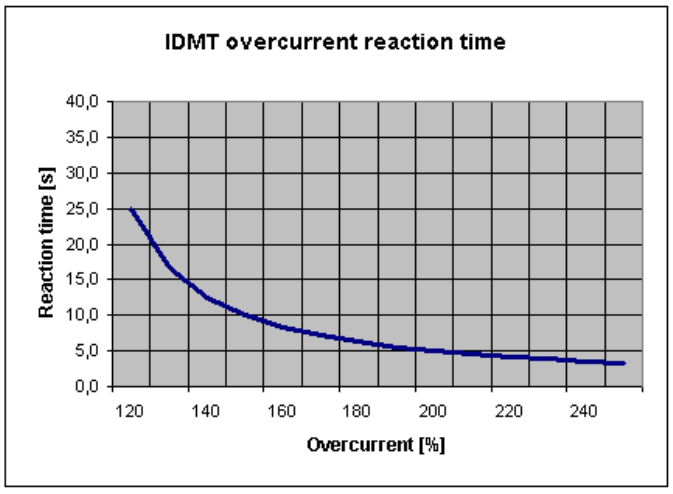
Group	Bank protect
Range [units]	1 .. 600.0 [s]
Related FW	3.0
Description	This setpoint adjusts the reaction time of the IDMT overcurrent protection if the overcurrent level is 200% of the *nominal current*. The reaction time of the IDMT overcurrent protection is not fixed; it depends on how much is the actual current above the limit (nominal). The higher is the overcurrent the shorter the reaction time will be.

Overcurrent [% of I_{nom}] | Reaction time [s]

Example: 2Inom del = 5 s

$$\text{REACTION TIME [s]} = \frac{\textit{2Inom del [s]} * 100}{\text{Overcurrent [\%]} - 100\ \textit{[\%]}}$$

Overcurrent [% of I_{nom}]	Reaction time [s]
100	no alarm
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



EXAMPLE OF IDMT OVERCURRENT PROTECTION CURVE

NOTE:

	The IDMT overcurrent protection is *Breaker open and cool down (BOC)* type.

Setpoint: Bank >V BOC

Group	Bank Protect
Range [units]	*Bank <V BOC* .. 150 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator overvoltage protection. The threshold is adjusted in % of the nominal generator voltage, which is either *BankNomV* or *BankNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase gets over the threshold for time longer than *Bank V del*. **NOTE:** The asociated protection to this setpoint is *Breaker open and cool down (BOC)* type. There is also *Shutdown* overvoltage protection, which is adjusted by setpoint *Bank >V Sd*. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Bank <V BOC

Group	Bank protect
Range [units]	20 .. *Bank >V BOC* [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator undervoltage protection. The threshold is adjusted in % of the nominal generator voltage, which is either *BankNomV* or *BankNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase drops below the threshold for time longer than *Bank V del*. **NOTE:** The generator undervoltage protection is *Breaker open and cool down (BOC)* type. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Bank >V Sd

Group	Bank protect
Range [units]	50 .. 150 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator overvoltage **shutdown** protection. The threshold is adjusted in % of the nominal generator voltage, which is either *BankNomV* or *BankNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase gets over the threshold for time longer than *Bank V del*. **NOTE:** The asociated protection to this setpoint is *Shutdown* type. There is also *Breaker open and cool down (BOC)* overvoltage protection, which is adjusted by setpoint *Bank >BOC*. **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.**

Setpoint: Bank V del

Group	Bank protect
Range [units]	0.00 .. 600.00 [s]
Related FW	3.0
Description	The setpoint adjusts the delay for generator under- and overvoltage protections. The thresholds for these protections are adjusted by setpoints *Bank >V BOC*, *Bank <V BOC* and *Gen >V Sd*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: Bank >f

Group	Bank protect
Range [units]	*Bank <f* .. 150 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator overfrequency protection. The threshold is adjusted in % of the system frequency (*Nominal*

	Freq). The protection activates if the frequency in phase L3 gets over the threshold for time longer than *Bank f del*. **NOTE:** The generator overfrequency protection is *Breaker open and cool down (BOC)* type. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Bank <f

Group	Bank protect
Range [units]	50 .. *Bank >f* [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator underfrequency protection. The threshold is adjusted in % of the system frequency (*Nominal Freq*). The protection activates if the frequency in phase L3 drops below the threshold for time longer than *Bank f del*. **NOTE:** The generator underfrequency protection is *Breaker open and cool down (BOC)* type. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Bank f del

Group	Bank protect
Range [units]	0.00 .. 600.00 [s]
Related FW	3.0
Description	The setpoint adjusts the delay for generator under and overfrequency protections. The thresholds for these protections are adjusted by setpoints *Bank >f* and *Bank <f*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: Reverse power

Group	Bank protect
Range [units]	0 .. 50 [%]
Related FW	3.0
Description	This setpoint adjusts the threshold level for the generator reverse (negative) power protection. The threshold is adjusted in % of the generator *nominal power*. The protection activates if the generator power drops below the threshold for time longer than *ReversePwr del*. **NOTE:** The generator reverse power protection is *Breaker open and cool down (BOC)* type.

Setpoint: ReversePwr del

Group	Bank protect
Range [units]	0 .. 600.0 [s]
Related FW	3.0
Description	The setpoint adjusts the delay for generator reverse power protection. The threshold for the protection is adjusted by setpoint *Reverse power*.

Setpoint: Nom EthFltCurr

Group	Bank protect
Range [units]	0 .. 10000 [A]
Related FW	3.0
Force value possible	YES
Description	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*. When the EarthFault Current goes below the level given by *Nom EthFltCurr*, protection starts decreasing its thermal counter. For more information about this protection, refer to the setpoint *2EthFltCur del*.

Setpoint: 2EthFltCur del

Group	Bank protect
Range [units]	OFF, 0.1 .. 600.0 [s]
Related FW	3.0
Force value possible	YES

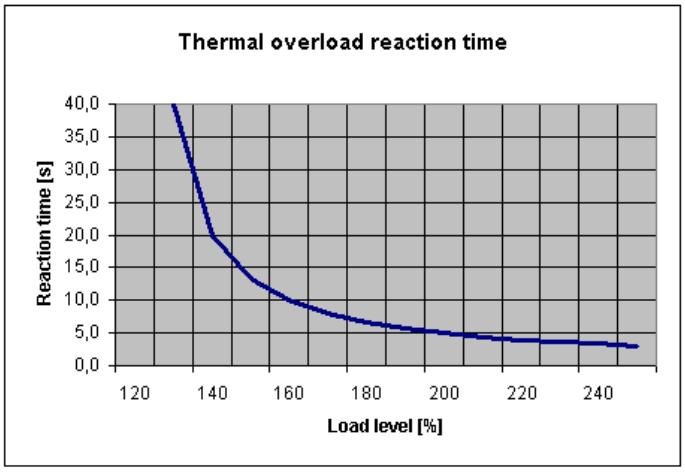
Description	This setpoint adjusts the reaction time of the IDMT EarthFault Current protection if the current is 200% of the base level given by the setpoint *Nom EthFltCurr*. The reaction time of the IDMT EarthFault Current protection is not fixed; it depends on how much is the current above the limit (base level). The higher is the current the shorter the reaction time will be.

Load level [% of P_{nom}] | Reaction time [s]

Example: 2POvrldStEvDel = 5 s
OverldStrtEval = 120 %

REACTION TIME [s] = $\frac{\text{2POvrldStEvDel [s]} * (200 - \text{OverldStrtEval [\%]})}{\text{Engine load [\%]} - \text{OverldStrtEval [\%]}}$

Load level [% of P_{nom}]	Reaction time [s]
100	no alarm
110	no alarm
120	3600,0
130	40,0
140	20,0
150	13,3
160	10,0
170	8,0
180	6,7
190	5,7
200	5,0
210	4,4
220	4,0
230	3,6
240	3,3
250	3,1



EXAMPLE OF IDMT CURRENT PROTECTION CURVE

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*. This function prevents the protection from completely reseting when the EarthFault Current goes below *Nom EthFltCurr* for only a short period of time. This behavior emulates circuit-breaker with thermal current protection.

Setpoint: Bank V unbal

Group	Bank protect
Range [units]	0 .. 200 [%]
Related FW	3.0
Description	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 *BankNomV* or *BankNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection is *Breaker open and cool down* type and **is created in the default archive as universal analog protection** at the value *Gen*

	V unbal, which is calculated as maximum difference between two phase voltages. The protection activates if the voltage unbalance gets over the threshold for time longer than *Bank V unb del*. **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.

Setpoint: Bank V unb del

Group	Bank protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.0
Description	This setpoint adjusts the delay for the generator voltage unbalance protection. The threshold for the protection is adjusted by setpoint *Bank V unbal*. **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.

Setpoint: Bank I unbal

Group	Bank protect
Range [units]	0 .. 200 [%]
Related FW	3.0
Description	This setpoint adjusts the threshold level for the generator current unbalance protection. The threshold is adjusted in % of the generator *nominal current*. The protection is *Breaker open and cool down* type and **is created in the default archive as universal analog protection** at the value *Gen I unbal*, which is calculated as maximum difference between two phase currents. The protection activates if the current unbalance gets over the threshold for time longer than *Bank I unb del*. **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.

Setpoint: Bank I unb del

Group	Bank protect
Range [units]	0.0 .. 600.0 [s]

Related FW	3.0
Description	This setpoint adjusts the delay for the generator current unbalance protection. The threshold for the protection is adjusted by setpoint *Bank I unbal*. **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.

Setpoint: Bus V unbal

Group	Bank protect
Range [units]	0 .. 200 [%]
Related FW	3.0
Description	This setpoint adjusts the threshold level for the bus voltage unbalance protection. The threshold is adjusted in % of the nominal generator voltage, which is either *BusNomV* or *BusNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection **is created in the default archive as universal analog protection** at the value *Bus V unbal*, which is calculated as maximum difference between two bus phase voltages. The protection activates if the voltage unbalance gets over the threshold for time longer than *Bus V unb del*. **NOTE:** Activation of the protection is only recorded into the history file, no other actions are performed. **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.

Setpoint: Bus V unb del

Group	Bank protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.0
Description	This setpoint adjusts the delay for the bus voltage unbalance protection. The threshold for the protection is adjusted by setpoint *Bus V unbal*. **NOTE:** The bus 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.

Group: Power management

Setpoint: Pwr Management

Group	Pwr Management
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to enable/disable the power management function 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*, i.e. if the input is active the gen-set is running and vice versa.

Setpoint: #Pwr mgmt mode

Group	Pwr management
Range [units]	ABS(kW), ABS(kVA), REL(%LOAD) [-]
Related FW	3.0
Description	This setpoint is used to select the power management mode: **ABS (kW)**: The power management is based on actual *active power* and gen-set *nominal power*. The reserves are calculated and adjusted in kW. **ABS (kVA)**: The power management is based on actual *apparent power* and gen-set "nominal apparent power" is calculated as 3 * *Nomin current* * *GenNomV*. The reserves are calculated and adjusted in kVA. **NOTE:** This mode is intended for systems supplying loads with low power factor. It prevents the gen-sets from operating at high currents. **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 %.

Setpoint: Priority

Group	Pwr Management
Range [units]	1 .. 32 [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjusting of the gen-set priority. Value of 1 represents the the highest priority (lowest starting order), value of 32 is the lowest priority

	(highest starting order). To "push" the particular genset temporarily into the highest priority, value of 0 can be forced (see *Force value 1*) into this setpoint.

Setpoint: #PriorAutoSwap

Group	Pwr management
Range [units]	DISABLED, RUN HOURS EQU, LD DEMAND SWAP [-]
Related FW	3.0
Description	This setpoint selects the method of optimalization of priorities: **DISABLED** — Optimalization is disabled. Priorities are given directly by the values adjusted into the setpoints *Priority*. **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 optimalize 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.cz). Note that this priority swapping function may be used only if *Pwr mgmt mode* is set to ABS (kW). **NOTE:** See the chapter Optimalization of priorities for more details. **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 optimalization is enabled at least one gen-set in the group must be set as the master for the optimalization (*Priority ctrl* = 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. **CAUTION!** If the controller which is set to MASTER in PriorAutoSwap function is in *Emerg. manual*, priority autoswapping will not work and no other controller will assume MASTER role.

Setpoint: Priority ctrl

Group	Pwr management

Range [units]	SLAVE, MASTER [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to select the role of this particular controller in the optimalization 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 beeing 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.

Setpoint: #SysAMFstrtDel

Group	Pwr management
Range [units]	0 .. 600 [s]
Related FW	3.0
Description	This setpoint adjusts the delay between closing of the input *Sys start/stop* and activation of the gen-set group into island operation (i.e. the *MCB feedback* is open). The delay of activation of the group into parallel-to-mains operation is fixed 1s. The setpoint is primarily intended for adjusting the "Mains failure autostart" delay in sites, where the input *Sys start/stop* is controlled directly by a mains decoupling relay.

Setpoint: ##SysAMFstopDel

Group	Pwr Management
Range [units]	0 .. 600 [s]
Related FW	3.0
Description	This setpoint adjusts the delay between opening of the input *Sys start/stop* and deactivation of the gen-set group if *MCB feedback* is open. If the MCB feedback is closed, the the delay is fixed 1s. The setpoint is primarily intended for adjusting the "Mains return" delay in sites, where the input *Sys start/stop* is controlled directly by a mains decoupling relay.

Setpoint: #LoadResStrt 1

Group	Pwr Management
Range [units]	-32000 .. *LoadResStop 1* [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #1 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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*, *LoadResStrt 3* or *LoadResStrt 4* depending on which load reserve set is selected) determines also the number of gensets (that are part of the power management) which will start (according to their priority and nominal power). **NOTE:** There is a possiblity to assign this setpoint negative number. This can be used in some situations to allow genset start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the Troubleshooting guide for more information (chapter "MGCB is not closed although gensets are running"). **NOTE:** # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.

Setpoint: #LoadResStop 1

Group	Pwr Management
Range [units]	*LoadResStrt 1* .. 32000 [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #1 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #LoadResStrt 2

Group	Pwr Management
Range [units]	-32000 .. *LoadResStop 2* [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #2 is active. Learn more

	about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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 1*, *LoadResStrt 3* or *LoadResStrt 4* depending on which load reserve set is selected) determines also the number of gensets (that are part of the power management) which will start (according to their priority and nominal power). **NOTE:** There is a possiblity to assign this setpoint negative number. This can be used in some situations to allow genset start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the Troubleshooting guide for more information (chapter "MGCB is not closed although gensets are running"). **NOTE:** # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.

Setpoint: #LoadResStop 2

Group	Pwr Management
Range [units]	*LoadResStrt 2* .. 32000 [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #2 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #LoadResStrt 3

Group	Pwr Management
Range [units]	-32000 .. *LoadResStop 3* [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #3 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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 1*, *LoadResStrt 2* or *LoadResStrt 4* depending on which load reserve set is selected) determines also the number of gensets (that are part of the power

	management) which will start (according to their priority and nominal power). **NOTE:** There is a possiblity to assign this setpoint negative number. This can be used in some situations to allow genset start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the Troubleshooting guide for more information (chapter "MGCB is not closed although gensets are running"). **NOTE:** # sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.

Setpoint: #LoadResStop 3

Group	Pwr Management
Range [units]	*LoadResStrt 3* .. 32000 [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #3 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #LoadResStrt 4

Group	Pwr Management
Range [units]	-32000 .. *LoadResStop 4* [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #4 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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 1*, *LoadResStrt 2* or *LoadResStrt 3* depending on which load reserve set is selected) determines also the number of gensets (that are part of the power management) which will start (according to their priority and nominal power). **NOTE:** There is a possiblity to assign this setpoint negative number. This can be used in some situations to allow genset start after Sys Start/Stop gets active. It is not destined for normal operation. Please refer to the Troubleshooting guide for more information (chapter "MGCB is not closed although gensets are running"). **NOTE:**

	# sign in the name of this setpoint marks that this setpoint is shared among all controllers connected by CAN2 bus.

Setpoint: #LoadResStop 4

Group	Pwr Management
Range [units]	*LoadResStrt 4* .. 32000 [kX]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in absolute mode. i.e. *Pwr mgmt mode* = ABS (kW) or ABS (kVA) if the reserve set #4 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #%LdResStrt 1

Group	Pwr Management
Range [units]	0 .. *#%LdResStop 1* [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #1 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. If none of these inputs is active the set #1 is selected.

Setpoint: #%LdResStop 1

Group	Pwr Management
Range [units]	*#%LdResStrt 1* .. 110 [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #1 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #%LdResStrt 2

Group	Pwr Management
Range [units]	0 .. *#%LdResStop 2* [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #2 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. If none of these inputs is active the set #1 is selected.

Setpoint: #%LdResStop 2

Group	Pwr Management
Range [units]	*#%LdResStrt 2* .. 110 [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #2 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #%LdResStrt 3

Group	Pwr Management
Range [units]	0 .. *%LdResStop 3* [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #3 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. If none of these inputs is active the set #1 is selected.

Setpoint: #%LdResStop 3

Group	Pwr Management
Range [units]	*#%LdResStrt 3* .. 110 [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #3 is active. Learn more about reserves

	in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #%LdResStrt 4

Group	Pwr Management
Range [units]	0 .. *%LdResStop 4* [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for start in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #4 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. If none of these inputs is active the set #1 is selected.

Setpoint: #%LdResStop 4

Group	Pwr Management
Range [units]	*#%LdResStrt 4* .. 110 [%]
Related FW	3.0
Description	This setpoint is used to adjust the load reserve for stop in relative mode. i.e. *Pwr mgmt mode* = REL (%) if the reserve set #4 is active. Learn more about reserves in the chapter Reserves, minimal running power. The currently active reserve set is selected by binary inputs *Load res 2*, *Load res 3* and *Load res 4*. 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.

Setpoint: #NextStrt Del

Group	Pwr Management
Range [units]	0 .. 3600 [s]
Related FW	3.0
Description	This setpoint is used to adjust the delay of starting the next gen-set when the actual load reserve drops below the adjusted reserve for start, but the group is still not overloaded.

Setpoint: ##OverldNextDel

Group	Pwr Management
Range [units]	0 .. 3600 [s]
Related FW	3.0
Description	If the system reserve drops below the start limit for next gen-set the delay *#NextStrt del* 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* reaches zero. This setpoint is used to prevent this situation. If the *#NextStrt del* timer is already counting down (i.e. the condition for starting of next gen-set **based on reserves is fullfiled**), the total load of running gen-sets reaches 90% of their nominal capacity and the remaining time of the running timer is higher than *#OverldNextDel*, the running timer is shortened to the value of *#OverldNextDel* to speed up the start-up of the next gen-set. **NOTE:** The setpoint takes place only in island operation.

Setpoint: #NextStopDel

Group	Pwr Management
Range [units]	0 .. 3600 [s]
Related FW	3.0
Description	This setpoint is used to adjust the delay of stopping the next gen-set when the actual load reserve rises above the adjusted load reserve for stop.

Setpoint: #SlowStopDel

Group	Pwr Management
Range [units]	0 .. 600 [s]
Related FW	3.0
Description	This setpoint is used to adjust how long the particular gen-set will suppress it's own *Slow stop* 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.

Setpoint: #MinRunPower 1

Group	Power Management
Range [units]	0 .. 65000 [kW]
Related FW	3.0
Description	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 fulfiled, if the total remaining nominal

	power dropped below this minimal value. There are 3 different *MinRunPower* setpoints, this particular one is activated by the input *MinRun power 1*. **NOTE:** If more than one binary input for MinRunPower activation is closed MinRunPower 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.

Setpoint: #MinRunPower 2

Group	Power Management
Range [units]	0 .. 65000 [kW]
Related FW	3.0
Description	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 fulfiled, if the total remaining nominal power dropped below this minimal value. There are 3 different *MinRunPower* setpoints, this particular one is activated by the input *MinRun power 2*. **NOTE:** If more than one binary input for MinRunPower activation is closed MinRunPower 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.

Setpoint: #MinRunPower 3

Group	Power Management
Range [units]	0 .. 65000 [kW]
Related FW	3.0
Description	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 fulfiled, if the total remaining nominal power dropped below this minimal value. There are 3 different *MinRunPower* setpoints, this particular one is activated by the input *MinRun power 3*. **NOTE:** If more than one binary input for MinRunPower activation is closed MinRunPower 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.

Setpoint: #RunHrsMaxDiff

Group	Pwr management
Range [units]	0 .. 65000 [h]
Related FW	3.0
Description	This setpoint adjusts the "deadband" for the running hours equalization function. The priorities are swapped not until the relative engine hours (RHE) difference is higher than this deadband.

Setpoint: #PwrBandContr 1

Group	Pwr management
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]
Related FW	3.0
Description	This setpoint is used to select the gen-sets which will run within the power band #1 if the optimalization according to gen-set size is active. Learn more about this topis in the chapter Gen-set size optimalization. **NOTE:** The combinations of gensets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.

Setpoint: #PwrBandContr 2

Group	Pwr management
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]
Related FW	3.0
Description	This setpoint is used to select the gen-sets which will run within the power band #2 if the optimalization according to gen-set size is active. Learn more about this topis in the chapter Gen-set size optimalization. **NOTE:** The combinations of gensets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.

Setpoint: #PwrBandContr 3

Group	Pwr management
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]
Related FW	3.0
Description	This setpoint is used to select the gen-sets which will run within the power band #3 if the optimalization according to gen-set size is active. Learn more about this topis in the chapter Gen-set size optimalization. **NOTE:** The combinations of gensets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.

Setpoint: #PwrBandContr 4

Group	Pwr management
Range [units]	1, 2, 1+2, 3, 1+3, 2+3, 1+2+3 [-]
Related FW	3.0
Description	This setpoint is used to select the gen-sets which will run within the power band #4 if the optimalization according to gen-set size is active. Learn more about this topis in the chapter Gen-set size optimalization. **NOTE:** The combinations of gensets must be created so, that the total nominal power of the Power band #1 < #2 < #3 < #4.

Setpoint: #PwrBnChngDlUp

Group	Pwr management
Range [units]	0 .. 3600 [s]
Related FW	3.0
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. Learn more about this topis in the chapter Gen-set size optimalization.

Setpoint: #PwrBnChngDlDn

Group	Pwr management
Range [units]	0 .. 3600 [s]
Related FW	3.0
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. Learn more about this topis in the chapter Gen-set size optimalization.

Setpoint: Control group

Group	Pwr management
Range [units]	COMMON (=1), 2 .. 32 [-]
Related FW	3.0
Description	This setpoint selects the logical group to which the particular gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1 (COMMON).

Setpoint: GroupLinkLeft

Group	Pwr management
Range [units]	COMMON (=1), 2 .. 32 [-]
Related FW	3.0
Description	If the input *GroupLink* of this particular controller is used to provide the "group link" information for two logical groups, 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).

Setpoint: GroupLinkRight

Group	Pwr management
Range [units]	COMMON (=1), 2 .. 32 [-]
Related FW	3.0
Description	If the input *GroupLink* of this particular controller is used to provide the "group link" information for two logical groups, 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).

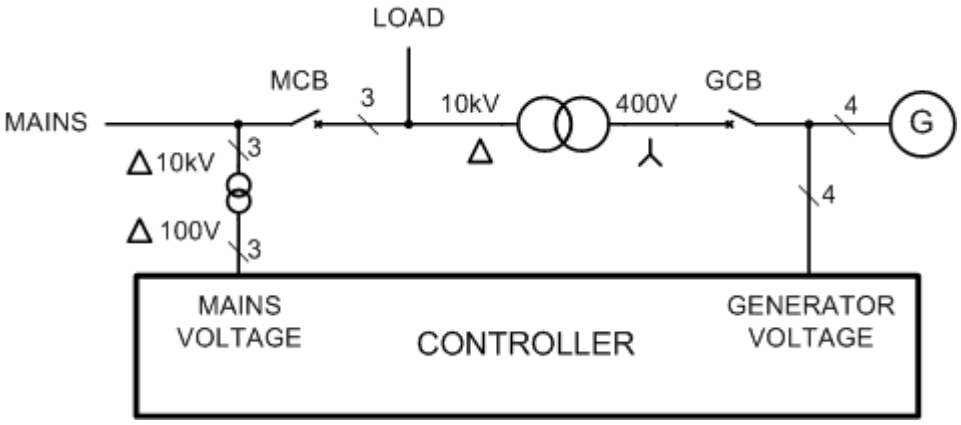
Group: Sync/Load ctrl

Setpoint: Voltage window

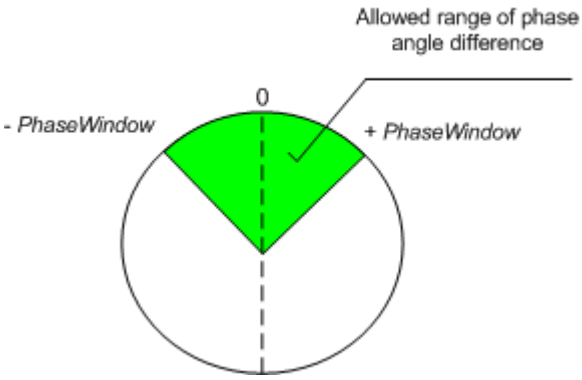
Group	Sync/Load Ctrl
Range [units]	0.0 .. 100.0 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts maximum difference between generator and mains/bus voltage in respective phases for voltage matching during synchronizing.

Setpoint: GtoM AngleReq

Group	Sync/Load ctrl
Range [units]	-45 .. 45 [°]
Related FW	3.0
Description	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. 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 *GtoM AngleReq* = 30. 

Setpoint: Phase window

Group	Sync/Load Ctrl
Range [units]	0 .. 90 [°]
Related FW	3.0
Force value possible	YES
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. 

Setpoint: Dwell time

Group	Sync/Load Ctrl
Range [units]	0.0 .. 25.0 [s]
Related FW	3.0

Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the period of time that the phase angle difference must stay within +/-*Phase Window* and voltage difference within *Voltage Window* before the respective breaker, which is actually beeing synchronized, is closed.

Setpoint: Freq gain

Group	Sync/Load Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.0
Description	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*. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: Freq int

Group	Sync/Load Ctrl
Range [units]	0 .. 100 [%]
Related FW	3.0
Description	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*.

Setpoint: Angle Gain

Group	Sync/Load Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.0
Description	This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop. The synchronizing process contains two following steps: 1. The first step is to match the generator frequency to the mains frequency. In this step the frequency regulation loop (*Freq reg loop*) is active. 2. The following step is to match the phase angle difference of the mains and generator voltages to the setpoint *GtoM AngleReg*. The angle regulation loop is active in this step.

	As soon as the phase angle difference stays within the window adjusted by *Phase window* and the voltage difference stays in the *Voltage window*, both for period *Dwell time*, the circuit breaker closing command is issued. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: BCB open level

Group	Sync/Load Cont
Range [units]	0 .. 100 [%]
Related FW	3.0
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 *BCB open del* the GCB is then opened regardless of the gen-set power. **NOTE:** The speed of the ramp is adjusted by the setpoint *Load ramp* in subordinated gen-sets.

Setpoint: BCB open del

Group	Sync/Load Ctrl
Range [units]	0 .. 1800 [s]
Related FW	3.0
Force value possible	YES
Description	This setpoint adjusts the maximum duration of the gen-set unloading ramp. If the end point of the ramp (*BCB open level*) is not reached within time period adjusted by this setpoint the GCB is then opened regardless of the gen-set power. **NOTE:** The speed of the ramp is adjusted by the setpoint *Load ramp* in subordinated gen-sets.

Setpoint: Sync timeout

Group	Sync/Load Ctrl
Range [units]	1 .. 1800, NO TIMEOUT [s]
Related FW	3.0
Description	This setpoint adjusts the maximum duration of forward or reverse synchronization. If the synchronizing is not successful within this period of time, the *Sync Timeout* or *RevSyncTimeout* alarm will be issued. **NOTE:** If the synchronizing is not successful within 1/10 of the *Sync timeout* or 60s (if *Sync timeout* <600s) the synchronization process is automatically restarted again,

	i.e. the speed governor output is reset to default value and then frequency regulation loop is started again. If NO TIMEOUT is selected the automatic restart occurs every 180s. This method helps to sychronize successfully even in difficult conditions.

Group: Volt/PF ctrl

Setpoint: Voltage gain

Group	Volt/PF Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.0
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*. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: Voltage Int

Group	Volt/PF Ctrl
Range [units]	0 .. 100 [%]
Related FW	3.0
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*.

Group: Force value

Setpoint: Force value 1

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 2

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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. **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.

Setpoint: Force value 3

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 4

Group	Force value

Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 5

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 6

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 7

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 8

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 9

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 10

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 11

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 12

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 13

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 14

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 15

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: Force value 16

Group	Force value
Range [units]	[-]
Related FW	3.0
Description	This is one of the 16 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 *Force value 1*. **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.

Setpoint: ExtValue1deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 1*. This initial value is applied either when the controller is powered-on or when the *ExtValue 1* is reset by the binary input *ExtValue1reset*.

Setpoint: ExtValue1LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue1HiLim* [X]
Related FW	3.0

Description	This setpoint adjusts the low limit of the value of *ExtValue 1* if the value is lowered/raised by the binary inputs *ExtValue1 up* and *ExtValue1 down*. The *ExtValue 1* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 1* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue1HiLim

Group	Force value
Range [units]	*ExtValue1LoLim* .. 32000 [X]
Related FW	3.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 1* if the value is lowered/raised by the binary inputs *ExtValue1 up* and *ExtValue1 down*. The *ExtValue 1* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 1* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue1 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 1* is beeing changed while the input *ExtValue1 up* or *ExtValue1 down* is active.

Setpoint: ExtValue2deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.0
Force value possible	YES

Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 2*. This initial value is applied either when the controller is powered-on or when the *ExtValue 2* is reset by the binary input *ExtValue2reset*.

Setpoint: ExtValue2LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue2HiLim* [X]
Related FW	3.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 2* if the value is lowered/raised by the binary inputs *ExtValue2 up* and *ExtValue2 down*. The *ExtValue 2* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 2* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue2HiLim

Group	Force value
Range [units]	*ExtValue2LoLim* .. 32000 [X]
Related FW	3.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 2* if the value is lowered/raised by the binary inputs *ExtValue2 up* and *ExtValue2 down*. The *ExtValue 2* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 2* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue2 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.0
Force value possible	YES
Force value possible	YES

Description	This setpoint adjusts the rate pre second at which the *ExtValue 2* is beeing changed while the input *ExtValue2 up* or *ExtValue2 down* is active.

Setpoint: ExtValue3deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 3*. This initial value is applied either when the controller is powered-on or when the *ExtValue 3* is reset by the binary input *ExtValue3reset*.

Setpoint: ExtValue3LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue3HiLim* [X]
Related FW	3.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 3* if the value is lowered/raised by the binary inputs *ExtValue3 up* and *ExtValue3 down*. The *ExtValue 3* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 3* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue3HiLim

Group	Force value
Range [units]	*ExtValue3LoLim* .. 32000 [X]
Related FW	3.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 3* if the value is lowered/raised by the binary inputs *ExtValue3 up* and *ExtValue3 down*. The *ExtValue 3* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 3* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue3 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 3* is beeing changed while the input *ExtValue3 up* or *ExtValue3 down* is active.

Setpoint: ExtValue4deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 4*. This initial value is applied either when the controller is powered-on or when the *ExtValue 4* is reset by the binary input *ExtValue4reset*.

Setpoint: ExtValue4LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue4HiLim* [X]
Related FW	3.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 4* if the value is lowered/raised by the binary inputs *ExtValue4 up* and *ExtValue4 down*. The *ExtValue 4* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 4* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue4HiLim

Group	Force value
Range [units]	*ExtValue4LoLim* .. 32000 [X]
Related FW	3.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 4* if the value is lowered/raised by the binary inputs *ExtValue4 up* and *ExtValue4 down*. The *ExtValue 4* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 4* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue4 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 4* is beeing changed while the input *ExtValue4 up* or *ExtValue4 down* is active.

Group: Load shedding

Setpoint: Ld shed active

Group	Load shedding
Range [units]	DISABLED, ISLAND ONLY, ISL+TRIP PARAL, ALL THE TIME [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used for adjustment when the load shedding function will be active (see also IM-NT-MCB/MGCB help for more information on MCB/MGCB). **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*) 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. For more information see the chapter Load shedding.
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.

Setpoint: Ld shed level

Group	Load shedding
Range [units]	*Ld recon level* .. 200 [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to adjust the relative load level (in % of *nominal power* of gen-set) for load shedding. When the relative load level exceeds this level for more than *Ld shed delay* time the next load shedding output is closed. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld shed delay

Group	Load shedding
Range [units]	0.0 .. 600.0 [s]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to adjust time period the relative load level must be above the *Ld shed level* limit to close the next load shedding output. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld recon level

Group	Load shedding
Range [units]	0 .. *Ld shed level* [%]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to adjust the relative load level (in % of *nominal power* of

	gen-set) for load reconnection. When the relative load level drops below this level for more than *Ld recon delay* time the next load can be reconnected back. The appropriate load shedding output is either opened automatically when the condition above is fulfiled (*AutoLd recon* = ENABLED) or manually by activation of the input *ManualLdRecon*. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld recon del

Group	Load shedding
Range [units]	0 .. 600 [s]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to adjust time period the relative load level must be below the *Ld recon level* limit to allow reconnection of next load group. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: AutoLd recon

Group	Engine Protect
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint selects whether the reconnection of the load occurs automatically when the relative load level stays below the *reconnection limit* for a period of the *reconnection delay* or the reconnection must be initiated manually by the input *ManualLdRecon*. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Group: Timer settings

Setpoint: Timer channel 1

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #1*. Output from this channel

	is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 2

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #2*. Output from this channel is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 3

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #3*. Output from this channel is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 4

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #4*. Output from this channel is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 5

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #5*. Output from this channel

	is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 6

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #6*. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 7

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #7*. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 8

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #8*. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 9

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #9*. Output from this channel

	is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 10

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #10*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 11

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #11*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 12

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #12*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 13

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #13*. Output from this channel

	is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 14

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #14*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 15

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #15*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 16

Group	Timer settings
Range [units]	[-]
Related FW	3.0
Description	This setpoint adjusts the mode of the *Timer channel #16*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Group: Act. calls/SMS

Setpoint: History record

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0

Force value possible	YES
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *History record* occurs. See the chapter Alarm management for more information about protection types. **NOTE:** As the *History record* protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.

Setpoint: Alarm only

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *Alarm only* occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Warning

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *warning*-type protection occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Off load

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value	YES

possible	
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *Off load* occurs. See the chapter Alarm management for more information about protection types. **NOTE:** As the *Off load* protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.

Setpoint: BrkOpen&CoolDn

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *BrkOpen&CoolDn*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Mains protect

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *Mains protect* occurs. See the chapter Alarm management for more information about protection types. **NOTE:** As the *Mains protect* protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.

Setpoint: Slow stop

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES

Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *Slow stop*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Shutdown

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *Shutdown*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: ShutdownOvr

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *Sd Override*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: AcallCH1-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
Description	The setpoint is used to specify the alert type of the active calls - channel 1. See the chapter Alarm messaging for more details.

Setpoint: AcallCH1-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
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 Alarm

	messaging for more details.

Setpoint: AcallCH2-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
Description	The setpoint is used to specify the alert type of the active calls - channel 2. See the chapter Alarm messaging for more details.

Setpoint: AcallCH2-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
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 Alarm messaging for more details.

Setpoint: AcallCH3-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
Description	The setpoint is used to specify the alert type of the active calls - channel 3. See the chapter Alarm messaging for more details.

Setpoint: AcallCH3-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
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 Alarm messaging for more details.

Setpoint: AcallCH4-Type

Group	Act. calls/SMS

Range [units]	[-]
Related FW	3.0
Description	The setpoint is used to specify the alert type of the active calls - channel 4. See the chapter Alarm messaging for more details.

Setpoint: AcallCH4-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
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 Alarm messaging for more details.

Setpoint: AcallCH5-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
Description	The setpoint is used to specify the alert type of the active calls - channel 5. See the chapter Alarm messaging for more details.

Setpoint: AcallCH5-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.0
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 Alarm messaging for more details.

Setpoint: NumberRings AA

Group	Act. calls/SMS
Range [units]	1 .. 30 [-]
Related FW	3.0
Description	This setpoint is used to adjust the number of rings after which the modem, which is attached to he 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.

Setpoint: ActCallAttempt

Group	Act. calls/SMS
Range [units]	1 .. 250 [-]
Related FW	3.0
Description	This setpoint is used to adjust the maximum number of consequent attempts to perform an active data call. The next attempt is performed 120s after the previous unsuccessful attempt.

Setpoint: Acall+SMS lang

Group	Act. calls/SMS
Range [units]	1 .. 7 [-]
Related FW	3.0
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 Languages in GenConfig. Index 1 is always english.

Group: Date/Time

Setpoint: Time stamp act

Group	Date/Time
Range [units]	DISABLED, ENGINE RUNNING, ALWAYS [-]
Related FW	3.0
Description	The setpoint selects the *Time stamp* function mode. **DISABLED** — The function is disabled. **ENGINE RUNNING** — While the engine is running the *Time stamps* records are recorded into the history log with period adjusted by setpoint *Time Stamp Per*. **ALWAYS** — The *Time stamps* records are recorded into the history log with period adjusted by setpoint *Time Stamp Per* all the time while the controler is switched on.

Setpoint: Time Stamp Per

Group	Date/Time
Range [units]	1 .. 240 [min]
Related FW	3.0
Description	The setpoint adjusts the time interval for *Time stamp* records. See also the setpoint *Time stamp act*.

Setpoint: #SummerTimeMod

Group	Date/Time
Range [units]	DISABLED, WINTER, SUMMER, WINTER-S, SUMMER-S [-]
Related FW	3.0
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.

Setpoint: #Time

Group	Date/Time
Range [units]	[HH:MM:SS]
Related FW	3.0
Description	The setpoint shows the current time from the internal RTC clock of the controller and can be also used to readjust it. **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:** Setpoint with the symbol # are synchronized between controllers.

Setpoint: #Date

Group	Date/Time
Range [units]	[dd.mm.yyyy]
Related FW	3.0
Description	The setpoint shows the date from the internal RTC clock of the controller and can be also used to readjust it. **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:** Setpoint with the symbol # are synchronized between controllers.

Table of values

Group: Bank values

Value: Bank nom act

Group	Bank values
Units	kW
Related FW	3.0
Description	Actual nominal power of the bank.

Value: Bank nom

Group	Bank values
Units	kW
Related FW	3.0
Description	Actual nominal power of the bank.

Value: Bank power

Group	Bank values
Units	kW
Related FW	3.0
Description	Actual nominal power of the bank.

Value: Act power

Group	Bank values
Units	kW
Related FW	3.0
Description	Generator total active power.

Value: Act pwr L1

Group	Bank values
Units	kW
Related FW	3.0
Description	Generator active power in phase L1.

Value: Act pwr L2

Group	Bank values
Units	kW
Related FW	3.0
Description	Generator active power in phase L2.

Value: Act pwr L3

Group	Bank values
Units	kW
Related FW	3.0
Description	Generator active power in phase L3.

Value: React power

Group	Bank values
Units	kVAr
Related FW	3.0
Description	Generator total reactive power.

Value: React pwr L1

Group	Bank values
Units	kVAr
Related FW	3.0
Description	Generator reactive power in phase L1.

Value: React pwr L2

Group	Bank values
Units	kVAr
Related FW	3.0
Description	Generator reactive power in phase L2.

Value: React pwr L3

Group	Bank values
Units	kVAr
Related FW	3.0
Description	Generator reactive power in phase L3.

Value: Appar pwr

Group	Bank values
Units	kVA
Related FW	3.0
Description	Generator total apparent power.

Value: Appar pwr L1

Group	Bank values
Units	kVA
Related FW	3.0
Description	Generator apparent power in phase L1.

Value: Appar pwr L2

Group	Bank values
Units	kVA
Related FW	3.0
Description	Generator apparent power in phase L2.

Value: Appar pwr L3

Group	Bank values
Units	kVA
Related FW	3.0
Description	Generator apparent power in phase L3.

Value: Pwr factor

Group	Bank values
Units	-
Related FW	3.0
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.

Value: Load char

Group	Bank values
Units	-
Related FW	3.0
Description	Character of the generator load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).

Value: Pwr factor L1

Group	Bank values
Units	-
Related FW	3.0
Description	Generator power factor in phase L1.

Value: Load char L1

Group	Bank values
Units	-
Related FW	3.0
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).

Value: Pwr factor L2

Group	Bank values
Units	-
Related FW	3.0
Description	Generator power factor in phase L2.

Value: Load char L2

Group	Bank values
Units	-
Related FW	3.0
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).

Value: Pwr factor L3

Group	Bank values
Units	-
Related FW	3.0
Description	Generator power factor in phase L3.

Value: Load char L3

Group	Bank values
Units	-
Related FW	3.0
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).

Value: Bank PF

Group	Bank values
Units	Hz
Related FW	3.0
Description	Bank 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.

Value: Bank Lchr

Group	Bank values
Units	Hz
Related FW	3.0
Description	Character of the bank load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).

Value: Bank freq

Group	Bank values
Units	Hz
Related FW	3.0
Description	Bank frequency. The frequency is measured in the phase L3.

Value: Bank V L1-N

Group	Bank values

Units	V
Related FW	3.0
Description	Bank 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*.

Value: Bank V L2-N

Group	Bank values
Units	V
Related FW	3.0
Description	Bank 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*.

Value: Bank V L3-N

Group	Bank values
Units	V
Related FW	3.0
Description	Bank 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*.

Value: Bank V

Group	Bank values
Units	V
Related FW	3.0
Description	Bank 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*.

Value: Bank V L1-L2

Group	Bank values
Units	V
Related FW	3.0
Description	Bank voltage between phases L1 and L2.

	NOTE: The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Bank V L2-L3

Group	Bank values
Units	V
Related FW	3.0
Description	Bank voltage between phases L2 and L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Bank V L3-L1

Group	Bank values
Units	V
Related FW	3.0
Description	Bank voltage between phases L3 and L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Bank curr L1

Group	Bank values
Units	A
Related FW	3.0
Description	Bank current in phase L1. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Bank curr L2

Group	Bank values
Units	A
Related FW	3.0
Description	Bank current in phase L2. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Gen curr L3

Group	Bank values
Units	A
Related FW	3.0
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 *CT ratio prim* and *CT ratio sec*.

Value: Bank V unbal

Group	Bank values
Units	%
Related FW	3.0
Description	Bank 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".

Value: Bank I unbal

Group	Bank values
Units	V
Related FW	3.0
Description	Bank 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".

Value: Slip freq

Group	Bank values
Units	Hz
Related FW	3.0
Description	Differential frequency between the bank and the mains/bus.

Value: Angle

Group	Bank values
Units	°

Related FW	3.0
Description	The angle between the phasors of the bank and mains/bus voltage.

Group: Bus values

Value: Bus freq

Group	Bus values
Units	Hz
Related FW	3.0
Description	Bus frequency. The frequency is measured in the phase L3.

Value: Bus V L1-N

Group	Mains values
Units	V
Related FW	3.0
Description	Bus voltage in phase L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Bus V L2-N

Group	Bus values
Units	V
Related FW	3.0
Description	Bus voltage in phase L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vb VT ratio*.

Value: Bus V L3-N

Group	Bus values
Units	V
Related FW	3.0
Description	Bus voltage in phase L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vb VT ratio*.

Value: Bus V

Group	Bus values
Units	V
Related FW	3.0

Description	Bus 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 *Vb VT ratio*.

Value: Bus V L1-L2

Group	Bus values
Units	V
Related FW	3.0
Description	Bus voltage phase L1 to L2.

Value: Bus V L2-L3

Group	Bus values
Units	V
Related FW	3.0
Description	Bus voltage phase L2 to L3.

Value: Bus V L3-L1

Group	Bus values
Units	V
Related FW	3.0
Description	Bus voltage phase L3 to L1.

Value: Bus V unbal

Group	Bus values
Units	V
Related FW	3.0
Description	Bus voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the Bus nominal voltage.

Value: EarthFC

Group	Bus values
Units	A
Related FW	3.0
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 *EarthFltCurCTp* and *Im3/ErFlCurCTs*.

Group: Power management

Value: BankPriority

Group	Pwr management
Units	-
Related FW	3.0
Description	This value shows current priority number. It corresponds to the setpoint *Priority* except following situations: • If at least one of binary inputs *Priority SW "X"* is configured on some source and is active then the actual gen-set priority is given by the combination of these inputs. • If a *force value function* is configured at the *Priority* 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 Gen-set size optimalization is active then the actual priority is given by the optimalization function.

Value: Act Reserve

Group	Pwr management
Units	-
Related FW	3.0
Description	Actual absolute reserve.

Value: Reserve

Group	Pwr management
Units	-
Related FW	3.0
Description	Actual absolute reserve for start. This value contains a copy of the setpoint *#LoadResStrt* from the currently selected reserve set.

Value: Reserve Stp

Group	Pwr management
Units	kX
Related FW	3.0
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 *Nominal power* of the genset which is first to stop. #LoadResStop is used from the currently selected reserve set.

Value: ActRes rel

Group	Power management
Units	%

Related FW	3.0
Description	Actual relative reserve.

Value: Res rel

Group	Power management
Units	%
Related FW	3.0
Description	Actual relative reserve for start. This value contains a copy of the setpoint *#%LdResStrt* from the currently selected reserve set.

Value: ResStp rel

Group	Power management
Units	%
Related FW	3.0
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: *[Nominal power of gen-set which is next to be stopped + ((%LdResStp/100) * Sum of nominal powers of gen-sets loaded in power management except the one which is next to be stopped)]/(Sum of nominal powers of gen-sets loaded in power management)*. #%LdResStop is used from the currently selected reserve set.

Value: MinR PWR

Group	Power management
Units	kW
Related FW	3.0
Description	Currently active Minimal Running Power level. If the value contains 0 the minimal running power function is disabled.

Group: Sync/Load ctrl

Value: ActPwrReq

Group	Sync/Load ctrl
Units	kW
Related FW	3.0
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.

Value: LSO

Group	Sync/Load ctrl
Units	%
Related FW	3.0
Description	Load sharing output.

Value: SystLoadCtrl

Group	Sync/Load ctrl
Units	-
Related FW	3.0
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*.

Value: TotRunPact Q

Group	Sync/Load ctrl
Units	kVAr
Related FW	3.0
Description	Sum of **reactive** power of all banks within the group that are connected to the bus.

Value: TotRunPact P

Group	Sync/Load ctrl
Units	kW
Related FW	3.0
Description	Sum of **active** power of all banks within the group that are connected to the bus.

Value: netPgnomPh

Group	Sync/Load ctrl
Units	kW
Related FW	3.0
Description	Sum of **nominal** power of all banks within the group that are connected to the bus.

Group: Volt/PF ctrl

Value: VSO

Group	Volt/PF ctrl
Units	%
Related FW	3.0

Description	VAr Sharing Output.

Value: SystPfCtrl

Group	Volt/PF ctrl
Units	-
Related FW	3.0
Description	Code of the current power factor control mode. The description how to obtain the text representation of each code can be found at the value *Engine state*.

Group: Gensets

Value: Gen-set1 pwr .. Gen-set31 pwr

Group	Gensets
Units	kW
Related FW	3.0
Description	Actual active power of particular gen-sets subordinated to the bank controller.

Value: GEN16

Group	Gensets
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives messages from the subordinated gen-set 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".

Value: GEN32

Group	Gensets
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives messages from the subordinated gen-set 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".

Value: GCB16

Group	Gensets
Units	-
Related FW	3.0

Description	Bits of this value show "1" if the bank controller receives the “GCB is closed” message from the subordinated gen-set 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".

Value: GCB32

Group	Gensets
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives the “GCB is closed” message from the subordinated gen-set 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".

Value: YEL16

Group	Gensets
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives the “Yellow alarm is present in the alarmlist” message from the subordinated gen-set 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".

Value: YEL32

Group	Gensets
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives the “Yellow alarm is present in the alarmlist” message from the subordinated gen-set 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".

Value: RED16

Group	Gensets
Units	-

Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives the “Red alarm is present in the alarmlist” message from the subordinated gen-set 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".

Value: RED32

Group	Gensets
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives the “Red alarm is present in the alarmlist” message from the subordinated gen-set 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".

Group: Force value

Value: ExtValue1

Group	Force value
Units	-
Related FW	3.0
Description	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. 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. **EXAMPLE:** 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. **CAUTION!** It is **not allowed** to solve this task by cyclic writing of the baseload setpoint from the supervisory device. The EEPROM memory may become damaged when any setpoint is written repeatedly with a short period. The proper solution is following: 1. Go to GenConfig, download the configuration from the controller, select the LAI tab and configure the logical analog input *LdCtrl:AnExBld* onto the *ExtValue1*, 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 InteliMonitor 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 *ExtValue1* (register number 40392 for IG/IS-NT-2.4).

Value: ExtValue2

Group	Force value
Units	-
Related FW	3.0
Description	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. 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 *ExtValue1*.

Value: ExtValue3

Group	Force value
Units	-
Related FW	3.0
Description	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. 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 *ExtValue1*.

Value: ExtValue4

Group	Force value
Units	X
Related FW	3.0
Description	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. 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 *ExtValue1*.

Group: Load shedding

Value: StatLdShed

Group	Load shedding
Units	-
Related FW	3.0
Description	The value indicates the current load shedding stage. 0 indicates that the load shedding is not active. See the chapter Load shedding for more details.

Group: Analog CU

Value: UBat

Group	Analog CU
Units	V
Related FW	3.0
Description	Voltage at the controller power supply terminals.

Value: CPU Temp

Group	Analog CU
Units	ºC
Related FW	3.0
Description	Temperature inside the controller (on the CPU).

Value: D+

Group	Analog CU
Units	V
Related FW	3.0
Description	Voltage measured at the D+ terminal. If this voltage is > 80% of the *Ubat* the D+ terminal is evaluated as active and the engine is evaluated as running. See also the chapter Start sequence.

Value: AIN CU-1

Group	Analog CU
Units	configurable
Related FW	3.0
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.

Value: AIN CU-2

Group	Analog CU
Units	configurable
Related FW	3.0
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.

Value: AIN CU-3

Group	Analog CU
Units	configurable
Related FW	3.0
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.

Value: AIN CU-4

Group	Analog CU
Units	configurable
Related FW	3.0
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.

Group: Bin inputs CU

Value: BIN

Group	Bin inputs CU
Units	-
Related FW	3.0
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.

Group: Bin outputs CU

Value: BOUT

Group	Bin outputs CU
Units	-
Related FW	3.0
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.

Group: Log Bout

Value: LogBout 1

Group	Log bout
Units	-
Related FW	3.0
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.

Value: LogBout 2

Group	Log bout
Units	-
Related FW	3.0
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.

Value: LogBout 3

Group	Log bout
Units	-
Related FW	3.0
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.

Value: LogBout 4

Group	Log bout
Units	-
Related FW	3.0
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.

Value: LogBout 5

Group	Log bout
Units	-
Related FW	3.0
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.

Value: LogBout 6

Group	Log bout
Units	-
Related FW	3.0
Description	This is a bit array containing status of logical binary outputs 81-96 of the controller. Bit0 represents LBO81, bit1 represents LBO82 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.

Value: LogBout 7

Group	Log bout
Units	-
Related FW	3.0
Description	This is a bit array containing status of logical binary outputs 97-112 of the controller. Bit0 represents LBO97, bit1 represents LBO98 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.

Value: LogBout 8

Group	Log bout
Units	-
Related FW	3.0
Description	This is a bit array containing status of logical binary outputs 113-128 of the controller. Bit0 represents LBO113, bit1 represents LBO114 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.

Value: LogBout 9

Group	Log bout
Units	-
Related FW	3.0
Description	This is a bit array containing status of logical binary outputs 128-143 of the controller. Bit0 represents LBO128, bit1 represents LBO129 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.

Value: RemoteControl

Group	Log bout
Units	-
Related FW	3.0
Description	This is a bit array containing status of the binary outputs *Remote control1* ... *Remote control8*.

Group: Info

Value: Controller mode

Group	Info
Units	-
Related FW	3.0
Description	This value contains actual controller mode. The controller mode is selected by the setpoint *Controller mode* but the setpoint position can be overriden by binary inputs *Remote OFF*, *Remote MAN*, *Remote AUT* or *Remote TEST*.

Value: SW Version

Group	Info
Units	-
Related FW	3.0
Description	Major and minor firmware version number. E.g. value "2,4" means version 2.4. Release version number is not included.

Value: Application

Group	Info

Units	-
Related FW	3.0
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.

Value: SW Branch

Group	Info
Units	-
Related FW	3.0
Description	Firmware branch code. Contains 1 in case of standard branches.

Value: PasswordDecode

Group	Info
Units	-
Related FW	3.0
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.

Value: CAN16

Group	Info
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives messages from the another bank 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".

Value: CAN32

Group	Info
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller receives messages from the another bank 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".

Value: Reg16

Group	Info
Units	-
Related FW	3.0
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.

Value: Reg32

Group	Info
Units	-
Related FW	3.0
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.

Value: GL16

Group	Info
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller which has address corresponding with the bit position has BCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.

Value: GL32

Group	Info
Units	-
Related FW	3.0
Description	Bits of this value show "1" if the bank controller which has address corresponding with the bit position has BCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 17-32.

Value: Engine state

Group	Info
Units	-
Related FW	3.0

Description	Code of the current state of the engine control. The text representation of each code can be obtained following way: 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.

Value: Breaker state

Group	Info
Units	-
Related FW	3.0
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*.

Value: Timer text

Group	Info
Units	-
Related FW	3.0
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*. Remaining time of the timer is available in the value *Timer val*.

Value: Timer val

Group	Info
Units	-
Related FW	3.0
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*.

Value: ECU DiagSource

Group	Info
Units	-
Related FW	3.0
Description	This value indicates from which source the ECU diagnostic messages are beeing received. The source depends on ECU type.

Value: NextTime1-4

Group	Info

Units	-
Related FW	3.0
Description	This value contains time of next activation of the timer block 1-4 (i.e. of the output *TimerAct 1-4*). The related date is available in the value *NextDate1-4*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate1-4

Group	Info
Units	-
Related FW	3.0
Description	This value contains date of next activation of the timer block 1-4 (i.e. of the output *TimerAct 1-4*). The related time is available in the value *NextTime1-4*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextTime5-8

Group	Info
Units	-
Related FW	3.0
Description	This value contains time of next activation of the timer block 5-8 (i.e. of the output *TimerAct 5-8*). The related date is available in the value *NextDate5-8*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate5-8

Group	Info
Units	-
Related FW	3.0
Description	This value contains date of next activation of the timer block 5-8 (i.e. of the output *TimerAct 5-8*). The related time is available in the value *NextTime5-8*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextTime9-12

Group	Info

Units	-
Related FW	3.0
Description	This value contains time of next activation of the timer block 9-12 (i.e. of the output *TimerAct 9-12*). The related date is available in the value *NextDate9-12*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate9-12

Group	Info
Units	-
Related FW	3.0
Description	This value contains date of next activation of the timer block 9-12 (i.e. of the output *TimerAct 9-12*). The related time is available in the value *NextTime9-12*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextTime13-16

Group	Info
Units	-
Related FW	3.0
Description	This value contains time of next activation of the timer block 13-16 (i.e. of the output *TimerAct 13-16*). The related date is available in the value *NextDate13-16*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate13-16

Group	Info
Units	-
Related FW	3.0
Description	This value contains date of next activation of the timer block 13-16 (i.e. of the output *TimerAct 13-16*). The related time is available in the value *NextTime13-16*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: AirGate ID

Group	Info

Units	-
Related FW	3.0
Description	If the controller is connected to an 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. InteliMonitor) to specify the respective controller when the connection is opened.

Value: AirGate status

Group	Info
Units	-
Related FW	3.0
Description	This value displays actual status of the connection to the AirGate server.

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.

Value: Latitude

Group	Info
Units	-
Related FW	3.0
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 succesfull GPS fix is established. If no valid value is available from InternetBridge-NT, value ##### is displayed.

Value: Longitude

Group	Info
Units	-
Related FW	3.0
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 succesfull GPS fix is established. If no valid value is available from InternetBridge-NT, value ##### is displayed.

Group: Statistics

Value: kWhours

Group	Statistics
Units	kWh
Related FW	3.0
Description	Active energy counter. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: kVArhours

Group	Statistics
Units	kVAh
Related FW	3.0
Description	Reactive energy counter. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: Run Hours

Group	Statistics
Units	h
Related FW	3.0
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 InteliMonitor menu Monitor -> Set statistics.

Value: Num starts

Group	Statistics
Units	-
Related FW	3.0
Description	Engine start commands 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 InteliMonitor menu Monitor -> Set statistics.

Value: NumUnsc start

Group	Statistics
Units	-
Related FW	3.0
Description	Unsuccessful starts counter. The counter is incremented always when *Start fail* alarm is issued. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: Service time 1

Group	Statistics
Units	h
Related FW	3.0
Description	This is maintenance countdown timer #1. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: Service time 2

Group	Statistics
Units	h
Related FW	3.0
Description	This is maintenance countdown timer #2. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: Service time 3

Group	Statistics
Units	h
Related FW	3.0
Description	This is maintenance countdown timer #3. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: Service time 4

Group	Statistics
Units	h
Related FW	3.0
Description	This is maintenance countdown timer #4. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: TotalDownTime

Group	Statistics
Units	h
Related FW	3.0
Description	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. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: DnTimeReqToRun

Group	Statistics
Units	h
Related FW	3.0
Description	This counter counts while the controller is in "not ready" state (see the value *Total downtime*) and there is a request for the gen-set to run. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: PulseCounter 1

Group	Statistics
Units	-
Related FW	3.0
Description	This is the value of *PulseCounter #1* module. See the binary input *PulseCounter 1*.

Value: PulseCounter 2

Group	Statistics
Units	-
Related FW	3.0
Description	This is the value of *PulseCounter #2* module. See the binary input *PulseCounter 2*. **NOTE:** Available in IS-NT only.

Value: PulseCounter 3

Group	Statistics
Units	-
Related FW	3.0
Description	This is the value of *PulseCounter #3* module. See the binary input *PulseCounter 3*. **NOTE:** Available in IS-NT only.

Value: PulseCounter 4

Group	Statistics
Units	-
Related FW	3.0
Description	This is the value of *PulseCounter #4* module. See the binary input *PulseCounter 4*. **NOTE:** Available in IS-NT only.

Table of binary input functions

Binary input: BCB feedback

Related FW	3.0
Description	This input is used for connection of the normally open feedback contact from the bank circuit breaker or contactor. If the input is active, the controller will consider the BCB as closed and vice versa. • If the feedback does not respond to a change of the control output *BCB close/open* within 2s, the alarm *BCB Fail* will be issued. • If the feedback changes it's position unexpectedly without any command given by the control output, the alarm *BCB Fail* will be issued immediately. **NOTE:**

	This input is obligatory.

Binary input: MCB feedback

Related FW	3.0
Description	This is the input for the mains circuit breaker or contactor auxiliary contact. If the input is active, the controller will consider the MCB as closed and vice versa.

Binary input: Sys start/stop

Related FW	3.0
Description	This input is used to activate and dectivate the praticular gen-set within the group. Reaction of the controller to a change of this input is delayed by setpoints *#SysAMFstrtDel* and *#SysAMFstopDel*. • 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 automaticaly according to the load. **NOTE:** If the power management is disabled by the *Pwr Management* setpoint, the gen-set excluded from the power management and starts and stops only according to position of this input. • If the input is not active, the gen-set is always stopped in AUT mode. **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 genset, switch it out from AUT mode.

Binary input: Emergency Stop

Related FW	3.0
Description	If the input is activated, engine shutdown is immediately performed. However, the controller behavior is slightly different compared to other shutdown alarms: • Outputs *Ignition*, *Ventilation*, *Cooling pump* and *Prelubr pump* are deactivated as well. • This input cannot be overridden with the input *Sd override*. **NOTE:** Because of safety reasons it is recommended to configure this input as *Normally closed* and use a NC switch. **CAUTION!** 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.

Binary input: REMOTE: Remote oOFF

Related FW	3.0
Description	The controller is forced into OFF mode while this input is active and the genset is not running. The controller will return into the previous mode after the input is deactivated. If the genset is running, the mode does not change until it is stopped. Use this input if you need to disable the genset temporarily from any reason (maintenance, control from a higher-level automation system etc..).

Binary input: REMOTE: Remote MAN

Related FW	3.0
Description	The controller is forced into MAN mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while MAN mode is forced by this input.

Binary input: REMOTE: Remote AUT

Related FW	3.0
Description	The controller is forced into AUT mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while AUT mode is forced by this input.

Binary input: AccessLock int

Related FW	3.0
Description	This input forces the controller **built-in** terminal into monitoring mode. • 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. **NOTE:** As the IS-NT and IGS-NT-BB do not have built-in terminal, this input is assigned to the terminal or IntelliVision (display) #1, which is supposed to be directly attached to the controller or mounted close to it.

Binary input: AccessLock ext

Related FW	3.0

Description	This input forces all external **remote** terminals into monitoring mode. • Setpoints changes are disabled. • Executing commands is disabled. • Change of controller mode is disabled. 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. **NOTE:** An example of such terminal is a PC with InteliMonitor, any kind of remote display connected via CAN2 or a PLC connected to the RS485 and communicating via MODBUS.

Binary input: Sd override

Related FW	3.0
Description	If the input is closed, all 2nd level protections are overriden to allow engine run in an emergency situation, e.g. when the gen-set works as a power supply for fire extinguishing equipment. 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. Following protections are **not** overriden by this input: • Emergency stop • Overspeed • Underspeed (only if *Fuel solenoid* = GAS ENGINE) • 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 can not be overriden (blocked) by the *Sd override* input.

Binary input: BGCB disable

Related FW	3.0
Description	The input is used to disable issuing the BCB closing command. • If the input is active during synchronizing, the controller will keep the genset synchronized without issuing the BCB closing command until the input is deactivated or *Sync timeout* is elapsed. • If the input is active and the BCB button is pressed in MAN mode to close the BCB to dead bus, the BCB will not be closed until the input is deactivated and the BCB button pressed again. • If the input is active and the BCB is to be closed to dead bus automatically, the BCB will not be closed until the input is deactivated.

Binary input: BCB fdb neg

Related FW	3.0
Description	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 *BCB feedback*. Maximal allowed time the both inputs are in the same position is 500ms, after this time the alarm *BCB Fail* is issued.

Binary input: MCB fdb neg

Related FW	3.0
Description	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*. Maximal allowed time the both inputs are in the same position is 500ms, after this time the alarm *MCB Fail* is issued.

Binary input: Emerg. manual

Related FW	3.0
Description	This input is designed to allow the gen-set to be controlled externally, not by the controller. 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 redundancy to disable redundant controller. The controller behaves following way: • Shows the text *EmergMan* 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. • *Stop Fail* alarm is not beeing 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. **NOTE:** For successful recovery from a running state when the input is deactivated it is recommended to use pulse-type control outputs instead of continous-type. E.g. *Stop Solenoid* for fuel supply control and *GCB ON coil*, *GCB OFF coil* for breaker control. Logical Binary Outputs that are deactivated (directly or indirectly) when *Emerg.*

	manual is active: 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

Binary input: ManualLdRecon

Related FW	3.0
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*. This input works only if automatic reconnection is disabled, i.e. the setpoint *AutoLd recon* is set to DISABLED.

Binary input: FaultResButton

Related FW	3.0
Description	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. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: HornResButton

Related FW	3.0
Description	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. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: StopButton

Related FW	3.0
Description	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. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: StartButton

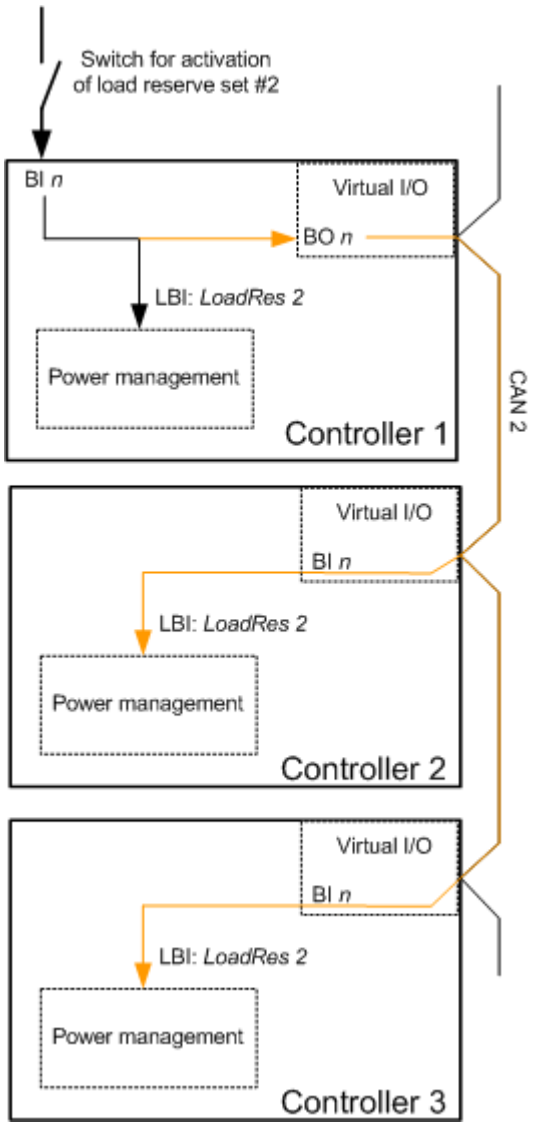
Related FW	3.0
Description	This input is used for an external START button mounted on the switchboard. The function of the input is identical as function of the start button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: BCBButton

Related FW	3.0
Description	This input is used for an external BCB button mounted on the switchboard. The function of the input is identical as function of the BCB button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: Load res 2

Related FW	3.0

Description	This input is used to activate the load reserve set #2 instead of the set #1, which is active by default. The set #2 is adjusted by setpoints: • *#LoadResStrt 2* and *#LoadResStop 2* if the power management is switched to absolute mode • *#%LdResStrt 2* and *#%LdResStop 2* if the power management is switched to relative mode. **CAUTION!** All controllers cooperating together in Power management must have **the same load reserve set 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.  EXAMPLE OF USING VIRTUAL PERIPHERIES FOR SIGNAL DISTRIBUTION

Binary input: Load res 3

Related FW	3.0
Description	This input is used to activate the load reserve set #3 instead of the set #1, which is active by default. The set #3 is adjusted by setpoints: • *#LoadResStrt 3* and *#LoadResStop 3* if the power management is switched to absolute (kW-based) mode • *#%LdResStrt 3* and *#%LdResStop 3* if the power management is switched to relative (%Pnom-based) mode. **CAUTION!** All controllers cooperating together in Power management must have **the same load reserve set 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 example in the description of the input *Load res 2*.

Binary input: Load res 4

Related FW	3.0
Description	This input is used to activate the load reserve set #4 instead of the set #1, which is active by default. The set #4 is adjusted by setpoints: • *#LoadResStrt 4* and *#LoadResStop 4* if the power management is switched to absolute (kW-based) mode • *#%LdResStrt 4* and *#%LdResStop 4* if the power management is switched to relative (%Pnom-based) mode. **CAUTION!** All controllers cooperating together in Power management must have **the same load reserve set 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 example in the description of the input *Load res 2*.

Binary input: MinRun power 1

Related FW	3.0
Description	This input is used to activate the function Minimal running power #1, which is adjusted by setpoint *#MinRunPower 1*. **NOTE:** The default value of minimal running power, which takes place while none of the inputs *MinRun power x*, is 0kW. **NOTE:** If more then one binary input for MinRunPower is activated, the one with the highest number is used (i.e. its corresponding value).

	CAUTION! 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 principial diagram of such distribution in the description of the input *Load res 2*.

Binary input: MinRun power 2

Related FW	3.0
Description	This input is used to activate the function Minimal running power #2, which is adjusted by setpoint *#MinRunPower 2*. **NOTE:** The default value of minimal running power, which takes place while none of the inputs *MinRun power x*, is 0kW. **NOTE:** If more then one binary input for MinRunPower is activated, the one with the highest number is used (i.e. its corresponding value). **CAUTION!** 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 principial diagram of such distribution in the description of the input *Load res 2*.

Binary input: MinRun power 3

Related FW	3.0
Description	This input is used to activate the function Minimal running power #3, which is adjusted by setpoint *#MinRunPower 3*. **NOTE:** The default value of minimal running power, which takes place while none of the inputs *MinRun power x*, is 0kW. **NOTE:** If more then one binary input for MinRunPower is activated, the one with the highest number is used (i.e. its corresponding value). **CAUTION!** 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 principial diagram of such distribution in the description of the input *Load res 2*.

Binary input: Priority sw A

Related FW	3.0
Description	This is one of four inputs *Priority sw A*, *Priority sw B*, *Priority sw C* and *Priority sw D* 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*.

ENCODING TABLE

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*.

Binary input: Priority sw B

Related FW	3.0
Description	This is one of four inputs *Priority sw A*, *Priority sw B*, *Priority sw C* and *Priority sw D* 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*. **NOTE:** See encoding table in the description of the input *Priority sw A*.

Binary input: Priority sw C

Related FW	3.0
Description	This is one of four inputs *Priority sw A*, *Priority sw B*, *Priority sw C* and *Priority sw D* 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*. **NOTE:** See encoding table in the description of the input *Priority sw A*.

Binary input: Priority sw D

Related FW	3.0
Description	This is one of four inputs *Priority sw A*, *Priority sw B*, *Priority sw C* and *Priority sw D* 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*. **NOTE:** See encoding table in the description of the input *Priority sw A*.

Binary input: GroupLink

Related FW	3.0
Description	This input is used for logical connection and disconnection of the two gen-set groups selected by setpoints *GroupLinkLeft* and *GroupLinkRight*. If the input is active, then the two selected groups will perform power management, kW-sharing and kVAr-sharing together as one large group. 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. **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.

Binary input: PulseCounter 1

Related FW	3.0
Description	This is the input of the *PulseCounter #1* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse1*, the counter value *PulseCounter 1* (in the group *Statistic*) is

	increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window.

Binary input: PulseCounter 2

Related FW	3.0
Description	This is the input of the *PulseCounter #2* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse2*, the counter value *PulseCounter 2* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window. **NOTE:** Available in IS-NT only.

Binary input: PulseCounter 3

Related FW	3.0
Description	This is the input of the *PulseCounter #3* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse3*, the counter value *PulseCounter 3* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window. **NOTE:**

	Available in IS-NT only.

Binary input: PulseCounter 4

Related FW	3.0
Description	This is the input of the *PulseCounter #4* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse4*, the counter value *PulseCounter 4* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window. **NOTE:** Available in IS-NT only.

Binary input: Timer block 1

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #1*. **NOTE:** See also the setpoint *TimerChannel 1* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 2

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #2*. **NOTE:** See also the setpoint *TimerChannel 2* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 3

Related FW	3.0

Description	This input is used to disable temporarily the output from the *Timer channel #3*. **NOTE:** See also the setpoint *TimerChannel 3* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 4

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #4*. **NOTE:** See also the setpoint *TimerChannel 4* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 5

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #5*. **NOTE:** See also the setpoint *TimerChannel 5* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 6

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #6*. **NOTE:** See also the setpoint *TimerChannel 6* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 7

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #7*. **NOTE:** See also the setpoint *TimerChannel 7* and output *TimerAct 5-8*. **NOTE:**

	See the chapter Timers for more details about timers.

Binary input: Timer block 8

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #8*. **NOTE:** See also the setpoint *TimerChannel 8* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 9

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #9*. **NOTE:** See also the setpoint *TimerChannel 9* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 10

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #10*. **NOTE:** See also the setpoint *TimerChannel 10* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 11

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #11*. **NOTE:** See also the setpoint *TimerChannel 11* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 12

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #12*. **NOTE:** See also the setpoint *TimerChannel 12* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 13

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #13*. **NOTE:** See also the setpoint *TimerChannel 13* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 14

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #14*. **NOTE:** See also the setpoint *TimerChannel 14* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 15

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #15*. **NOTE:** See also the setpoint *TimerChannel 15* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 16

Related FW	3.0
Description	This input is used to disable temporarily the output from the *Timer channel #16*. **NOTE:**

	See also the setpoint *TimerChannel 16* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: ExtValue1 up

Related FW	3.0
Description	For IS-NT only. While this input is active the value of *ExtValue 1* is contiously beeing increased at the rate of *ExtValue1 rate* until it reaches *ExtValue1HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 1* can't be written remotely from a remote terminal using the command *ExtValue 1*.

Binary input: ExtValue1 down

Related FW	3.0
Description	IS-NT specific function While this input is active the value of *ExtValue 1* is contiously beeing decreased at the rate of *ExtValue1 rate* until it reaches *ExtValue1LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 1* can't be written remotely from a remote terminal using the command *ExtValue 1*.

Binary input: ExtValue2 up

Related FW	3.0
Description	For IS-NT only. While this input is active the value of *ExtValue 2* is contiously beeing increased at the rate of *ExtValue2 rate* until it reaches *ExtValue2HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 2* can't be written remotely from a remote terminal using the command *ExtValue 2*.

Binary input: ExtValue2 down

Related FW	3.0
Description	IS-NT specific function While this input is active the value of *ExtValue 2* is contiously beeing decreased at the rate of *ExtValue2 rate* until it reaches *ExtValue2LoLim*. **NOTE:**

	If this input is used (configured), the *ExtValue 2* can't be written remotely from a remote terminal using the command *ExtValue 2*.

Binary input: ExtValue3 up

Related FW	3.0
Description	For IS-NT only. While this input is active the value of *ExtValue 3* is contiously beeing increased at the rate of *ExtValue3 rate* until it reaches *ExtValue3HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 3* can't be written remotely from a remote terminal using the command *ExtValue 3*.

Binary input: ExtValue3 down

Related FW	3.0
Description	IS-NT specific function While this input is active the value of *ExtValue 3* is contiously beeing decreased at the rate of *ExtValue3 rate* until it reaches *ExtValue3LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 3* can't be written remotely from a remote terminal using the command *ExtValue 3*.

Binary input: ExtValue4 up

Related FW	3.0
Description	For IS-NT only. While this input is active the value of *ExtValue 4* is contiously beeing increased at the rate of *ExtValue4 rate* until it reaches *ExtValue4HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 4* can't be written remotely from a remote terminal using the command *ExtValue 4*.

Binary input: ExtValue4 down

Related FW	3.0
Description	IS-NT specific function While this input is active the value of *ExtValue 4* is contiously beeing decreased at the rate of *ExtValue4 rate* until it reaches *ExtValue4LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 4* can't be written remotely from a remote terminal using the command *ExtValue 4*.

Binary input: ExtValue1reset

Related FW	3.0
Description	The *ExtValue 1* 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 *ExtValue1deflt*. While the reset input is active: • 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 *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue 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.

Binary input: ExtValue2reset

Related FW	3.0
Description	The *ExtValue 2* 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 *ExtValue2deflt*. While the reset input is active: • 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 *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue 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.

Binary input: ExtValue3reset

Related FW	3.0
Description	The *ExtValue 3* 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 *ExtValue3deflt*. While the reset input is active: • 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 *ExtValue* command. **NOTE:**

	Configuring of the reset input does not block writing the ExtValue 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.

Binary input: ExtValue4reset

Related FW	3.0
Description	The *ExtValue 4* 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 *ExtValue4deflt*. While the reset input is active: • 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 *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue 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.

Binary input: IssueActCallC1

Related FW	3.0
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*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations 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 *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC1*.

Binary input: IssueActCallC2

Related FW	3.0
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*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There

	are many predefined binary informations 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 *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC2*.

Binary input: IssueActCallC3

Related FW	3.0
Description	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*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations 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 *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC3*.

Binary input: IssueActCallC4

Related FW	3.0
Description	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*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations 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 *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC4*.

Binary input: IssueActCallC5

Related FW	3.0
Description	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 *AcallCH4-Addr*. This input can be used to inform a remote user about a specific non-alarm

	situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations 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 *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC5*.

Binary input: AccessLock D#2

Related FW	3.0
Description	This input forces the external **local** terminal or IntelliVision (display) #2 into monitoring mode. **NOTE:** Local display means that it is connected to dedicated RS485. There is possibility to connect up to 2 external displays in IG-NT-BB or 1 in IG-NT. It is possible to connect up to 3 external displays in IS-NT-BB and in IS-NT. • 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.

Binary input: AccessLock D#3

Related FW	3.0
Description	**NOTE:** For IS-NT and IS-NT-BB only. This input forces the external **local** terminal or IntelliVision (display) #3 into monitoring mode. **NOTE:** Local display means that it is connected to dedicated RS485. There is possibility to connect up to 2 external displays in IG-NT-BB or 1 in IG-NT. It is possible to connect up to 3 external displays in IS-NT-BB and in IS-NT. • 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.

Binary input: NeutralCB fdb

Related FW	3.0

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.*.

Binary input: CylDifEvalBlk

Related FW	3.0
Description	This input is used to disable temporarily evaluation of the alarms caused by cylinder temperatures deviations. **NOTE:** For IS-NT only.

Binary input: ECU StoppedEng

Related FW	3.0
Description	When this input is activated, the genset will be stopped immdiately without unloading and cooling phase, however no alarm will be issued. This input is intended for situations, where the genset 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 *Underspeed* 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.

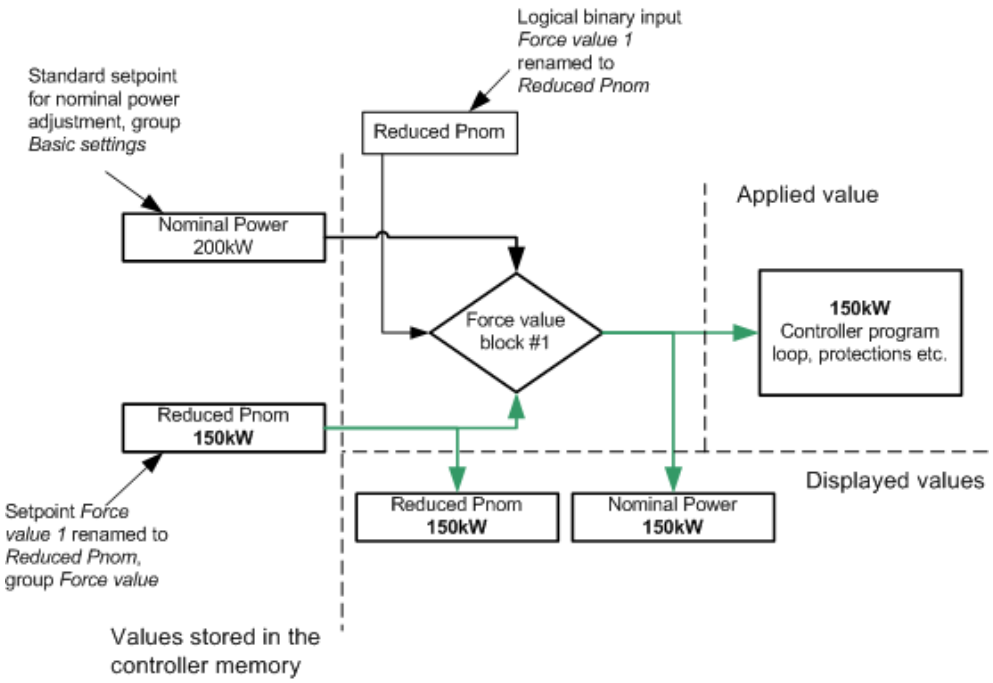
Binary input: CtrlHBeat sens

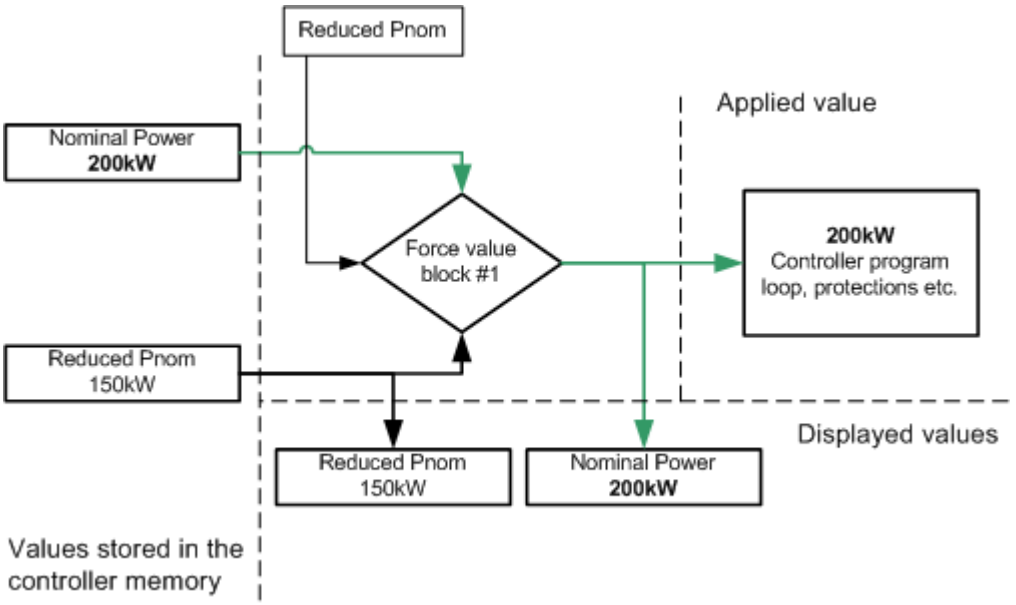
Related FW	3.0
Description	This input is used at a redundant controller to sense the "heart beat" from the main controller. The input is to be connected to the output *CtrlHeartBeat* of the main controller. If the redundant controller does not sense the heart beat from the main one, it will activate the binary output *CtrlHBeat FD*, which has to be wired such a way, that it disconnects the dead main controller from the genset, connects the redundant controller instead and activates it. **NOTE:** Learn more about redundancy in separate chapter Redundant controllers.

Binary input: Nominal speed

Related FW	3.0
Description	Use this input to bypass the idle phase of the start-up procedure. **NOTE:** The input is especially designed for shortening of the start-up procedure when the gen-set is starting to an AMF operation.

Binary input: ForceValueIn 1

Related FW	3.0
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 overriden 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/.  EXAMPLE OF AN ACTIVE FORCE VALUE BLOCK



EXAMPLE OF AN INACTIVE FORCE VALUE BLOCK

Binary input: ForceValueIn 2

Related FW	3.0
Description	This input activates the *Force value #2* block. If the input is active, the value of the setpoint, to which the Force value #2 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #2 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 3

Related FW	3.0
Description	This input activates the *Force value #3* block. If the input is active, the value of the setpoint, to which the Force value #3 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #3 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).

	NOTE: Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 4

Related FW	3.0
Description	This input activates the *Force value #4* block. If the input is active, the value of the setpoint, to which the Force value #4 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #4 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 5

Related FW	3.0
Description	This input activates the *Force value #5* block. If the input is active, the value of the setpoint, to which the Force value #5 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #5 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 6

Related FW	3.0
Description	This input activates the *Force value #6* block. If the input is active, the value of the setpoint, to which the Force value #6 block is configured, will be overriden by

	value of the alternative setpoint assigned to the Force value #6 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 7

Related FW	3.0
Description	This input activates the *Force value #7* block. If the input is active, the value of the setpoint, to which the Force value #7 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #7 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 8

Related FW	3.0
Description	This input activates the *Force value #8* block. If the input is active, the value of the setpoint, to which the Force value #8 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #8 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 9

Related FW	3.0
Description	This input activates the *Force value #9* block. If the input is active, the value of the setpoint, to which the Force value #9 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #9 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn10

Related FW	3.0
Description	This input activates the *Force value #10* block. If the input is active, the value of the setpoint, to which the Force value #10 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #10 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn11

Related FW	3.0
Description	This input activates the *Force value #11* block. If the input is active, the value of the setpoint, to which the Force value #11 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #11 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn12

Related FW	3.0
Description	This input activates the *Force value #12* block. If the input is active, the value of the setpoint, to which the Force value #12 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #12 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn13

Related FW	3.0
Description	This input activates the *Force value #13* block. If the input is active, the value of the setpoint, to which the Force value #13 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #13 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn14

Related FW	3.0

Description	This input activates the *Force value #14* block. If the input is active, the value of the setpoint, to which the Force value #14 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #14 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn15

Related FW	3.0
Description	This input activates the *Force value #15* block. If the input is active, the value of the setpoint, to which the Force value #15 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #15 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn16

Related FW	3.0
Description	This input activates the *Force value #16* block. If the input is active, the value of the setpoint, to which the Force value #16 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #16 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). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/.

	NOTE: See an example in the description of the binary input *Force value 1*.

Binary input: Force block 1

Related FW	3.0
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 *Protection block type* configured as *Force block 1* block type are blocked (i.e. temporarily disabled).

Binary input: Force block 2

Related FW	3.0
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 *Protection block type* configured as *Force block 2* block type are blocked (i.e. temporarily disabled).

Binary input: Force block 3

Related FW	3.0
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 *Protection block type* configured as *Force block 3* block type are blocked (i.e. temporarily disabled).

Binary input: Lang sel int A

Related FW	3.0
Description	This is one of three binary inputs *Lang sel int A*, *Lang sel int B*, *Lang sel int C*, used for selecting language of the **built-in** IG-NT terminal (display). As the IS-NT does not have built-in terminal, this input is assigned to the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it. **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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel int B

Related FW	3.0
Description	This is one of three binary inputs *Lang sel int A*, *Lang sel int B*, *Lang sel int C*, used for selecting language of the **built-in** IG-NT terminal (display). As the IS-NT does not have built-in terminal, this input is assigned to the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it.

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.

ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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). **CAUTION!** Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel int C

Related FW	3.0
Description	This is one of three binary inputs *Lang sel int A*, *Lang sel int B*, *Lang sel int C*, used for selecting language of the **built-in** IG-NT terminal (display). As the IS-NT does not have built-in terminal, this input is assigned to the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it. **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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#2 A

Related FW	3.0

Description	This is one of three binary inputs *Lang sel D#2 A*, *Lang sel D#2 B*, *Lang sel D#2 C*, used for selecting language of the **external** local terminal #2. **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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#2 B

Related FW	3.0
Description	This is one of three binary inputs *Lang sel D#2 A*, *Lang sel D#2 B*, *Lang sel D#2 C*, used for selecting language of the **external** local terminal #2. **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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#2 C

Related FW	3.0
Description	This is one of three binary inputs *Lang sel D#2 A*, *Lang sel D#2 B*, *Lang sel D#2 C*, used for selecting language of the **external** local terminal #2.

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.

ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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). **CAUTION!** Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#3 A

Related FW	3.0
Description	This is one of three binary inputs *Lang sel D#3 A*, *Lang sel D#3 B*, *Lang sel D#3 C*, 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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#3 B

Related FW	3.0
Description	This is one of three binary inputs *Lang sel D#3 A*, *Lang sel D#3 B*, *Lang sel D#3 C*, 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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#3 C

Related FW	3.0
Description	This is one of three binary inputs *Lang sel D#3 A*, *Lang sel D#3 B*, *Lang sel D#3 C*, 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. ENCODING 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

NOTE:
"0" in the table means the input is not active or not configured.

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).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: User mask 1

Related FW	3.0
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*, *User mask 2*, *User mask 3*, *User mask 4* 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*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.

E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

Binary input: User mask 2

Related FW	3.0
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**: No action regarding this screen instrument is taken. **SHOW**: By default the screen instrument is hidden. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is shown. **HIDE**: By default the screen instrument is shown. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden. E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

Binary input: User mask 3

Related FW	3.0
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**: No action regarding this screen instrument is taken. **SHOW**: By default the screen instrument is hidden. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is shown. **HIDE**: By default the screen instrument is shown. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden. E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

Binary input: User mask 4

Related FW	3.0
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*, *User mask 2*, *User mask 3*, *User mask 4* 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*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden. E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

Table of analog input functions

Analog input: LCD brightness

Related FW	3.0
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 overriden by this analog input.

Analog input: MLC:AnExSysBld

Related FW	3.0
Description	This functional input is used for requesting the **system baseload** externally by an analog input. The setpoint *SysBaseLdMode* must be set to EXTERNAL to read the system baseload from this input. **NOTE:** This logical analog input must be configured at each gen-set to the identical source. The *shared peripherial modules* can be used to distribute the value over the controllers via the CAN2 bus. See the note in the description of the setpoint *SysBaseLdMode*.

Analog input: MPF:AnExSysBPF

Related FW	3.0
Description	This functional input is used for requesting the **system power factor** externally by an analog input. The setpoint *SysBasePFMode* must be set to EXTERNAL to read the requested system power factor from this input. **NOTE:** This logical analog input must be configured at each gen-set to the identical

	source. The *shared peripherial modules* can be used to distribute the value over the controllers via the CAN2 bus. See the note in the description of the setpoint *SysBaseLdMode*.

Analog input: Cold temp 1

Related FW	3.0
Description	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. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #1. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Analog input: Cold temp 2

Related FW	3.0
Description	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. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #2. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Analog input: Cold temp 3

Related FW	3.0
Description	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. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #3. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

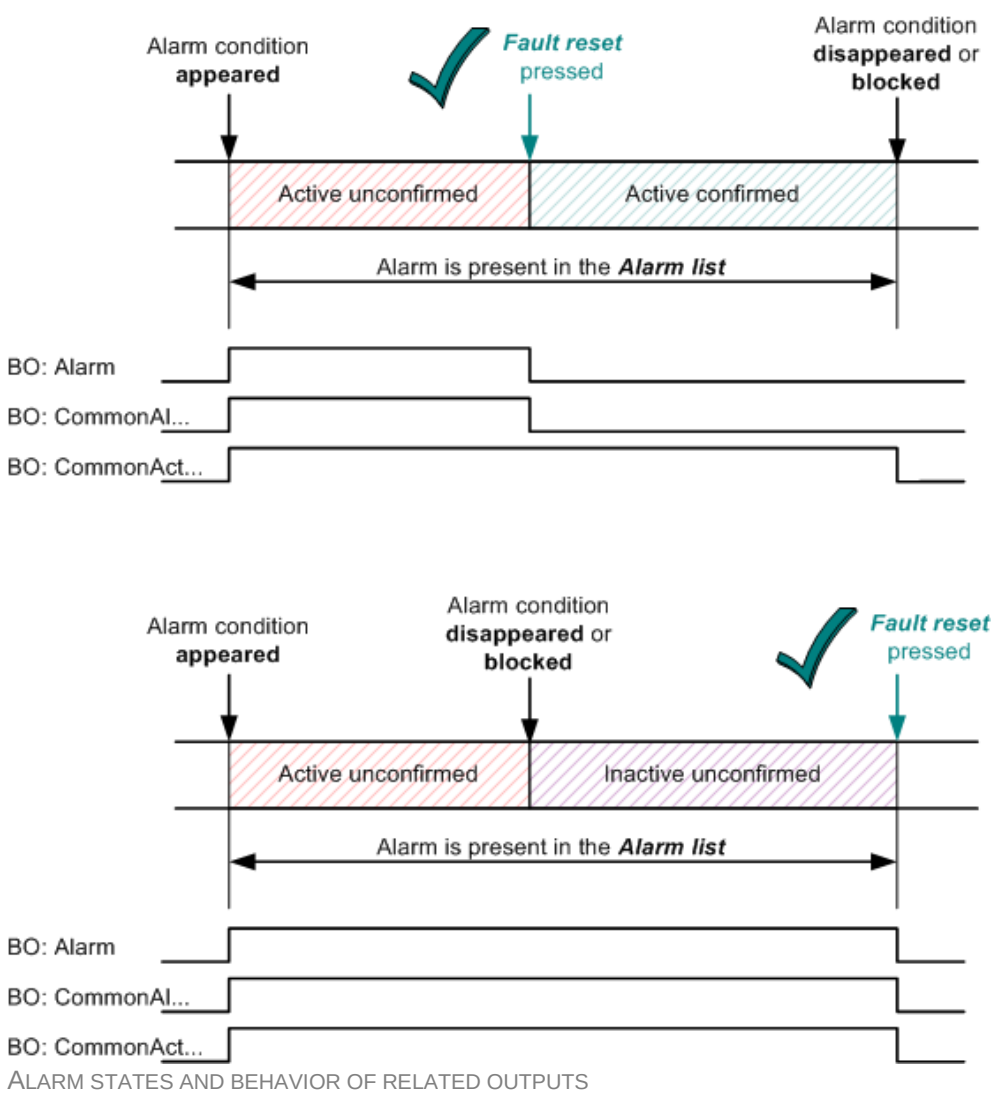
Analog input: Cold temp 4

Related FW	3.0
Description	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. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #4. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Table of binary output functions

Binary output: Alarm

Related FW	3.0
Description	The output is closed if there is at least one **unconfirmed** alarm in the alarm list. **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.



ALARM STATES AND BEHAVIOR OF RELATED OUTPUTS

Binary output: Horn

Related FW	3.0
Description	The output closes together with the output *Alarm*. It opens when the output *Alarm* is opened or *Horn reset* button is pressed or *Horn timeout* has elapsed.

Binary output: CommonAlLev 1

Related FW	3.0
Description	This output is active if there is at least one **unconfirmed** 1st-level (yellow) alarm present in the alarm list. See the chapter Alarm management for more information.

Binary output: CommonAlLev 2

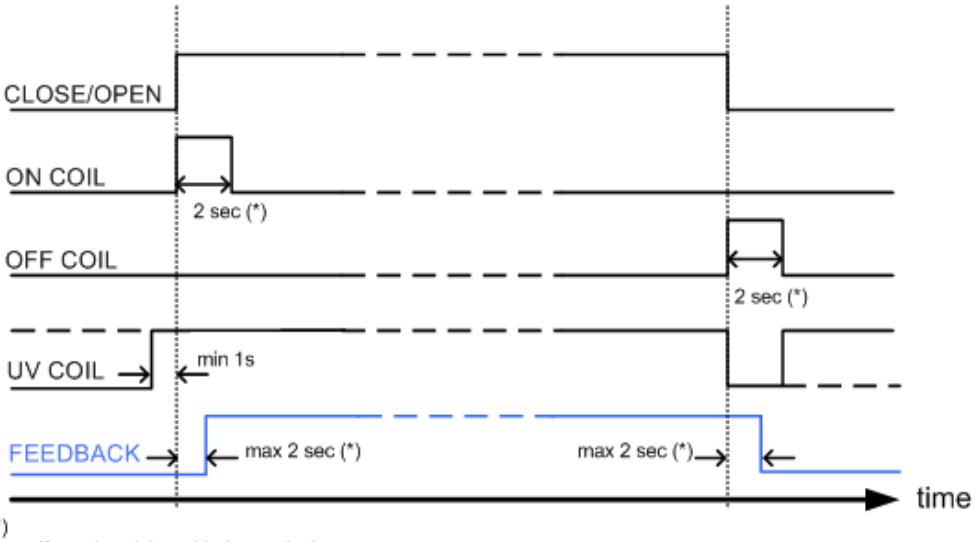
Related FW	3.0

Description	This output is active if there is at least one **unconfirmed** 2nd-level (red) alarm present in the alarm list. See the chapter Alarm management for more information.

Binary output: Cooling Pump

Related FW	3.0
Description	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 *Starting* period) and opens at the end of the *Aftercooling* period, which takes place after the engine has been fully stopped. Duration of the aftercooling period is adjusted by the setpoint *AfterCool time*. The output opens immediately when *Emergency stop* is activated or if the controller is switched to OFF mode.

Binary output: BCB Close/Open

Related FW	3.0
Description	This output is intended for control of the BCB if a **contactor** is used as BCB. The output provides continuous signal while the BCB has to be closed. There are also other outputs availabe for BCB control: • *BCB ON coil* • *BCB OFF coil* • *BCB UV coil*  (*) 5 sec if synchronizing with the particular breaker is disabled. TIMING OF BREAKER CONTROL OUTPUTS

Binary output: BCB ON Coil

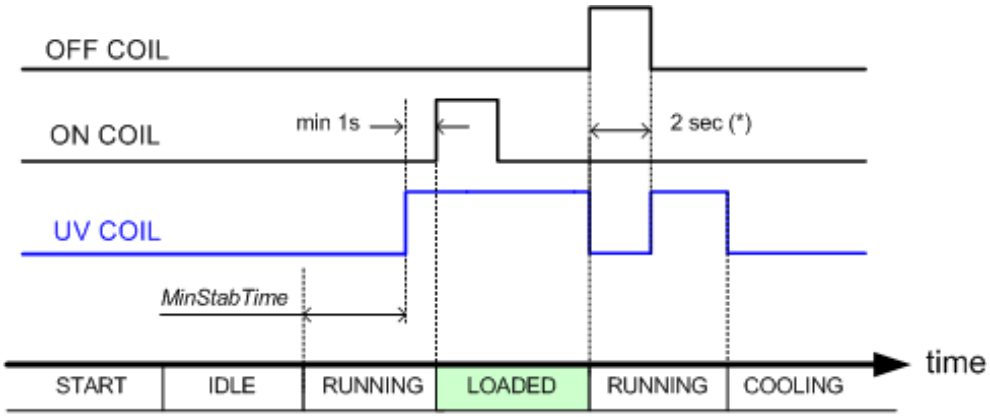
Related FW	3.0
Description	This output is intended for closing of the BCB using ON coil if a **circuit breaker** is used as BCB. The output provides 2 sec pulse when the BCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *BCB close/open* output. There are also other outputs availabe for BCB control: • *BCB close/open* • *BCB OFF coil* • *BCB UV coil*

Binary output: BCB OFF Coil

Related FW	3.0
Description	This output is intended for opening of the BCB using OFF coil if a **circuit breaker** is used as BCB. The output provides 2 sec pulse when the BCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *BCB close/open* output. There are also other outputs availabe for BCB control: • *BCB close/open* • *BCB ON coil* • *BCB UV coil*

Binary output: BCB UV Coil

Related FW	3.0
Description	This output is intended for opening of the BCB using an undervoltage coil if a **circuit breaker** is used as BCB. • The output is closed after the gen-set has been started, *Min stab time* has elapsed and the generator voltage and frequency has got into limits. BCB 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 BCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 5sec. • 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 BCB (e.g. in MAN). • The output remains opened if the *Cooling* phase follows after opening of the BCB.



(*)
5 sec if synchronizing with the particular breaker is disabled.

GCB UV COIL OUTPUT TIMING

There are also other outputs availabe for GCB control:

- *BCB close/open*
- *BCB ON coil*
- *BCB OFF coil*

Binary output: Syst res OK

Related FW	3.0
Description	The output is closed while the actual reserve is above the selected reserve for start.

Binary output: Syst res 1 OK

Related FW	3.0
Description	The output is closed while the actual reserve is above the reserve for start from the reserve set #1.

Binary output: Syst res 2 OK

Related FW	3.0
Description	The output is closed while the actual reserve is above the reserve for start from the reserve set #2.

Binary output: Syst res 3 OK

Related FW	3.0

Description	The output is closed while the actual reserve is above the reserve for start from the reserve set #3.

Binary output: Syst res 4 OK

Related FW	3.0
Description	The output is closed while the actual reserve is above the reserve for start from the reserve set #4.

Binary output: AllAvailGS run

Related FW	3.0
Description	The output is closed while all gen-sets in the group, which participate in the power management, are running and loaded.

Binary output: Vbus <>

Related FW	3.0
Description	The output is closed while the *generator over/under voltage* alarm is present in the alarm list.

Binary output: Vbus <>

Related FW	3.0
Description	The output is closed while the *bus over/under voltage* alarm is present in the alarm list.

Binary output: Overcurrent

Related FW	3.0
Description	The output is closed while there is either the *Generator IDMT Overcurrent* or *Generator Short current* alarms present in the alarm list.

Binary output: Common Wrn

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Warning* 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 Alarm management for more information.

Binary output: Common Sd

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Shutdown* 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 Alarm management for more information.

Binary output: Common SdOvr

Related FW	3.0
Description	Common output that closes with 2s 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.

Binary output: Common Stp

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Slow stop* 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 Alarm management for more information.

Binary output: Common Fls

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Sensor fail* 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 Alarm management for more information.

Binary output: Common LoP

Related FW	3.0
Description	This IS-NT specific function! The output is closed while there is at least one alarm of the *Low power* type present in the alarm list. See the chapter Alarm management for more information.

Binary output: Common OfL

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Off load* type present in the alarm list. See the chapter Alarm management for more information.

Binary output: Common BOC

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Breaker open&Cool-down* 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 Alarm management for more information.

Binary output: Common AI

Related FW	3.0
Description	The output is closed while there is at least one alarm of the *Alarm only* 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 Alarm management for more information.

Binary output: Common Hst

Related FW	3.0
Description	The output is closed for 1s when any alarm of *History record* type appears. See the chapter Alarm management for more information.

Binary output: CommonActLev 1

Related FW	3.0
Description	The output is closed while there is at least one 1st 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 Alarm management for more information.

Binary output: CommonActLev 2

Related FW	3.0
Description	The output is closed while there is at least one 2nd 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 Alarm management for more information.

Binary output: Alarm flashing

Related FW	3.0
Description	This is the flashing alternative of the output *Alarm*, i.e. the output flashes with period 1s/1s while the output *Alarm* is closed.

Binary output: Horn flashing

Related FW	3.0
Description	This is the flashing alternative of the output *Horn*, i.e. the output flashes with period 1s/1s while the output *Horn* is closed.

Binary output: FltResButnEcho

Related FW	3.0
Description	This output provides 1s pulse when: • *Fault reset* button is pressed on the controller front panel or • *Fault reset* button is pressed on any of external local/remote terminals or • *fault reset* command is received via communication line or • the input *FaultResButton* is activated.

Binary output: HrnResButnEcho

Related FW	3.0
Description	This output provides 1s pulse when: • *Horn reset* button is pressed on the controller front panel or • *Horn reset* button is pressed on any of external local/remote terminals or • *horn reset* command is received via communication line or • the input *HornResButton* is activated.

Binary output: StartButnEcho

Related FW	3.0
Description	This output provides 1s pulse when: • *Start* button is pressed on the controller front panel or • *Start* button is pressed on any of external local/remote terminals or • *start* command is received via communication line or • the input *StartButton* is activated.

Binary output: StopButnEcho

Related FW	3.0
Description	This output provides 1s pulse when: • *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* is activated.

Binary output: BCBButnEcho

Related FW	3.0
Description	This output provides 1s pulse when: • *BCB* button is pressed on the controller front panel or • *BCB* button is pressed on any of external local/remote terminals or • *BCB close/open* command is received via communication line or • the input *BCBButton* is activated.

Binary output: BCB status

Related FW	3.0
Description	This output indicates the BCB position, how it is internally considered in the controller. The position is based on *BCB feedback* input and optionally also on the *BCB fdb neg* input. • 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 BCB 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. The output can be used for indication of the BCB position.

Binary output: MCB status

Related FW	3.0
Description	This output indicates the MCB position, how it is internally considered in the controller. The position is based on *MCB feedback* input and optionally also on the *MCB fdb neg* input. • 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.

	The output can be used for indication of the MCB position.

Binary output: Bank params OK

Related FW	3.0
Description	This output indicates that the bank actually provides proper voltage and frequency. The output is closed while the bank of gen-sets is running (regardless of whether BCB is closed or not) and **all bank electrical parameters** are in limits.

Binary output: Bus Params OK

Related FW	3.0
Description	This output indicates that the bus is healthy. The output is closed while **all bus electrical parameters** are in limits.

Binary output: kWh pulse

Related FW	3.0
Description	This output generates 100ms pulse always when the internal kWh counter incremented.

Binary output: In synchronism

Related FW	3.0
Description	This output is closed **during synchronization** when all synchro conditions have been fulfilled. The output is opened either when: • the synchro conditions are lost **or** • the corresponding breaker has been closed **or** • the sychronizing was interrupted or timed out. Synchro conditions are following: • Phase shift between generator and mains (bus) voltage must be within range of ±*Phase window* for period longer than *Dwell time*. • Voltage difference between generator and mains (bus) voltage (in all phases) must be lower or equal to *Voltage window* for period longer than *Dwell time*. The output is intended for manual synchronization. Automatic closing of GCB **must be disabled** for this case. Use the input *GCB disable*.

Binary output: InMainsParal

Related FW	3.0
Description	This LBO indicates that controller (or logical group, which the controller is member of) is connected to the mains. It means that there exists a way across MCB (IM-NT-MCB application) or MCB+MGCB (IM-NT-MGCB application) to the controller. It is possible to configure this signal as MCB feedback of the controller, what can be useful for complicated applications with higher amount of mains. **NOTE:** This signal works correctly only if IM-NT is used as the MCB/MGCB control device.

Binary output: Engines swapped

Related FW	3.0
Description	This output is activated by the master controller for 100 ms pulse when the priority of two gen-sets was swapped by the Running hours equalization function.

Binary output: Neutral CB C/O

Related FW	3.0
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* 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 *Wrn NCB fail* is issued. **NOTE:** Learn more about neutral contactor in the description of the setpoint *#Neutral cont.*.

Binary output: PeriphCommErr

Related FW	3.0
Description	The output is closed while there is an error in the communication with any peripheral unit (e.g. IS-AIN8, IGS-PTM, ...).

Binary output: CtrlHeartBeat

Related FW	3.0
Description	The output provides alternating signal with rate 500ms active / 500ms 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: • 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 Redundant controllers.

Binary output: CtrlHBeat FD

Related FW	3.0
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: • If the input *CtrlHBeat sens* 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 the setpoint *Watched Contr* . **NOTE:** Learn more about redundancy in separate chapter Redundant controllers.

Binary output: LdShed stage 1

Related FW	3.0
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 Load shedding.

Binary output: LdShed stage 2

Related FW	3.0
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 fulfiled. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Binary output: LdShed stage 3

Related FW	3.0
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 fulfiled. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Binary output: TimerAct 1-4

Related FW	3.0
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 Timers for more details about timers.

Binary output: TimerAct 5-8

Related FW	3.0
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 Timers for more details about timers.

Binary output: TimerAct 9-12

Related FW	3.0
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 Timers for more details about timers.

Binary output: TimerAct 13-16

Related FW	3.0
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 Timers for more details about timers.

Binary output: TimerActiveCom

Related FW	3.0
Description	This is combined output from all timer channels. The output is active if at least one timer channel is active.

Binary output: SystReady

Related FW	3.0
Description	The output is closed while the group of gen-sets has enough capacity to fulfil the requested power reserve. If this output is not closed it means the system has not enough capacity to fulfil the reserve even if all the gen-sets will run. **NOTE:** *Fulfiled reserve* means the actual reserve is above the requested reserve for start. **NOTE:** This output **do not indicate the requested reserve has been already fulfiled**. It only indicates whether the system is able to fulfil it or not.

Binary output: Ready for Load

Related FW	3.0
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.

Binary output: Gen-set active

Related FW	3.0
Description	The output closes at the beginning of the prestart phase and opens after the gen-set has been fully stopped. If the bank fails to start the output opens after the last cranking attempt. **NOTE:** The output also closes if the engine begins to rotate spontaneously.

Binary output: Operational

Related FW	3.0
Description	The output is closed when the bank is ready for operation or is currently in operation.

Binary output: Ready

Related FW	3.0
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:

	• the genset is not running **and** • the controller is not in OFF mode **and** • there isn't any alarm blocking start of the bank

Binary output: Not ready

Related FW	3.0
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: • the genset is not running **and** • the controller is in OFF mode **or** • there is an alarm blocking start of the bank.

Binary output: Starting

Related FW	3.0
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 bank goes to running phase or when it failed to start. See the diagram in the descrition of the output *Cranking* for details.

Binary output: Running

Related FW	3.0
Description	This output is closed at the end of the *Idle* phase when the output *Idle/Nominal* 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.

Binary output: ForwardSynchro

Related FW	3.0
Description	The output is closed during forward synchronizing and opens when the output *GCB status* is activated (= GCB was closed). **NOTE:** The output can be used for control of an external synchronizing module.

Binary output: Loaded

Related FW	3.0

Description	The output is closed while the gen-set is loaded and the load is beeing regulated according to selected mode (baseload, import/export, power management etc.) or is not beeing regulated in single island operation.

Binary output: Logical 0

Related FW	3.0
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 continously inactive.

Binary output: Logical 1

Related FW	3.0
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.

Binary output: Bin selector 1

Related FW	3.0
Description	Output is closed or opened according to the setpoint *Bin selector 1*. **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.

Binary output: Bin selector 2

Related FW	3.0
Description	Output is closed or opened according to the setpoint *Bin selector 2*. **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.

Binary output: Bin selector 3

Related FW	3.0
Description	Output is closed or opened according to the setpoint *Bin selector 3*. **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.

Binary output: Bin selector 4

Related FW	3.0
Description	Output is closed or opened according to the setpoint *Bin selector 4*. **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.

Binary output: WrongPhSeq

Related FW	3.0
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.

Binary output: User Button 1

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 2

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately. **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** — Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 3

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately. **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** — Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 4

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 5

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to

	be generated from the moment of button pushing.

Binary output: User Button 6

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User button 7

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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 — Pressing the button issues log. binary output User button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 8

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 9

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 10

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 11

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 12

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 13

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately. **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** — Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 14

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately. **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** — Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 15

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to be generated from the moment of button pushing.

Binary output: User Button 16

Related FW	3.0
Description	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. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

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	Pressing the button issues log. binary output User Button X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing another puls of length of one second to

	be generated from the moment of button pushing.

Binary output: RemoteControl1

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl2

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl3

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl4

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl5

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl6

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl7

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl8

Related FW	3.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Alarm output: WrongConfig

Related FW	3.0
Description	This output is closed while there is the *WrongConfig* alarm present in the alarm list. The wrong configuration is indicated if the controller configuration contains a PLC program, which exceeds limits of the current controller hardware. Typically this situation can occur when a miniCHP archive is used in a controller without mCHP dongle inserted.

Alarm output: Dongle incomp

Related FW	3.0
Description	This output is closed while there is the *Dongle incomp* alarm present in the alarm list. The incompatible dongle is indicated when a function is switched on, which requires dongle, however the dongle is not inserted or does not contain the appropriate feature. Typical situations are: • Power management is enabled and there is not any dongle with "PMS" feature inserted in the controller. • The controller is in situation, when the load sharing should beeing performed, however there is not any dongle with "LS" feature inserted in the controller.

Alarm output: Emergency stop

Related FW	3.0
Description	This output is closed while the *Emergency stop* alarm is present in the alarm list. The emergency stop alarm is activated by the input *Emergency stop*.

Alarm output: WrnServiceT1+2

Related FW	3.0
Description	This output is closed while the *WrnServiceT1+2* alarm is present in the alarm list. This alarm occurs when the counter *Service time 1* or *Service time 2* has reached zero value. Both timers must be reset to a nonzero value to get rid of this alarm.

Alarm output: WrnServiceT3+4

Related FW	3.0
Description	This output is closed while the *WrnServiceT3+4* alarm is present in the alarm list. This alarm occurs when the counter *Service time 3* or *Service time 4* has reached zero value. Both timers must be reset to a nonzero value to get rid of this alarm.

Alarm output: Overspeed

Related FW	3.0
Description	This output is closed while the *Overspeed* alarm is present in the alarm list.

Alarm output: Underspeed

Related FW	3.0
Description	This output is closed while the *Underspeed* alarm is present in the alarm list.

Alarm output: Start fail

Related FW	3.0
Description	This output is closed while the *Start fail* alarm is present in the alarm list. See the diagram in the description of the *Starter* output for information when the start fail alarm is indicated.

Alarm output: Sd Stop fail

Related FW	3.0
Description	This output is closed while the *Sd Stop fail* alarm is present in the alarm list. This alarm appears when the gen-set indicates that it is rotating although it has to be stopped. This situation can occur: • when the gen-set starts to rotate spontaneously (from the controller point of view) or • when the gen-set does not stop after the stop command has been issued. See the timing diagram in the description of the output *Stop Solenoid*.

Alarm output: ChrgAlternFail

Related FW	3.0
Description	This output is closed while the *ChrgAlternFail* alarm is present in the alarm list. This alarm appears when the voltage at the controller D+ terminal drops below 90% of the controller supply voltage for more than 2s. **NOTE:** Function of the D+ terminal is selected by the setpoint *D+ Function*.

Alarm output: Pickup fail

Related FW	3.0
Description	This output is closed while the *ChrgAlternFail* alarm is present in the alarm list.

	This alarm appears when the engine is running (there is at least one "running symptom" active), however zero speed is detected. **NOTE:** Pickup fail can be indicated even if the speed is actually measured from the generator frequency. The "running symptoms" are listed in the description of the output *Starter*.

Alarm output: Sd ExtBattFlat

Related FW	3.0
Description	This output is closed while the *Sd Battery flat* alarm is present in the alarm list. This alarm appears when reset of the controller occurs while the gen-set is actually cranking. Such a situation is considered as a reset caused by a drop of the supply voltage due to starter motor current when the gen-set starting battery is in bad condition.

Alarm output: Stp GCB fail

Related FW	3.0
Description	This output is closed while the *GCB fail* alarm is present in the alarm list.

Alarm output: BOC NCB fail

Related FW	3.0
Description	This output is closed while the *NCB fail* alarm (neutral circuit breaker) is present in the alarm list.

Alarm output: Stp Sync fail

Related FW	3.0
Description	This output is closed while the *Stp Sync fail* alarm is present in the alarm list, i.e. if the last synchronization process was not successful and ended by timeout.

Alarm output: WrnSpdRegLim

Related FW	3.0
Description	This output is closed while the *WrnSpdRegLimit* alarm is present in the alarm list, i.e. while the analog output for speed governor is near minimum or maximum position (out of the range *SpeedGovLowLim* + 0.2V to *SpeedGovHiLim* - 0.2V for more than 2s). **NOTE:** This alarm is disabled when speed governing via binary outputs *Speed up* and *Speed dn* is used (i.e. at least one of these outputs is configured onto a physical

	or virtual output terminal).

Alarm output: WrnVoltRegLim

Related FW	3.0
Description	This output is closed while the *WrnVoltRegLim* alarm is present in the alarm list, i.e. while the analog output for AVR is near minimum or maximum position (out of the range 2% to 98% for more than 2s). **NOTE:** This alarm is disabled when AVR control via binary outputs *AVR up* and *AVR dn* is used (i.e. at least one of these outputs is configured onto a physical or virtual output terminal).

Alarm output: Sd Oil press B

Related FW	3.0
Description	This output is closed while the *Sd Oil press B* alarm is present in the alarm list, i.e. while there is a mismatch between gen-set state (running/stopped) and position of the input *Oil press*.

Alarm output: OfL StartBlck

Related FW	3.0
Description	This output is closed while message *OfL StartBlck* is present in the alarm list. The message indicates that the setpoints *Island enable*, *ParallelEnable* and *Synchro enable* are adjusted in such a way, that the genset is not allowed to operate in current conditions, for example if mains breaker is opened and however island operation is disabled.

Alarm output: Start blocking

Related FW	3.0
Description	The output is closed while there is the message *Start blocking* in the alarm list, i.e. while the input *Startblocking* is closed.

Alarm output: Fuel theft

Related FW	3.0
Description	This output is closed while the *Fuel theft* alarm is present in the alarm list. This alarm occurs when the fuel level value measured at the analog input *Fuel level* drops faster than is the limit adjusted by setpoint *MaxFuelDrop*.

Alarm output: PLC State 1

Related FW	3.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 1* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: PLC State 2

Related FW	3.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 2* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: PLC State 3

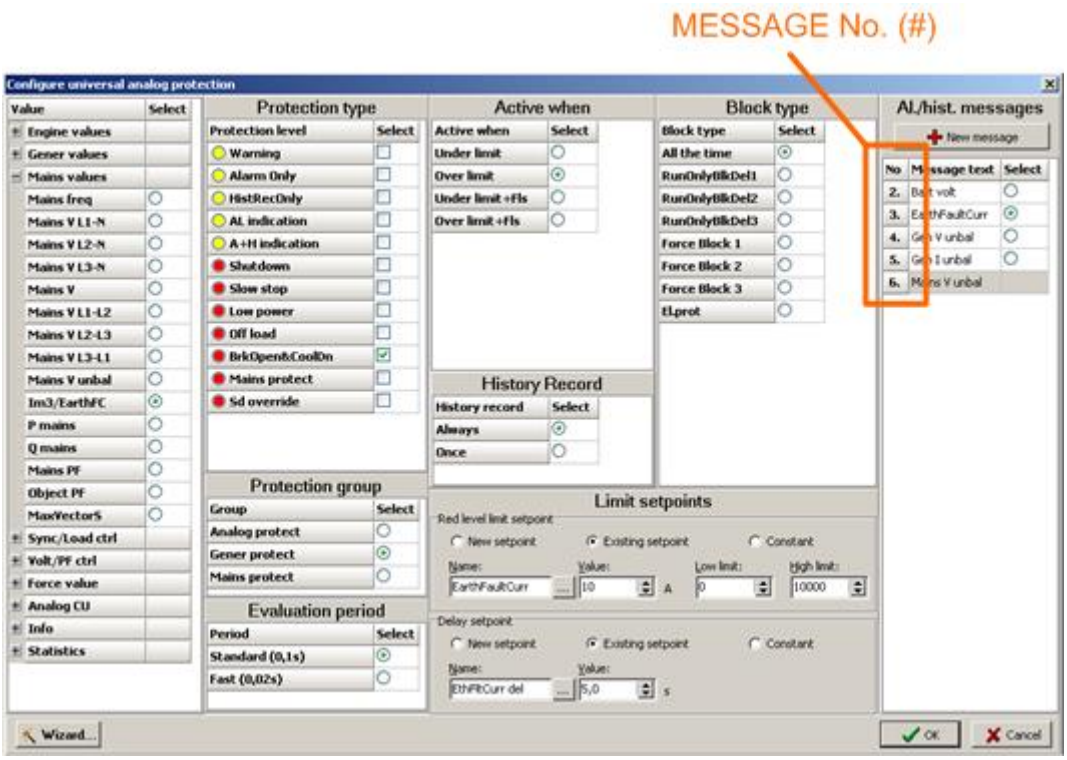
Related FW	3.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 3* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: PLC State 4

Related FW	3.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 4* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: UnivState 1

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #1** is used, is present in the alarm list. **NOTE:** The actual text of the message depends on configuration.



HOW TO FIND OUT THE MESSAGE NUMBER

Alarm output: UnivState 2

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #2** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 3

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #3** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 4

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #4** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 5

Related FW	3.0

Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #5** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 6

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #6** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 7

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #7** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 8

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #8** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 9

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #9** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 10

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #10** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 11

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #11** is used, is present in the alarm list. See the *UnivState 1*

	for picture how to find the message number.

Alarm output: UnivState 12

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #12** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 13

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #13** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 14

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #14** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 15

Related FW	3.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #15** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.