REFERENCE GUIDE

Table of Contents

General guidelines

What is described in this manual?

This manual describes IGS-NT-GeCon-MARINE- „MINT“ software configuration. The Generator controller 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/generators
- Gen-set/generator control panel builders
- For everybody who is concerned with installation, operation and maintenance of the gen-set/generator

!! Warnings !!

Remote control

The IGS-NT controller can be remotely controlled. In case 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 output GCB 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

PAGE	(Capital letters in the frame) buttons on the front panel
Break Return	(Italic) set points
Generator protections	(Bold) Set point group
REMOTE START/STOP	(Capital letters) binary inputs and outputs
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)!!!

Be aware that gen-set can automatically or remotely start !!!

Switch the controller to SEM 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

For suitable firmware for your controller please consult this table:

Firmware (*.mhx)

InteliGen NT GC InteliGen NTC GC	InteliGen NT BaseBox InteliGen NTC BaseBox	InteliSys NT BaseBox InteliSys NTC BaseBox
IG-NT-GC-GeCon-MARINE-3.5.0	IG-NT-BB-GeCon-MARINE-3.5.0	IS-NT-GeCon-MARINE-3.5.0

Archives (*.ant)

InteliGen NT GC InteliGen NTC GC	InteliGen NT BaseBox InteliGen NTC BaseBox	InteliSys NT BaseBox InteliSys NTC BaseBox
IG-GC-GeCon-MARINE -SPTM-3.5.0	IG-BB-GeCon-MARINE -SPTM-3.5.0	IS- GeCon-MARINE-SPTM-3.5.0
IG-GC-GeCon-MARINE -SPI-3.5.0	IG-BB-GeCon-MARINE -SPI-3.5.0	IS- GeCon-MARINE-SPI-3.5.0
IG-GC-GeCon-MARINE -MINT-3.5.0	IG-BB-GeCon-MARINE -MINT-3.5.0	IS- GeCon-MARINE-MINT-3.5.0
IG-GC-GeCon-MARINE -COMBI-3.5.0	IG-BB-GeCon-MARINE -COMBI-3.5.0	IS- GeCon-MARINE-COMBI-3.5.0

Some features are available only in InteliGen NT Basebox, InteliGen NTC Basebox and InteliSys NT. These features are highlighted by green background.

Features which are not available in InteliGen^{NT} GC controller:

User MODBUS
Distributed Binary Inputs and Outputs

General description

Description of the controller system (with all options)

NT Family controllers are comprehensive AMF-controllers for single and multiple generating sets operating in stand-by or parallel modes. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications.
NT Family controllers are equipped with a powerful graphic display showing icons, symbols and bar-graphs for intuitive operation, which sets, together with high functionality, new standards in Gen-set controls.
The controller automatically starts the gen-set, closes the Gen-set C.B. when all conditions are met, then stops the engine* (* sw GeCon opens GCB only, not stops the engine) on external signal or by pressing push buttons.
Parallel to the Mains operation is a standard feature. Isolated parallel and Power Management System support are optional. Forward and reverse synchronizing, Generator protections, Mains protection including vector shift, load and power factor control are the major functions provided. Interfacing to foreign synchronizers and load sharers is supported.
The key feature of the controller is its easy-to-use operation and installation. Predefined configurations for typical applications are available as well as user-defined configurations for special applications.

Comparing of IGS-NT-GeCon-MARINE 3.5.0 with standard gen-set fw

GeCon does not take care of Engine control
GeCon accepts in SEM mode external control of GCB and Engine
GeCon can control the engine via Binary start/stop output signals only – see below. The independent Engine controller (e.g. ID-DCU) is expected.
Synchronizing and unloading timeouts can be disabled by setpoint setting (or Force value function)
All regulations (load, VAr sharing, frequency, voltage) can be disabled by setpoint change or by Force value
Interface GeCon to engine controller is provided by I/O wires no by communication line.

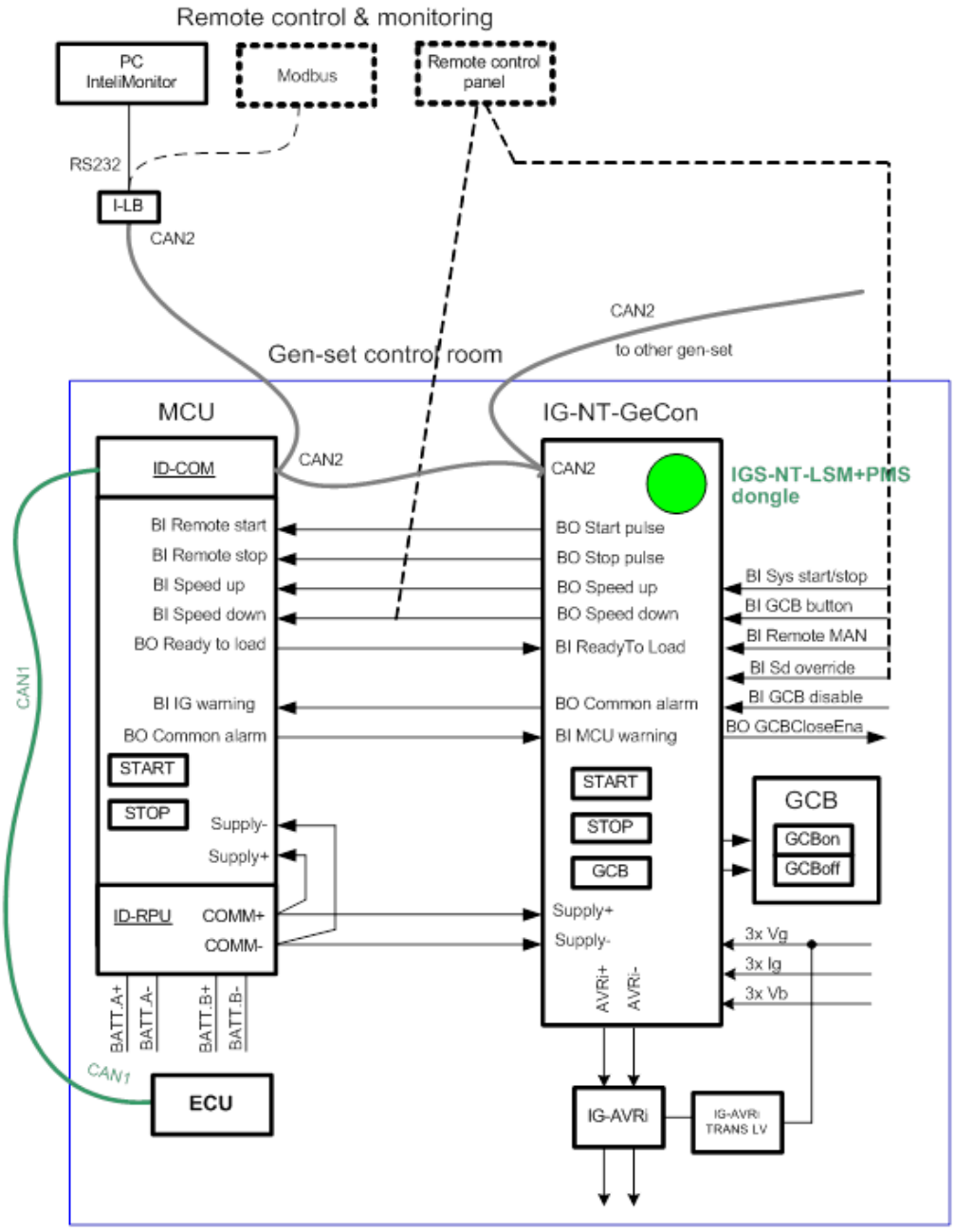
Available documentation

PDF FILE	DESCRIPTION
IGS-NT & ID-DCU Accessory Modules 02-2015.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.
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 Communication Guide 09-2014.pdf	Communication guide for IG/IS-NT controllers. It contains information how to connect control unit and all communication features descriptions
IGS-NT Installation Guide 08-2014.pdf	Installation guide for IG/IS-NT controllers. It contains technical information about controler and extension modules

IGS-NT Application Guide 05-2013.pdf	Application guide for IG/IS-NT controllers. It refers to application and typical installation settings and sites structures
IGS-NT Operator Guide 01-2014.pdf	Operator guide for IG/IS-NT

Example of interconnection GeCon x Engine controller

Schematic wiring:



Important signals/ interconnections:

From GeCon side:
BO: **Start pulse**, **Stop pulse** - for sending Start and Stop signals
Speed control (during synchronisation, regulation):
BO: **Speed Up**, **Speed Down** or Aout **SG out**

BI: **ReadyToLoad** – signal from Engine unit – it means that Engine is ready (speed is ok, no 2nd level alarms) and can be loaded.

Other signals:

- Information about Warnings / SD in one unit can be sent to second unit.
- ECU – in case of Ecu communicating via CAN bus J1939 – GeCon can be connected to CAN1 for showing ECU values on the display

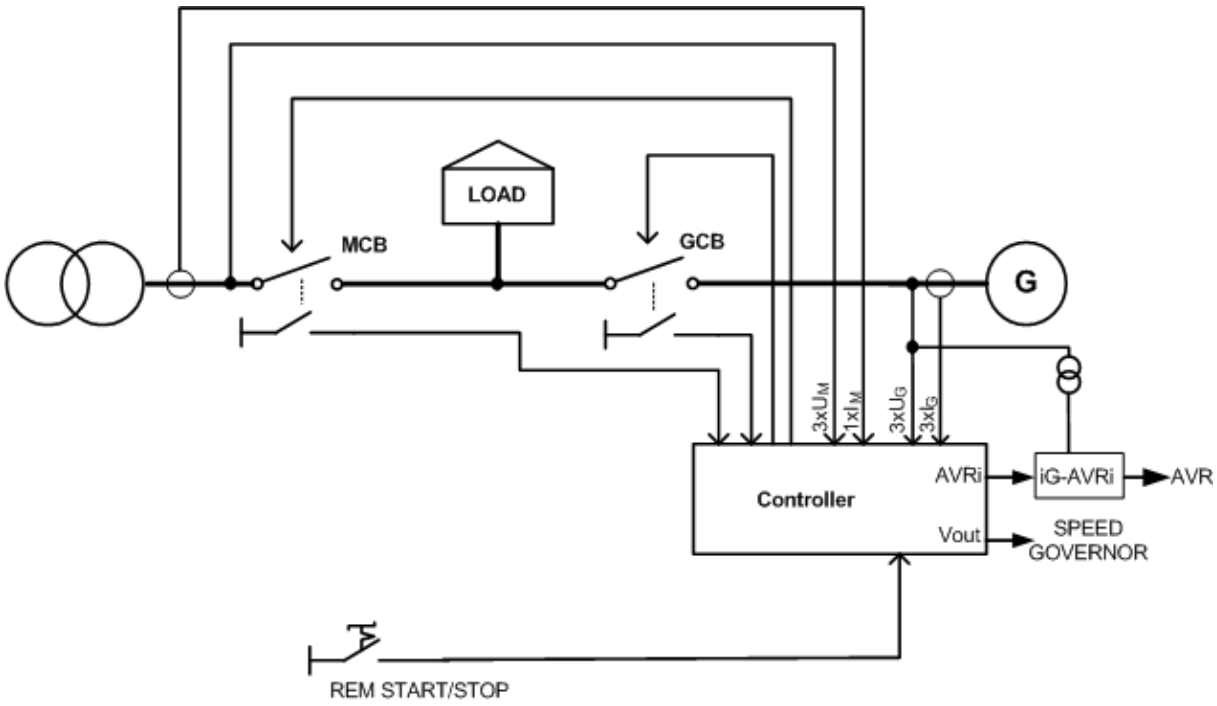
- Interconnection on CAN2:
  - For Time and Date synchronisation only- in case of IGS-NT and ID-DCU
  - In case of connection IB-NT or I-LB+ - you can monitor both kind of units (IGS-NT, ID-DCU)
  - In case of connection display – you can switch between both kind of units (IGS-NT, ID-DCU)

Functions

Basic description of SPtM application

The SPtM application is intended for single generator/gen-set and includes following main features:

- Automatic startup and stop sequences with adjustable timing
- Wide range of generator, additional freely configurable protections
- **Parallel to the mains operation**, many different load control modes (baseload, import/export control and other)
- **Island operation**
- **Integrated mains protection** (mains decoupling relay) including vector shift
- **AMF function** (automatic start if mains fails) with test feature
- **Two breaker control** (GCB, MCB) including **synchronizing**
- Soft loading and unloading



Modified setpoints

Below mentioned are GeCon specific setpoints only.

Group	Setpoint	Option	Function
Process control	*StartStopBtn*	ENABLED DISABLED	Standard panel Start/Stop buttons function. Panel Start/Stop buttons are disabled.
	ProtectionMode	ACTIVE NOT ACTIVE	ACTIVE: 2-nd level protections are evaluated, GCB or MCB is controlled. NOT ACTIVE: 2-nd level protections are evaluated, GCB or MCB is NOT opened. Exceptions are Emerg Stop and alarms types Sdoverride.
Sync/Load ctrl	*Sync timeout*	1-1800s NO TIMEOUT	Standard MINT function. Unlimited synchronizing time.
	GCB open level	1-100% NO LEVEL	Standard MINT function. No generator power open level detection.
	GCB open del	1-1800s NO TIMEOUT	Standard MINT function. Unlimited unloading procedure.

Hint:

All above mentioned setpoints can be Forced by Binary input(s) to another value (or switched between ENABLED and DISABLED).

Based on setpoint settings there are three possible operational modes HAND – SEM - AUT:

		“HAND”	SEM	AUT
Basic setting	*ControllerMode*	SEM	SEM	AUT
Process control	*StartStopBtn*	DISABLED	ENABLED	ENABLED
	ProtectionMode	NOT ACTIVE/ ACTIVE	ACTIVE	ACTIVE
Sync/Load ctrl	*Sync timeout*	NO TIMEOUT	1-1800s	1-1800s
	GCB open level	NO LEVEL	1-100%	1-100%
	GCB open del	NO TIMEOUT	1-1800s	1-1800s

Hint:

It is possible to configure (Force value) “HAND” – SEM switching via Binary input.

Controller modes

OFF mode

Use OFF mode to block controller functions (even if is power on). OFF mode is used for controller firmware or configuration change.
Binary outputs (e.g. GCB CLOSE/OPEN) are not energized, all closed Binary outputs are opened when controller is switched to OFF mode.
Gen-set cannot be started and operated from IGS-NT-GeCon controller – no response for panel buttons and Binary input commands.
Hint:
Switching to OFF mode is blocked on running engine to avoid accidental engine stop by mode change or by firmware or configuration programming.

SEM mode

Engine start can be activated from

- Engine controller (e.g. ID-DCU, ID-MCU)
- GeCon panel – Start button
- GeCon BI: StartButton
- Remotely e.g. from InteliMonitor

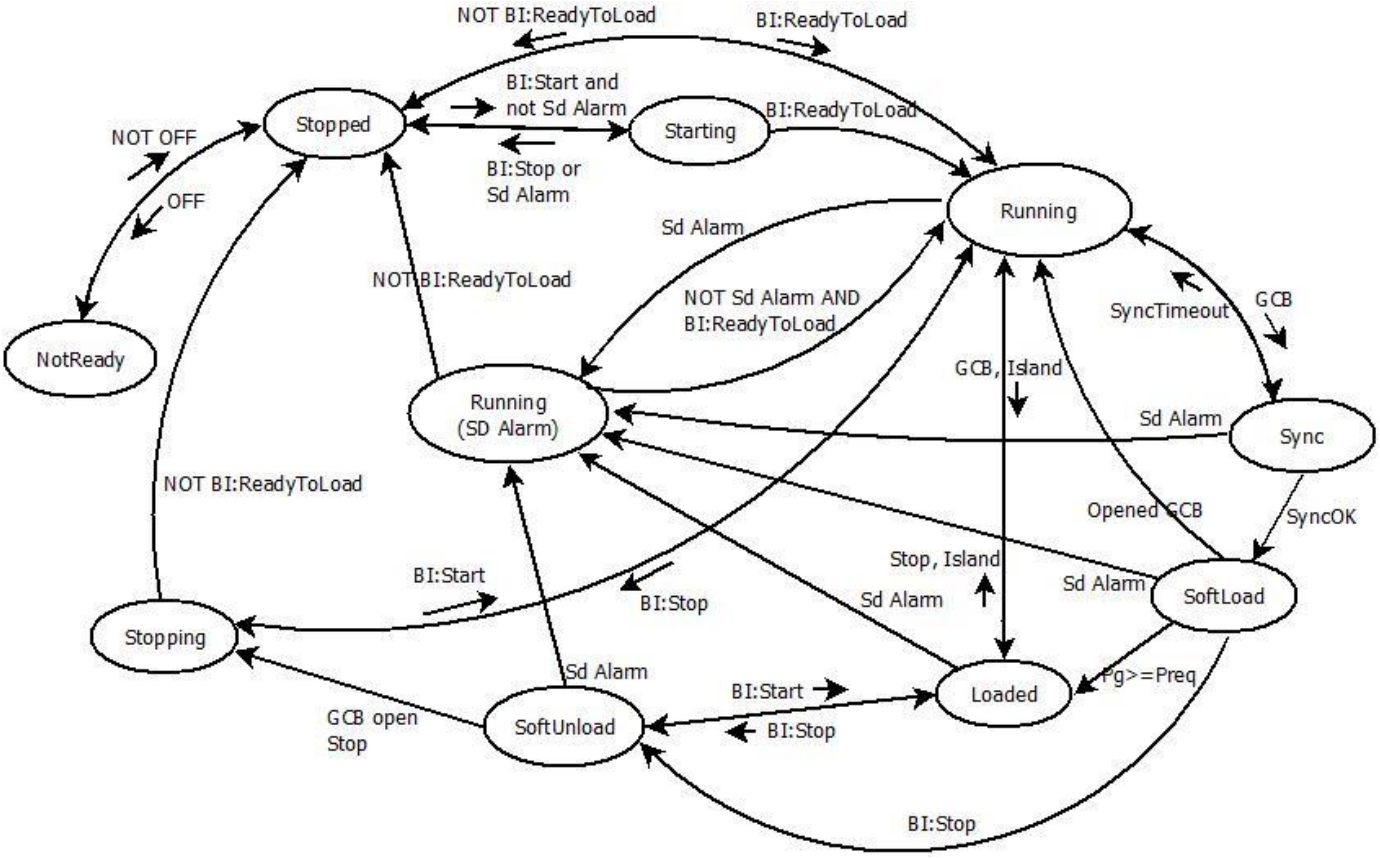
GeCon BI: ReadyToLoad initiates GeCon “Running” state” - activates **Gener protect**: *Min stab time* a *Max stab time* within the generator electric protections are activated.

Gen-set is loaded/unloaded from

- GeCon panel – GCB button
- GeCon BI: GCBButton
- Direct GCB “hand” control
- Remotely e.g. from InteliMonitor
- LBI: Gen unload

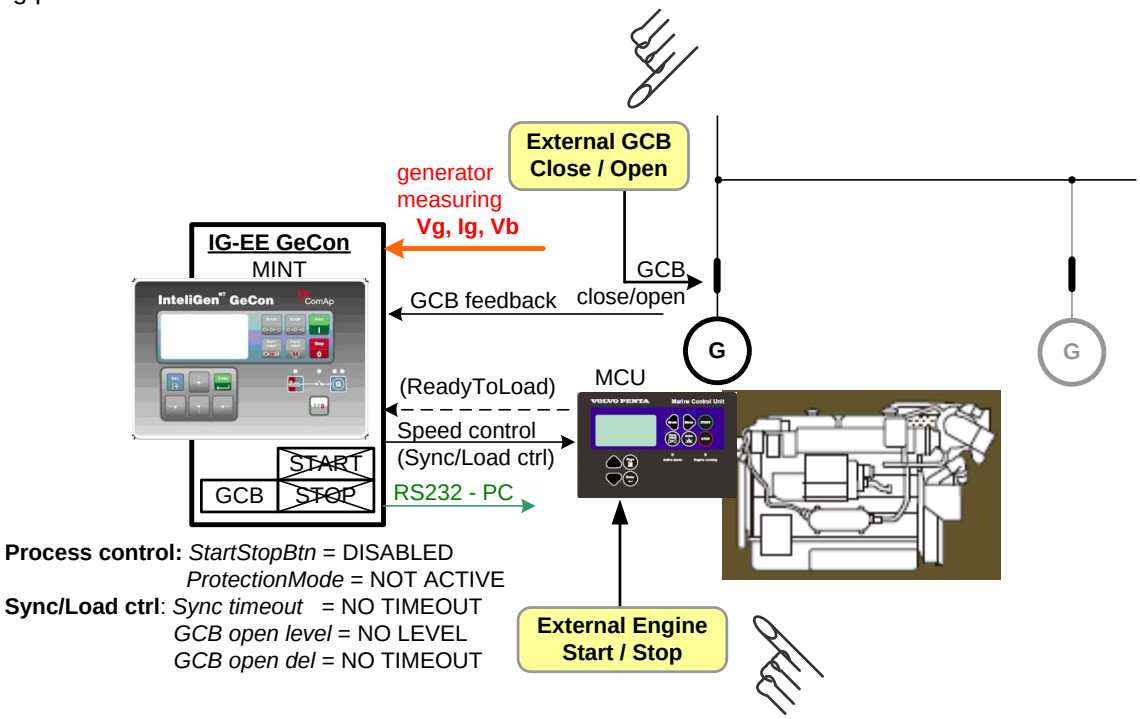
GCB closing from controller can be blocked by BI: GCB disable (does not block synchronization process)

Controller flow chart in SEM mode:



HAND mode

Hand mode is a special type of SEM mode. In Hand mode, the panel Start, Stop buttons are not working, GCB is supposed to be controlled externally. The Hand mode is achieved by setpoints adjustment - see the following picture.

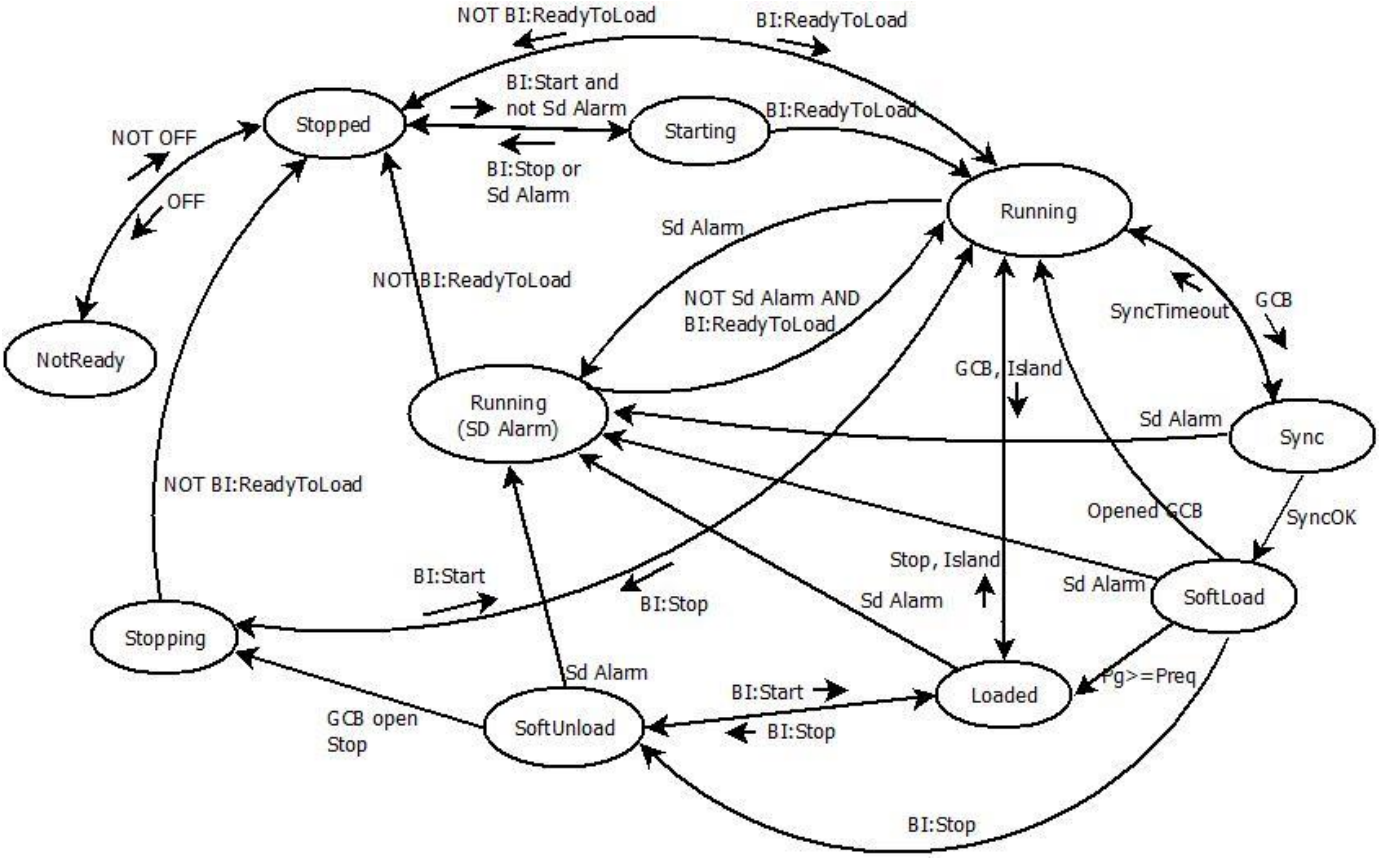


AUT mode

Engine start or Power management is activated from GeCon BI: Sys start/stop
GeCon BI: ReadyToLoad initiates GeCon “Running” state” - activates **Gener protect**: *Min stab time* a *Max stab time* within the generator electric protections are activated.
Gen-set starts synchronizing and is loaded/unloaded automatically based on

- Power management setting
- GeCon BI: Sys start/stop

GeCon will stop engine started from engine controller when BI Sys start/stop or due to Power management function.
Controller flow chart in AUT mode:



TEST mode

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

HINT
The controller does not respond to GCB ON/OFF , STOP, START in *Return To mains* = ENABLED.
Gen-set automatically starts, when TEST mode is selected.

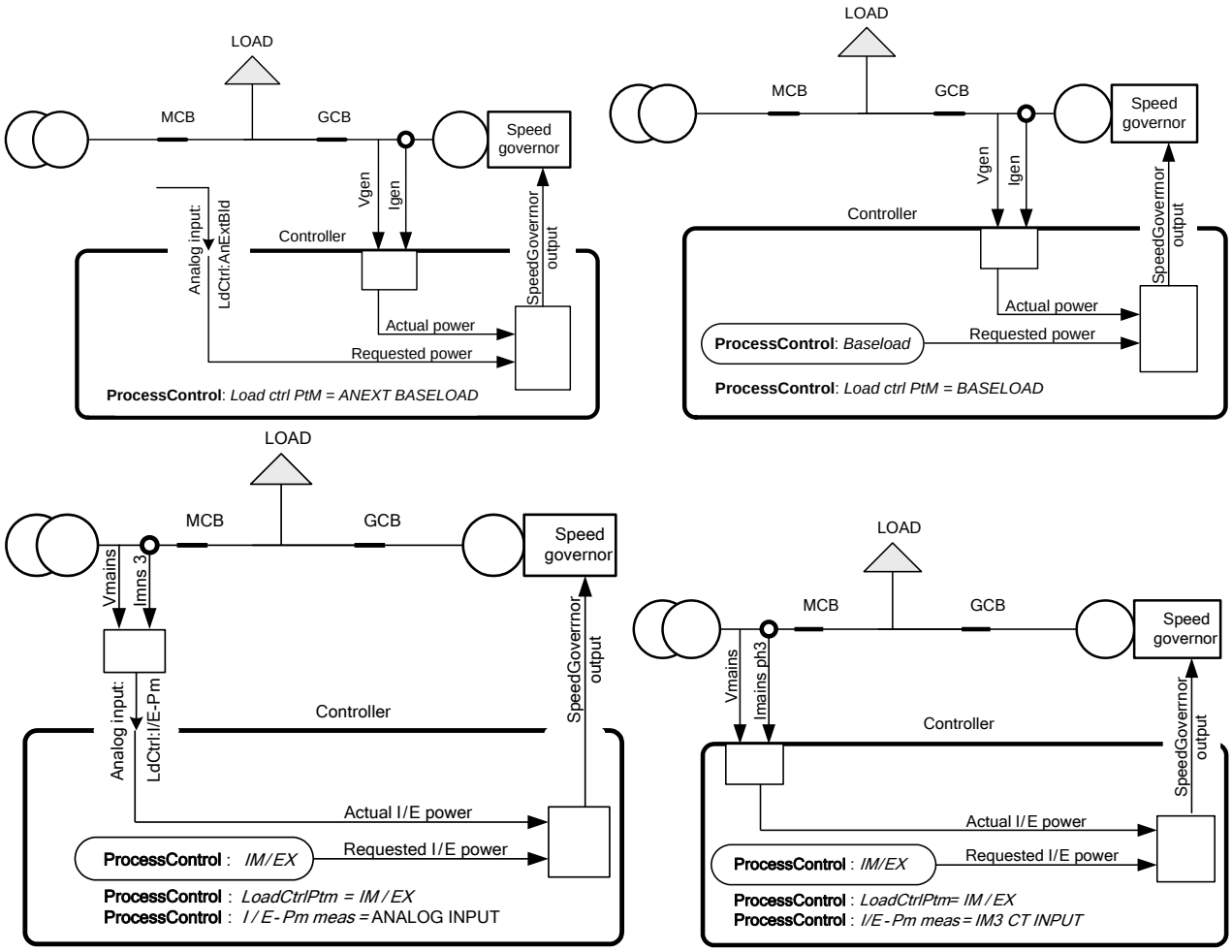
Mains parameters out of limits during synchronising

In case that mains parameters get out of permitted limits during synchronizing to mains (reverse or forward), the regulation of gen-set speed and voltage according to mains frequency and voltage is interrupted. During the state, when parameters reach out of limits, until “Mains fail” is issued, the engine speed and voltage regulation output is kept on the last value.

Active Power control modes in SPtM

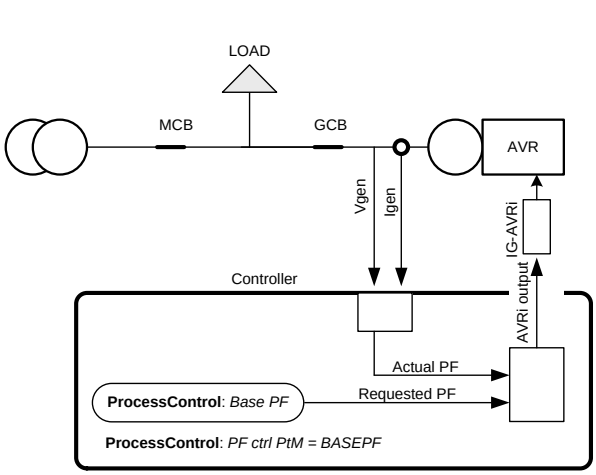
ProcessControl: *Load ctrl PtM*		
Mode	Function	Related Setpoints – LBI – LBO - LAI
BASELOAD	Gen-set power is regulated to value given by *Base load* setpoint.	**ProcessControl**: *Base load*
IM/EX	Gen-set load is controlled so, that the mains import is maintained constant at the level given by *Import load* setpoint – I/E power is measured by controller on auxiliary CT input or by analog input.	**ProcessControl**: *Import load, I/E Pm-meas*
ANEXT BASELOAD	Gen-set power is set by analog input.	**Analog input:** *LdCtrlAnextBld*
ANEXT IM/EX	Gen-set load is controlled so, that the mains import is maintained constant at the level given by the analog input *LdCtrl:AnExI/E* – I/E power is measured by controller on auxiliary CT input or by analog input.	**ProcessControl**: *I/E Pm-meas*, **Analog input:** *PFCtrl:AnExI/E*
T BY PWR	Gen-set power is controlled to keep the required temperature, that is measured via an analog input.	**ProcessControl**: *TempByPwr Treq, TempByPwr gain, TempByPwr int,* **Analog input:** *LdCtrl:TByPwr*

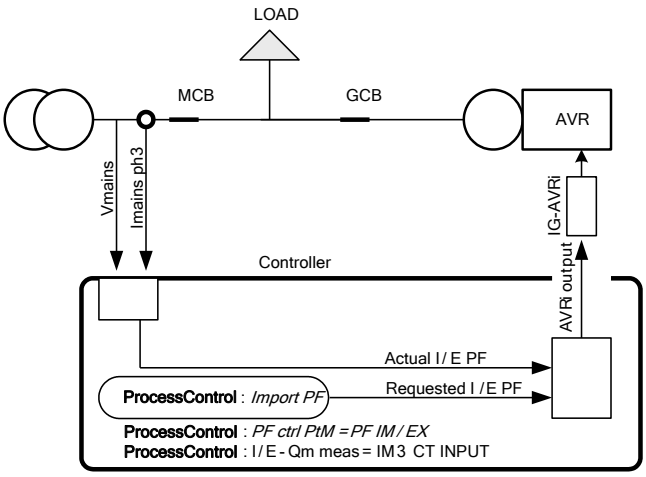
Another modes of active power control		
Mode	Function	Related Setpoints – LBI – LBO - LAI
Export limit	Limits export to the mains in the baseload mode. If the function is enabled, the gen-set power is limited so that mains import is always higher or equal to the setpoint *Import Load*.	**ProcessControl**: *Export limit = ENABLE, Import load*
Warming	The controller limits gen-set power for requested time or until the water temperature reach the requested value. After warming the gen-set goes to the requested (e.g. Baseload) power.	**ProcessControl**: *Warming load; Warming temp; Max warm time*
Peak shaving	Automatic gen-set start/stop based on object (load) consumption. Can be based on measured kW or kVA.	**ProcessControl**: *PeakLevelStart; PeakLevelStop; PeakAutS/S del, Peak kVA Start, Peak kVA Stop, PeakKVAS/S del,* **LBO**: *PeakShaveAct*

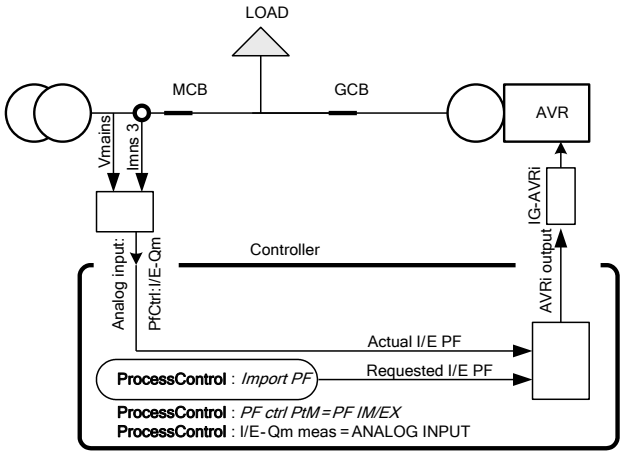


PF control modes

ProcCtrlSingle: *PF ctrl PtM*		
Mode	Function	Setpoints
BASEPF	Gen-set power factor is maintained at constant level adjusted by the setpoint *Base PF.*	**ProcCtrlSingle**: *PF ctrl PtM*
PF-IM/EX	Gen-set power factor is controlled so, that the mains power factor is maintained constant at the level adjusted by setpoint *Import PF*	**ProcCtrlSingle**: *Import PF*, *I/E Qm-meas*
ANEXT BASEPF	Gen-set power factor is maintained at constant level given by the analog input *PFCtrl:AnExBPF*	**Analog input:** *PFCtrl:AnExBPF*
ANEXT PF-IM/EX	Gen-set load is controlled so, that the mains power factor is maintained constant at the level given by the analog input *PFCtrl:AnExI/E* – I/E power factor is measured by controller on auxiliary CT input or by analog input.	**ProcCtrlSingle**: *I/E Qm-meas* **Analog input:** *PFCtrl:AnExI/E*







Load shedding

Load shedding function is dedicated for tripping of non-essential load in case of high generator current, high generator active power load, low generator voltage or drop of generator frequency.

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 AUT mode.
b) When MCB opens from parallel to mains operation in AUT mode.
c) Before MCB is opened in SEM mode by button.

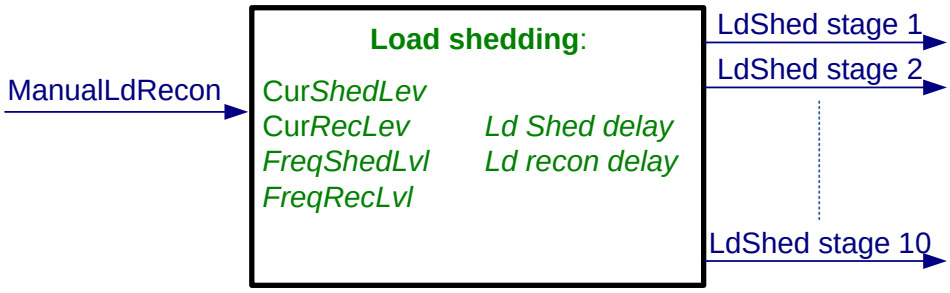
The load shedding function is active in all controller modes except OFF and MAN.

Load shedding has ten steps and each step is linked with its own Load shed x binary output. The non essential load shedding is based on generator active power, current, generator frequency or voltage. There is only one level for all 10 steps, as well for reconnection 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 S10 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, current, frequency or voltage is above/bellow a reconnection level.

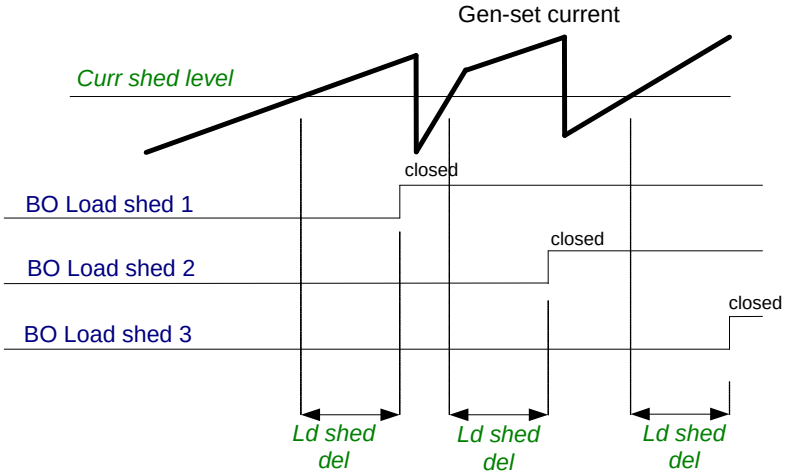
The current load shedding can be activated in case any of phase current exceeds the adjusted limit. The reconnection is able only in case all of the current values are below reconnection level.



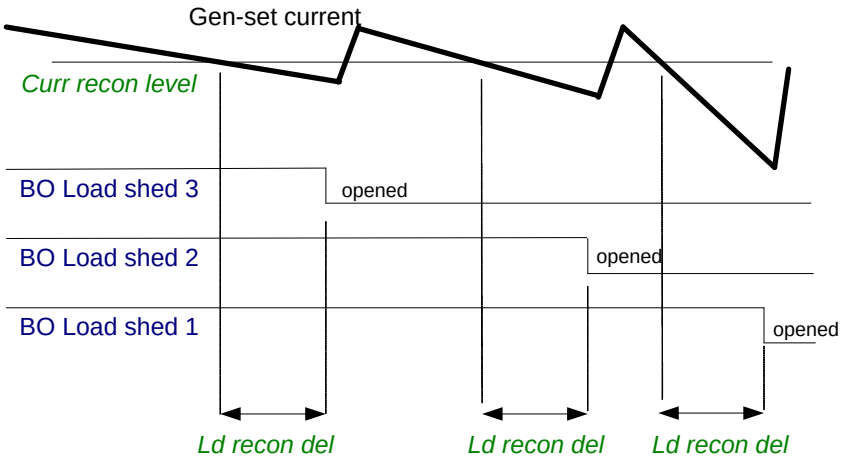
Hint:

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

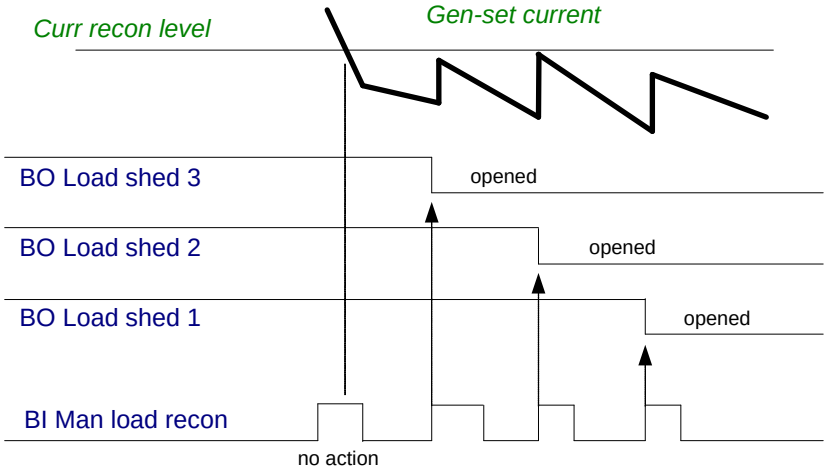
On the following pictures, the generator current load shedding is depicted. The current is evaluated from all 3 phases, each phase can activate the load shedding. On the picture, due to transparency, only 3 load shed outputs are depicted, not all 10.
The generator frequency/voltage based load shedding is in fact the same, but fall below preadjusted limit is watched, instead of exceeding of the limit as in case of current load shedding.



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



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



Test on load – SPtM

Affects the behavior in TEST mode. Before the activation of this function

1. adjust setpoint **AMF settings**: *ReturnTo mains* = DISABLED
2. adjust Process control: MFStart enable = YES.
3. switch controller to Test on load mode (see drawing below)

Gen-set starts and goes to load (synchronizes to the mains, closes GCB and opens MCB) automatically when this input is closed even if Mains is OK.

Transmition of power from mains to generator

Behaviour of function depends on settings of setpoint **ProcessControl:***I/E-Pm meas.* If the mains import is measured (**ProcessControl:***I/E-Pm meas* = IM3 CT INPUT or ANALO INPUT) then there is no time limitation for unloading and opening of MCB. The MCB is opened when the Import/Export goes below 0 ± 5% of **Basic settings:** *Nomin power*. *If the setpoint* **ProcessControl:***I/E-Pm meas* = NONE then the MCB is opened after delay given by setpoint **AMF settings:** *BreakerOverlap.*

Transmition of power from generator back to mains

GCB is opened when the power on gen-set is drops under level given by setpoint **Sync/Load ctrl:** *GCB open level* at the least after delay given by setpoint **AMF settings:** *BreakerOverlap.*

Test on load with break (interruption)

The transfer of the load in TEST mode can be performed with interruption in case that the parallel to mains operation is undesirable. Set setpoints **ProcessControl:***Parallel enable* = NO or **ProcessControl:***Synchro enable* = NONE or REVERSE, **ProcessControl:***Island enable* = YES: If the LBI *Test on Load* gets active the load is passed from the mains to the gen-set with interruption. Controller opens MCB and closes GCB after delay given by **AMF settings:***FwRet break*. After deactivation of LBI *Test on Load* GCB is opened and and MCB Is closed after delay given by **AMF settings:***FwRet break*.

HINT

It is possible to configure both binary inputs (Remote TEST and Test on load) to only one controller physical binary input internally.

Power derating

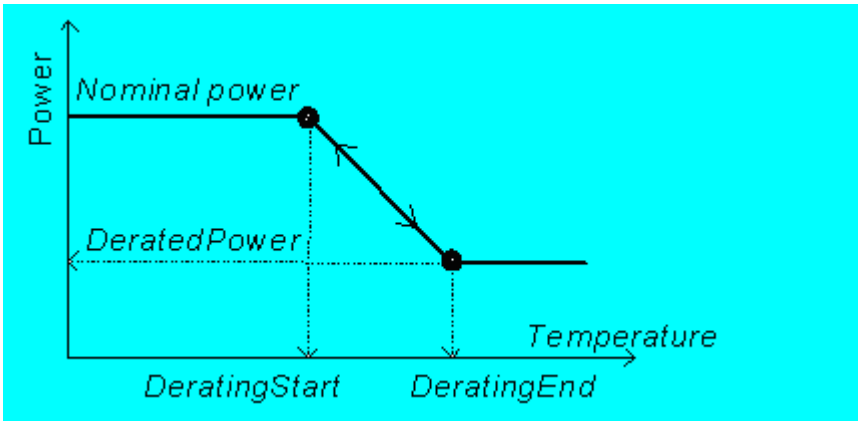
This function linearly **decreases genset nominal power** according to analog input value.
Gen-set power starts decreasing when temperature measured by Analog input PowerDeratingX exceeds *DeratingX strt* value.
Gen-set power is at *DeratedX pwr* value when temperature measured by Analog input Power deratingX is equal or higher than *DeratingX end* value.
Hint:
To use Power derating function configure at first Analog input PowerDeratingX to any IGS-NT or IS-AIN analog input terminal by GenConfig.

When Power derating function is active the generator overload protection is based on the Derated power! ! !

Derated power value **Pg derated** is visible in the controller measure screen.

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

Example :
Nomin power = 200 kW, *Derating1 strt* = 70 °C, *Derating1 end* = 100 °C, *Derated1 pwr* = 70 %.
Genset is running at Nominal power 200 kW. When temperature reached 70 °C the genset power starts decreasing. When temperature reached 100 °C genset runs at 70 % of Nominal power = 140 kW. When temperature increased above *DeratingX end* temperature level, gen-set power stays at *DeratedX pwr* level 140 kW.



Temperature derating function decreases genset power depend on setpoints *DeratingX strt*, *DeratingX end* and *DeratedX pwr*.

Temperature derating starts at *DeratingX strt* temperature.

At *DeratingX end* temperature runs genset at *DeratedX pwr* level.

Above *DeratingX end* temperature Genset runs at constant *DeratedX pwr*.

Protection mode settings

Protections in this application are **affected by Setpoint ProtectionMode (group ProcessControl).**
This setpoint is active in MAN,SEM and AUT mode.

Setpoint ProtectionMode has 2 options of settings:

ACTIVE:
Standard setting – all protections are active, in case of 2nd level alarm the breaker is opened/controlled.
(2-nd level alarms are evaluated, GCB or MCB is controlled)

NOT ACTIVE:
2-nd level alarms are evaluated only , but GCB or MCB are NOT controlled (no actions).
Exceptions are Emergency Stop and Sd override alarms type. If the controller is in AUT Mode it behaves as describe in Active Mode.

Circuit breakers operation sequence, GCB/MCB fail detection

NOTE:
In the following text, “CB” abbreviation is used for MCB or GCB respectively.

Related binary inputs:

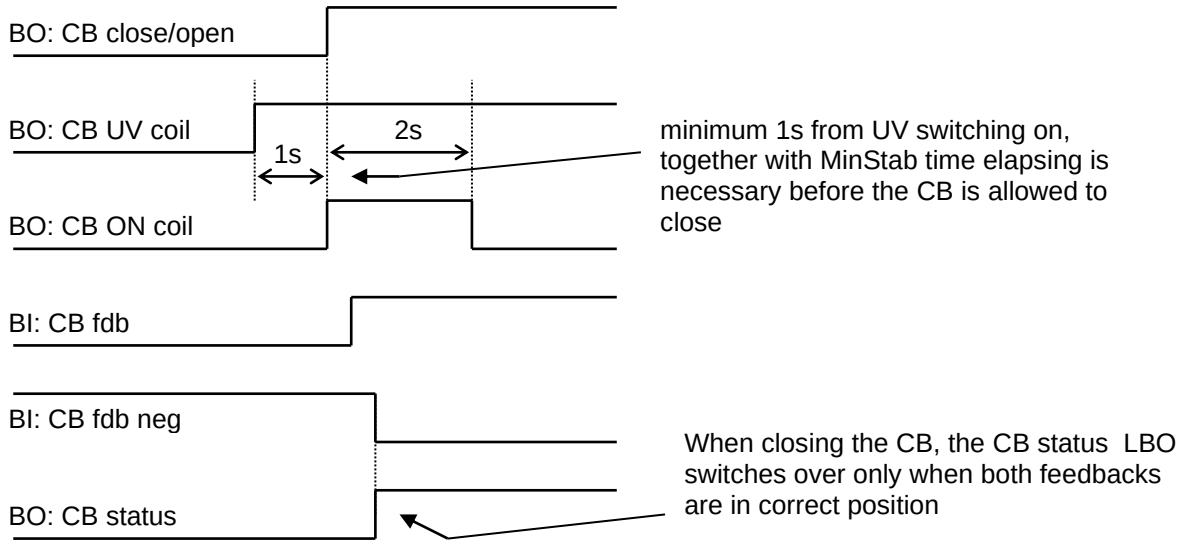
- CB fdb – CB feedback binary input
- CB fdb neg – negative CB feedback binary input. Used for increasing the reliability of CB status evaluated by the controller. In case that it is not configured, negative value of CB fdb is calculated internally within the controller.

Related binary outputs:

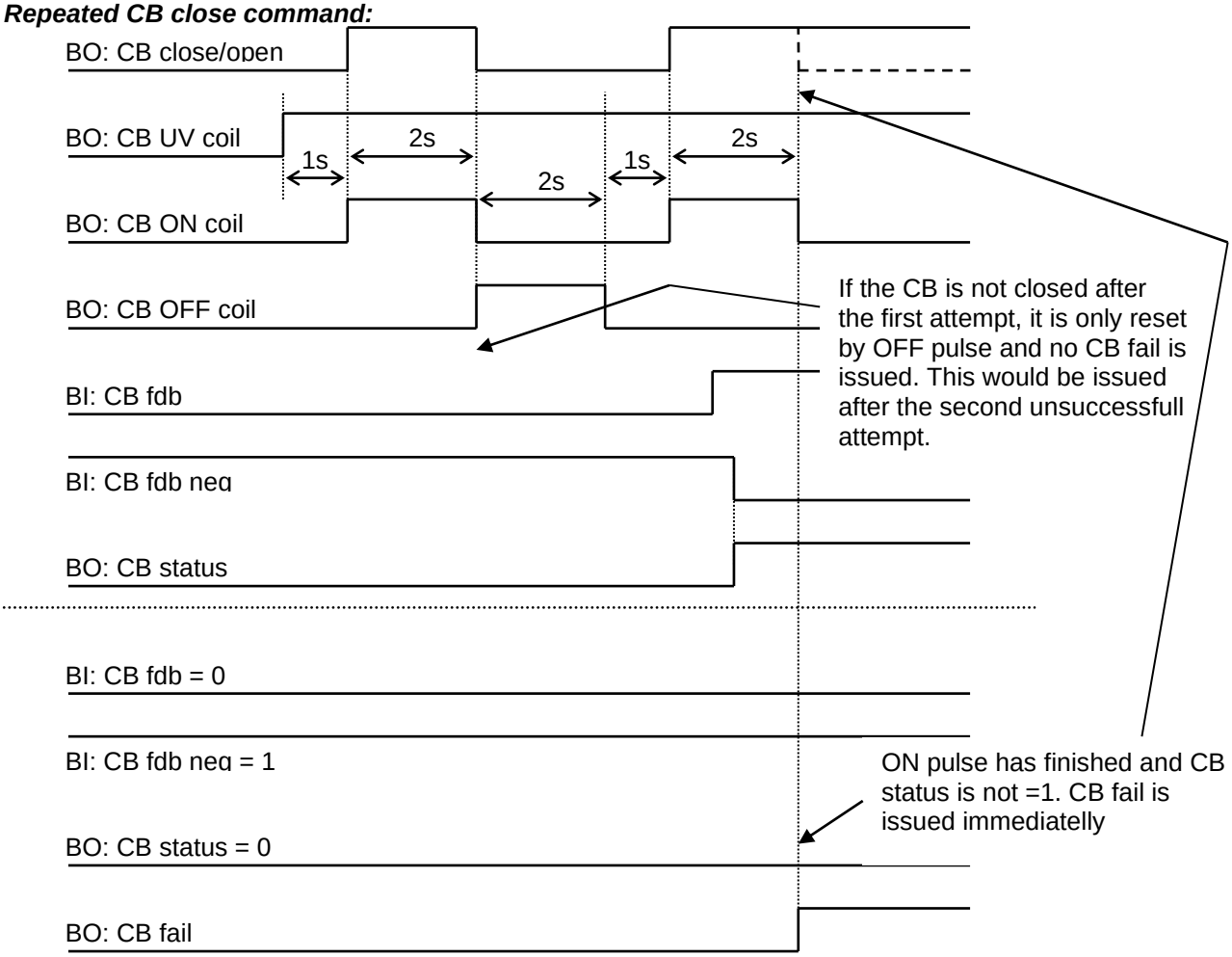
- CB close/open – output for circuit breaker. Equals to 1 during the time when CB is requested o be closed.
- CB ON coil – output for closing coil of the CB. 2s pulse (5s if synchronising is not provided by the particuilar CB) is used for closing the CB.
- CB OFF coil – output for opening coil of the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

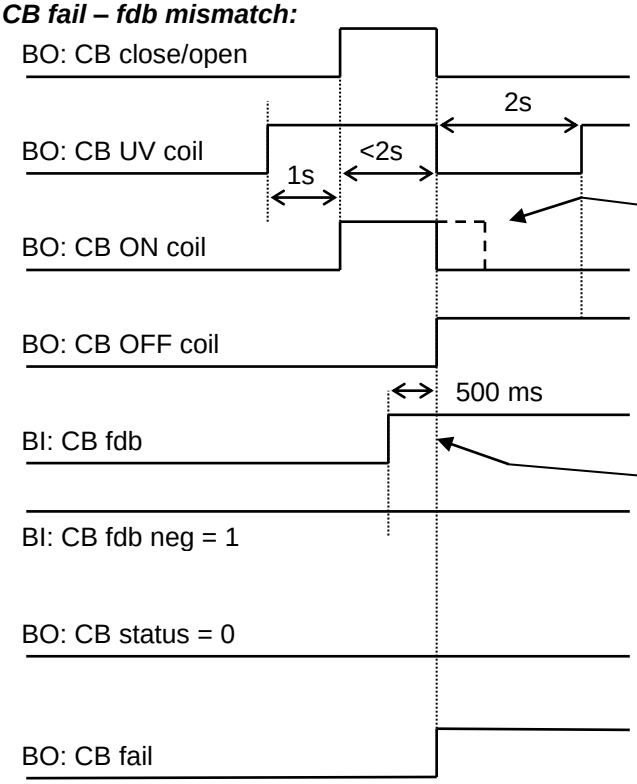
CB close command:



Repeated CB close command:



CB fail – fdb mismatch:

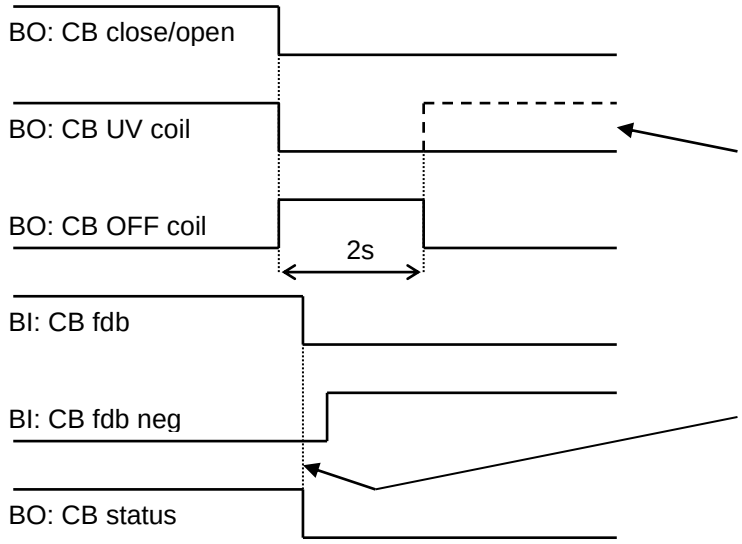


ON pulse is shortened/interrupted and replaced by UV and OFF pulse

OFF pulse is activated until both feedbacks return to the correct position +2 seconds.

CB fail – If any inconsistence between the two feedback signals is detected, CB fail is issued.

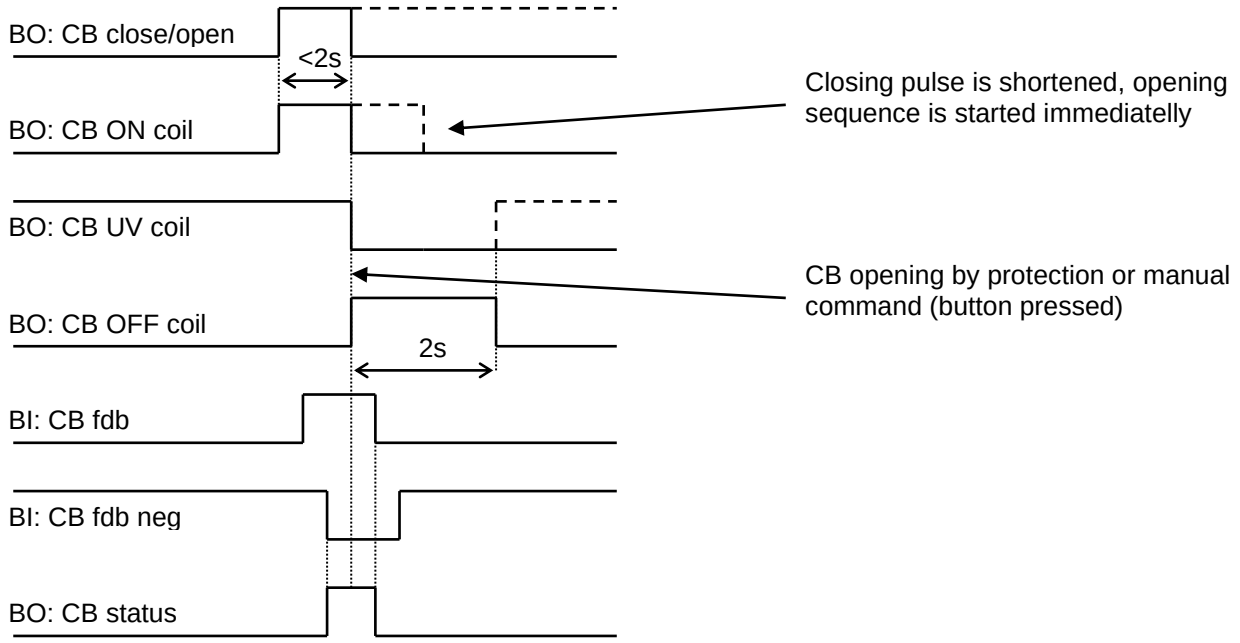
CB open command:



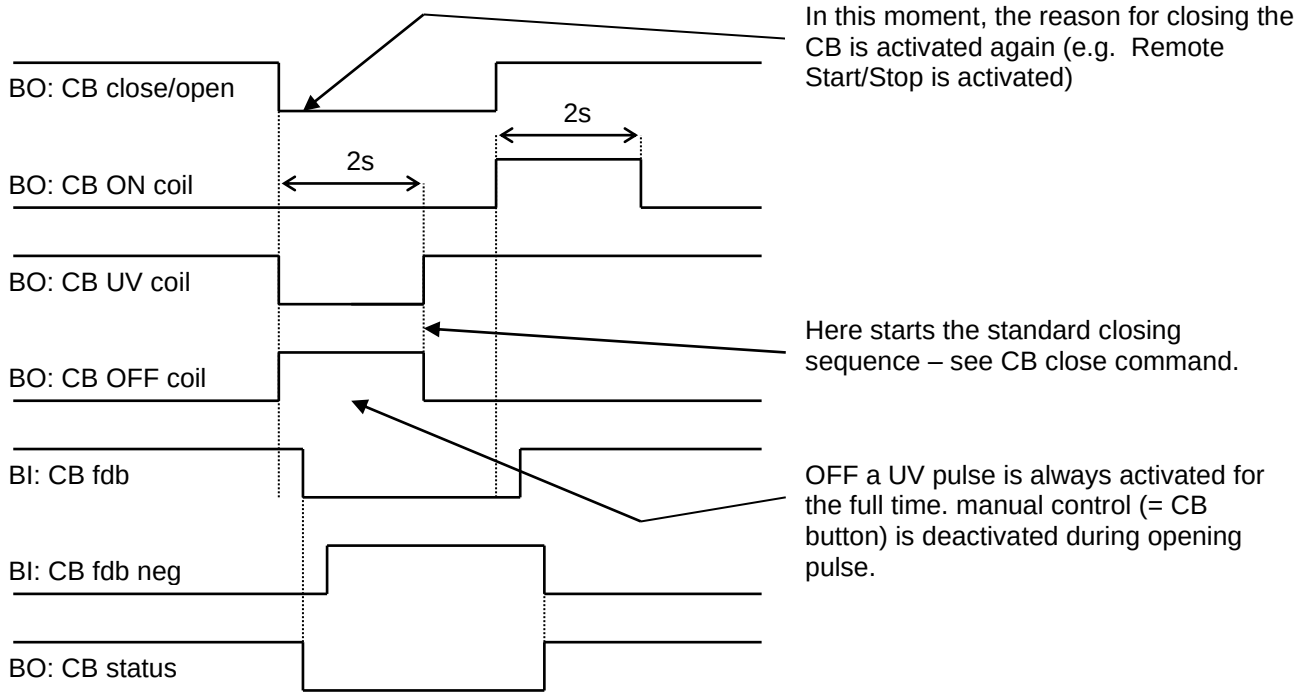
Further behavior of UV output depends on the system status. In case of transition to cooling stays off, if the Cb was opened manually and the engine keeps running, it activates again after timeout elapses.

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

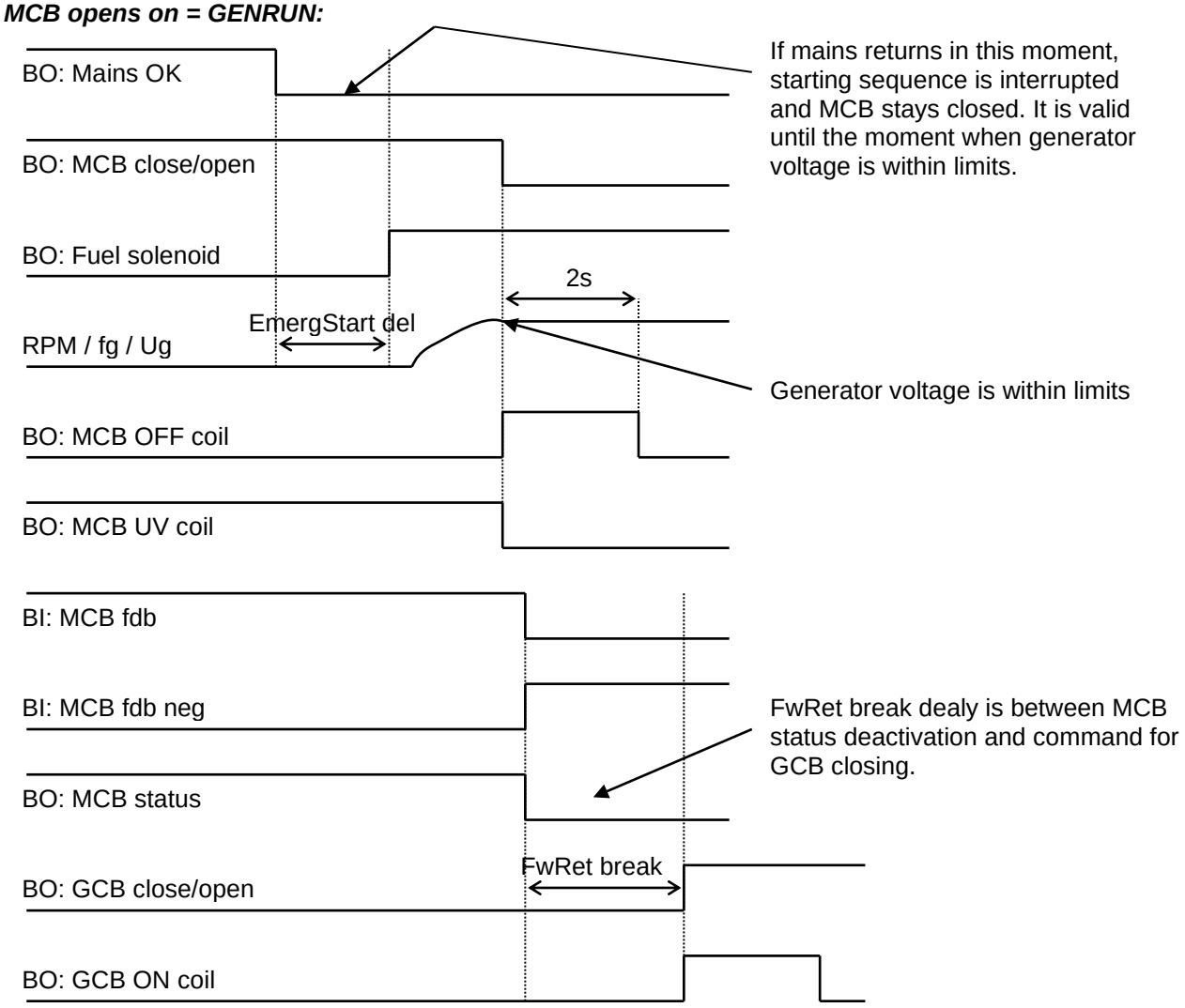
Transition closing -> opening (opening command is issued during closing pulse):



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

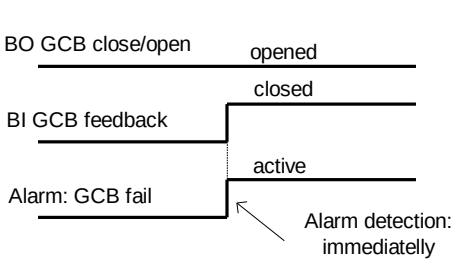


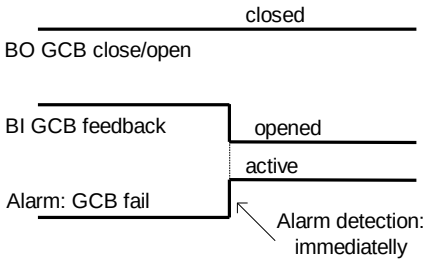
MCB opens on = GENRUN:



Other CB fail reasons:

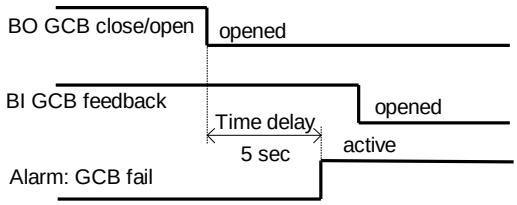
– When the BO CB close/open is in steady state and CB feedback is changed, the CB fail is detected immediately (no delay).





– 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.

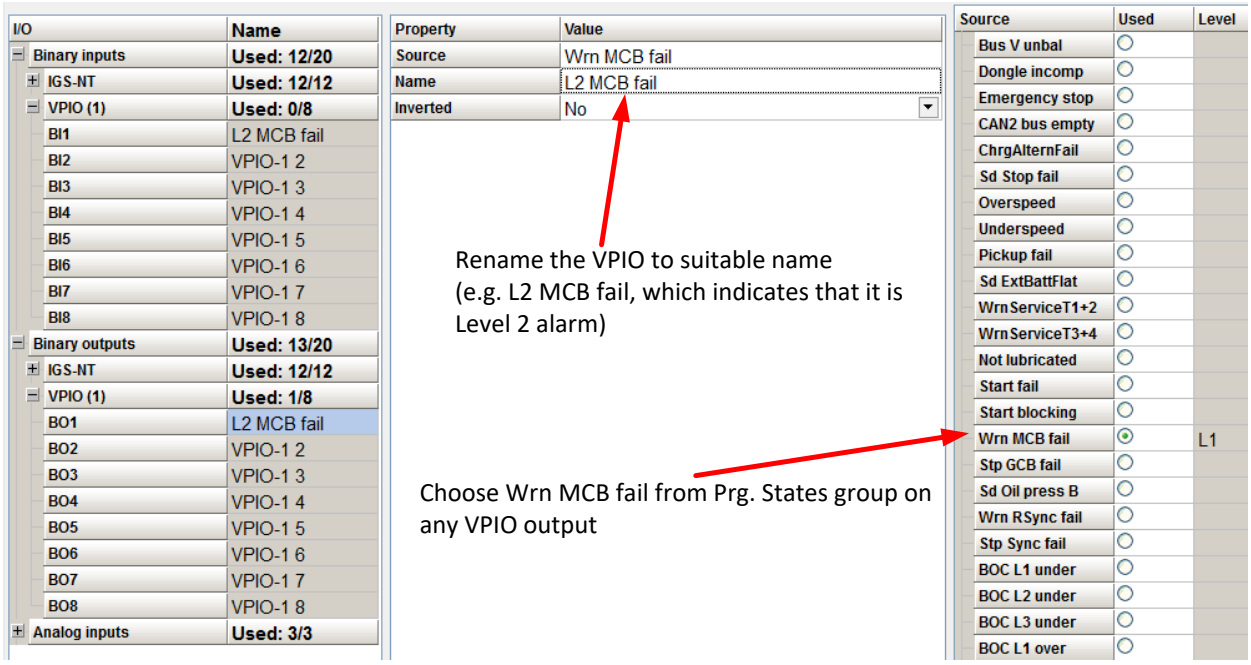
NOTE:
If the MCB or GCB feedback gets active during synchronization the breaker is imediately closed.

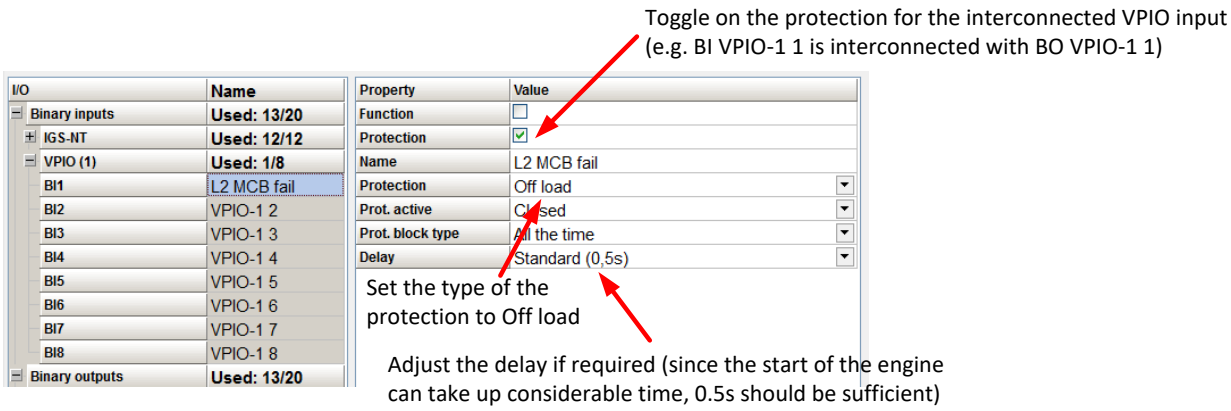
CAUTION!
In case that MCB feedback is active (MCB is expected as closed) and "MCB fail" is reported due to previous incorrect manipulation of MCB, in the moment of Fault reset, the MCB fail is cleared and the controller internally goes to "closed" state. I.e. MCB fdb status is confirmed and the output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

MCB fail Information

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

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





External breaker control

This application accepts external breaker control in these situations:

MINT application:
Mode:MAN, SEM
External breaker control is accepted only when LBI:ReadyToLoad=1

Exceptions:
If the BUS voltage is >15V and GCBfdb=1 and LBI:ReadyToLoad=0 then BO GCB Fail and History record are performed

SPtM application:
Mode:SEM
External MCB control is accepted
External GCB control is accepted only when LBI:ReadyToLoad=1

Exceptions:
If the Mains parameters are out of limits (voltage and frequency) and GCB and MCB are closed and LBI:ReadyToLoad=1 – external control is not accepted – Wrn MCB fail and Wrn GCB fail are evaluated.

If the Mains voltage is > 15V and MCBfdb=1 and GCBfdb=1 and LBI:ReadyToLoad=0 then BO GCB Fail and History record are performed.

SPI application:
Mode: SEM
External GCB control is accepted only when LBI:ReadyToLoad=1

Exceptions:
If the Mains parameters are out of limits (voltage and frequency) and GCB and MCB are closed and LBI:ReadyToLoad=1 – external control is not accepted – Wrn MCB fail and Wrn GCB fail are evaluated.

If the Mains voltage is > 15V and MCBfdb=1 and GCBfdb=1 and LBI:ReadyToLoad=0 then BO GCB Fail and History record are performed.

Peak shaving based on Active and Apparent power

The Peak shaving function is active only in AUT mode in parallel to Mains operation. Peak shaving is based on Object P or Object Q (consumption of load). If load consumption increases over **ProcessControl:***PeakLevelStart* or **ProcessControl:***PeakKVAStart* for period longer than **ProcessControl:***PeakAutS/S* or **ProcessControl:***PeakKVAS/S del* the gen-set is started (BO Sys start/stop is activated). If load consumption decreases below **ProcessControl:***PeakLevelStop* or **ProcessControl:***PeakKVAStop* for period longer than **ProcessControl:***PeakAutS/S del* or **ProcessControl:***PeakKVAS/S del* the gen-set is stopped. Both Peak shaving based on kW and kVA can work simultaneously (SYS START/STOP is activated if at least one condition is fulfilled). Peak shaving based on Apparent power is available in InteliGen-NT Basebox, InteliGen-NTC Basebox and InteliSys-NT only.

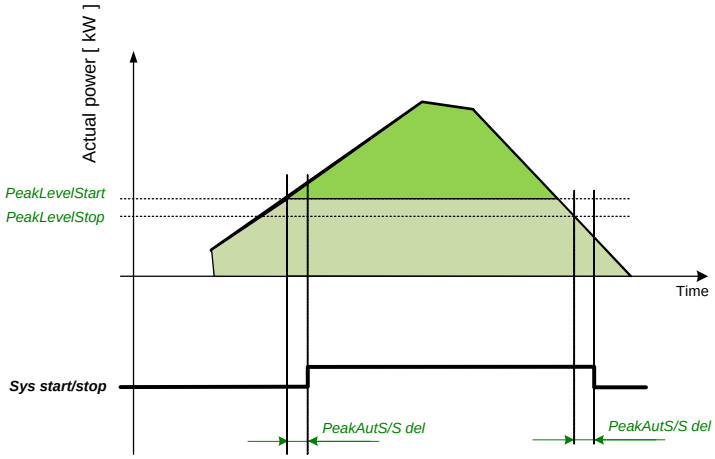


Figure: Example of peak shaving function based on Active power (the same function for Reactive power)

NOTE:
Function Peak Shaving based on Apparent power is not available for IG-NT-GC controller.

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).

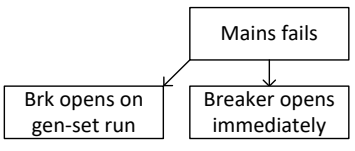
Name	Access Group	Value
History record	0 1 2 3 4 5 6 7	DISABLED
Alarm only	0 1 2 3 4 5 6 7	DISABLED
Warning	0 1 2 3 4 5 6 7	DISABLED
Mains protect	0 1 2 3 4 5 6 7	ENABLED
MainsP w/Reset	0 1 2 3 4 5 6 7	ENABLED
AcallCH1-Type	0 1 2 3 4 5 6 7	IB-E-MAIL
AcallCH1-Addr	0 1 2 3 4 5 6 7	emailAddress@domain.com
AcallCH2-Type	0 1 2 3 4 5 6 7	DATA-ISDN
AcallCH2-Addr	0 1 2 3 4 5 6 7	+111222333444
AcallCH3-Type	0 1 2 3 4 5 6 7	SMS-GSM
AcallCH3-Addr	0 1 2 3 4 5 6 7	+999111333555
NumberRings AA	0 1 2 3 4 5 6 7	3
ActCallAttempt	0 1 2 3 4 5 6 7	5
Acall+SMS lang	0 1 2 3 4 5 6 7	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.

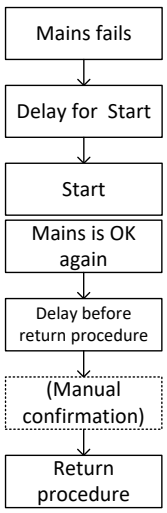
Automatic Mains Failure function

SPtM application contains complex AMF function. There are several setpoints that allows user to adjust the function behavior. Detailed description is below.

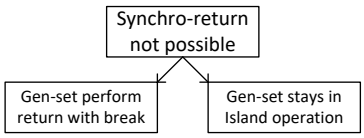
When the Mains fail occurs the system is started with adjustable delay (**AMF setting:***EmergStart del*).
In some cases it may be crucial to choose when the MCB opens after Mains failure). It is possible to choose whether the breaker opens directly when Mains failure is detected or when the generator is running. This is done via setpoint **AMF setting:***MCB opens on.*



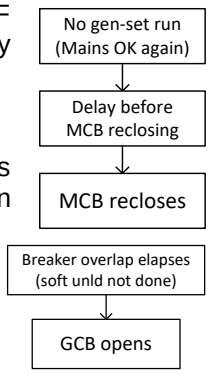
When the Mains parameters become OK again it is possible to adjust the delay time which must elapse before the controller starts the return to Mains procedure. This delay is adjusted



by **AMF setting:***Mains ret del.* This function is particularly useful when the Mains fail happens several times in a row with short period of Mains being OK.
It is also possible to choose option that return to Mains needs manual confirmation before the controller starts the return procedure. You can choose this by setpoint **AMF setting:***RetFromIsland*. For the full description of manual confirmation of return procedure refer to the decription of the setpoint.
By default return to Mains (when the Mains parameters are OK again and **AMF setting:***Mains ret del* elapses) is done by reverse synchronization of gen-set group back to Mains, soft unload of the gen-set and opening of its GCB or by opening GCB.
When it is not possible to synchronize to Mains (Parallel operation is not enabled, Synchronization is not enabled, Synchronization is unsuccesfull etc.), return with break may be enabled to ensure that the load returns to Mains even though parallel operation is not possible. **AMF setting:***ReturnWithIntr* enables the return with break (the duration of the break is given by the setpoint **AMF setting:***FwRet break*). If return with break is disabled and it is not (for whatever reason) possible to synchronize back to Mains, the gen-set stays running in Island operation even though the Mains is OK.



In case that the genset is not able to start (e.g. it is not not in AUT mode etc.) the AMF function recloses MCB back to healthy Mains after delay given by **AMF setting:***MCB close del* elapses.



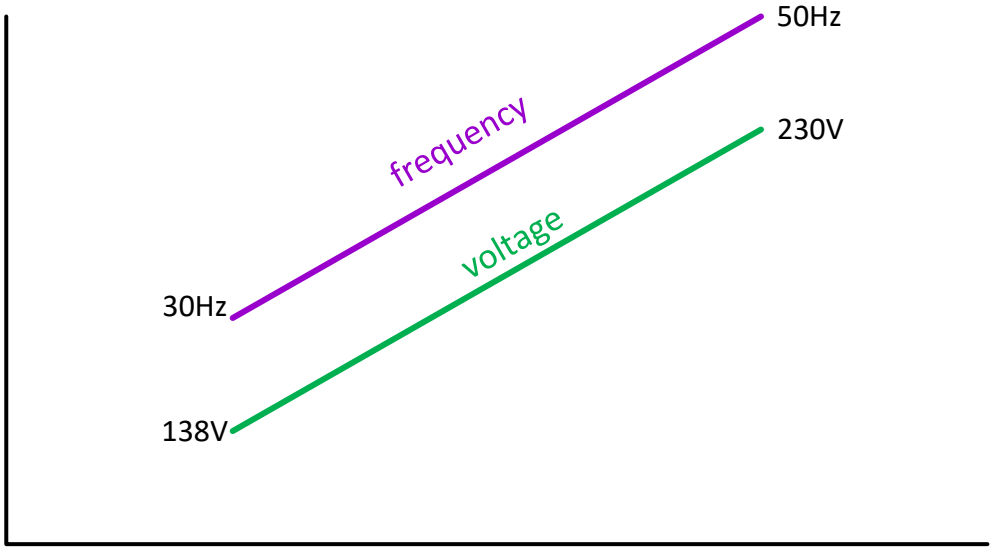
InSPtM application there is also setting for the duration of breaker overlap available. This time (given by the setpoint **AMF setting:***BreakerOverlap*) defines maximal time for run in parallel during return to once again healthy Mains (even though soft unloading is not completed, after **AMF setting:***BreakerOverlap* elapses the GCB is opened regardless of load on gen-set).

Variable speed support

This fw contains variable speed support which is used on Hybrid ship (ship with DC bus).
Variable speed control is usually used on ship where the gen-sets work in long term period on small load. By changing speed on genset is possible to achieve lower fuel consumption.
Frequency (and Voltage) are usually control according to current load.

For variable speed is used:
Setpoints:
Nominal freq 30..65 Hz (step 1 Hz) FV (Basic settings Group)
ForceBlock6Del 0-60s (step 0,1s) FV (Delays/Timers Group)
GenNomV, BusNomV FV (Basic settings Group)

Voltage dependence on frequency
In generator is induced magnetic flux, which is almost constant in various RPM.
It is necessary to change nominal frequency together with nominal voltage – due to their dependence.



Magnetic flux =U/f ~konstant

Temporary blocking of fix frequency and voltage protections

Temporary blocking of frequency and voltage fix protections

After submitting a request for change of nominal frequency and voltage the generator needs some time for performing the changes. During this time the fix frequency and voltage protections (connected to nominal values) must be blocked.
The time need for blocking of these protections is set by setpoint:
ForceBlock6Del 0-60s (step 0,1s) FV (Delays/Timers Group)

HINT

With larger frequency range the regulation can be rougher, in this case the AC/DC inverter is expected.

WARNING!

Used generator should be designed for variable rotation.

With frequency changes the nominal value of Voltage must be also changed.

Synchronisation

Phase match

The phase match synchronizing consists of voltage matching and frequency/angle matching. The maximum duration of synchronizing is given by the setpoint Sync/Load ctrl: *Sync timeout*. If the synchronizing is not successful within this period of time, the *Sync fail* alarm will be issued.

Voltage matching

The gen-set voltage is regulated to match the mains/bus voltage with tolerance given by the setpoint Sync/Load ctrl: *Voltage window*. The regulation is adjusted by the setpoints Volt/PF ctrl: *Voltage gain* and *Voltage Int*.

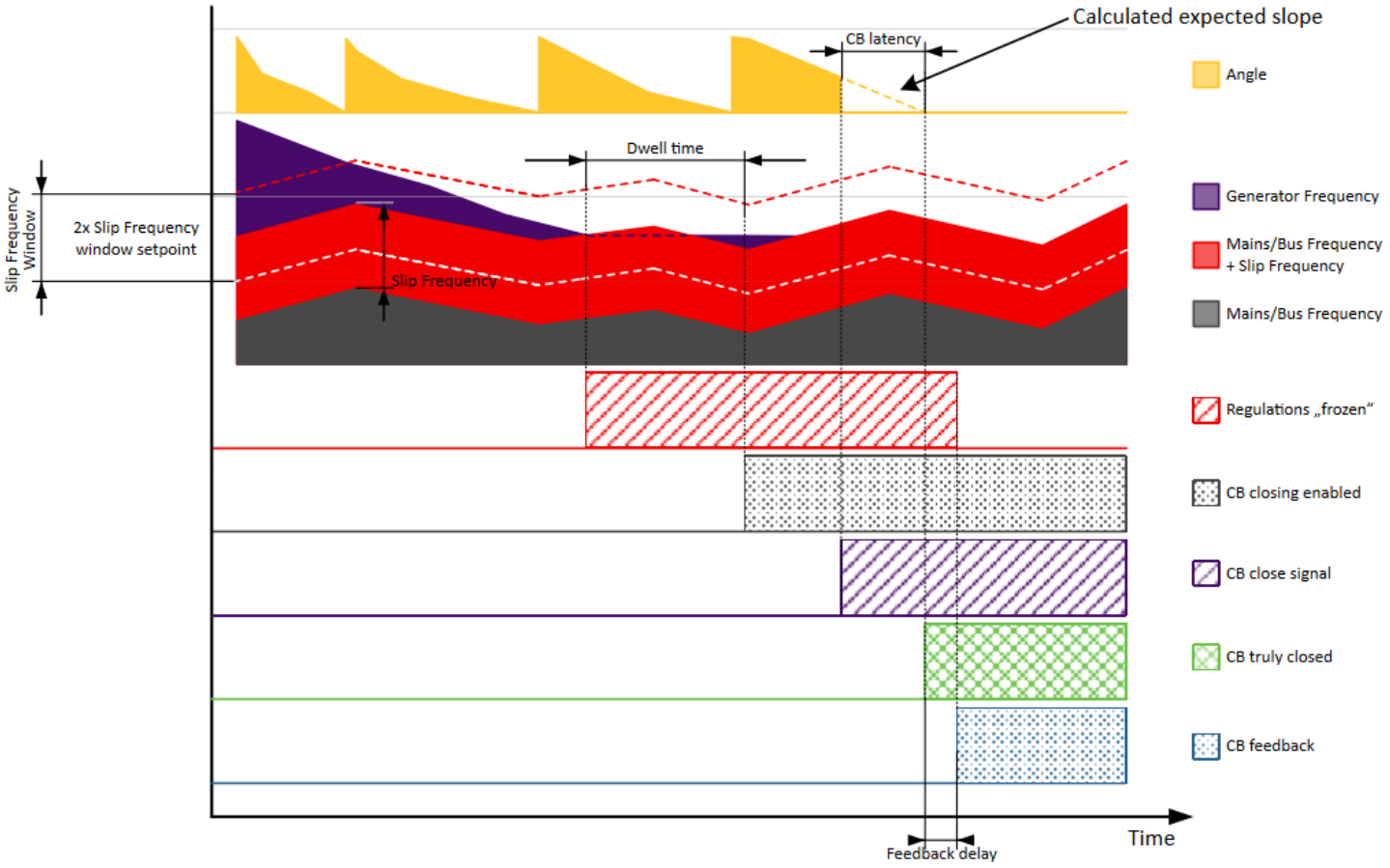
Frequency/angle matching

The gen-set frequency is regulated to match the mains/bus frequency first. The frequency regulation loop is active (setpoints Sync/Load ctrl: *Freq gain* and *Freq int*). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint Sync/Load ctrl: *Angle Gain*). When the angle is matched with tolerance +/- *Phase window* for a time given by the setpoint Sync/Load ctrl: *Dwell time* and the voltage is matched too, then the GCB is closed.
The matching loops will continue to run even if the GCB close command has been already issued until the controller receives LBI: *GCB feedback* or a GCB fail alarm occurs. After the feedback has been received, the control loops are switched to load and power factor loops or load and power factor sharing respectively.

Slip synchronisation

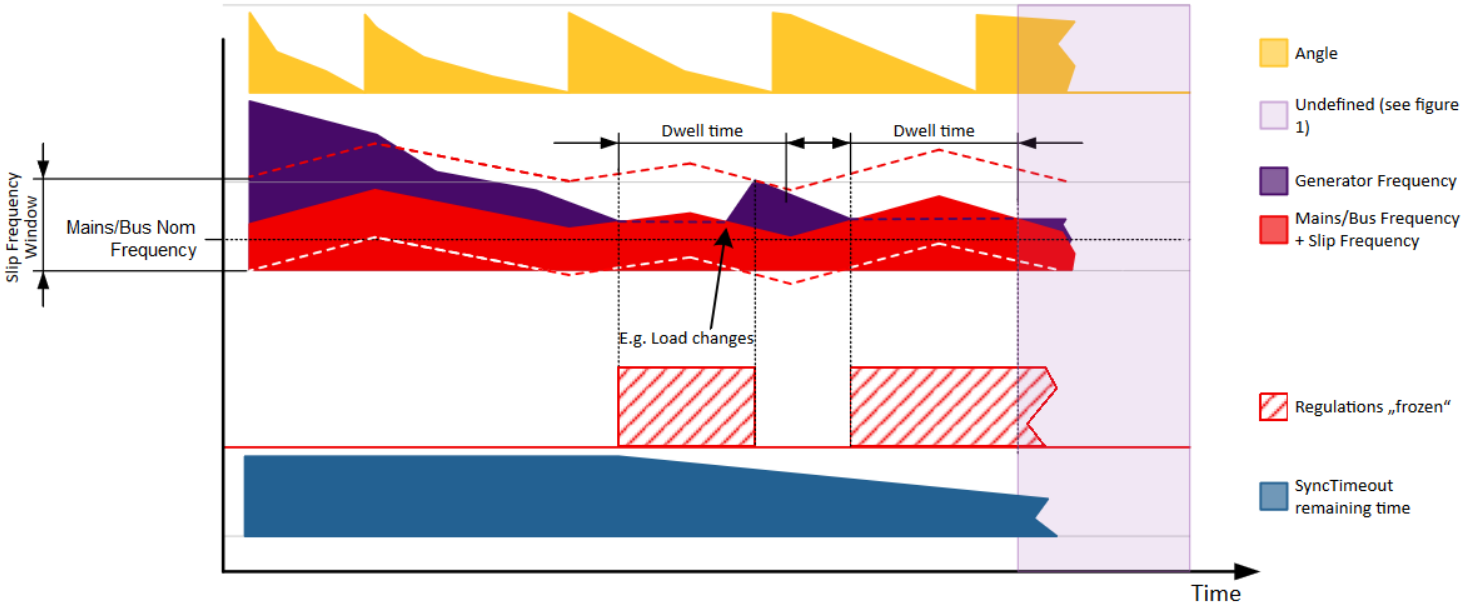
The slip synchronizing is based on frequency/angle matching. The maximum duration of synchronizing is given by the setpoint Sync/Load ctrl: *Sync timeout*. If the synchronizing is not successful within this period of time, the *Sync fail* alarm will be issued.

The frequency is regulated to match the Mains/Bus frequency + *Slip Frequency* value and the window is set by Sync/Load ctrl: *Slip Freq Win*. When the generator frequency reaches (Mains/Bus Frequency + *Slip frequency*) value, regulation loop is stopped (output is frozen at the actual value). If the generator frequency remains inside the window for the time longer than Sync/Load ctrl: *Dwell time* (page 1), the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value *Slip freq* and CB closing delay given by the setpoint Sync/Load ctrl: *GCB Latency* or *MCB Latency*). When the preclosing angle is reached the controller issues CB closing command. The breaker will close and CB feedback confirms that to the controller. When the breaker is closed the controller goes to parallel and activates regulation loops again.



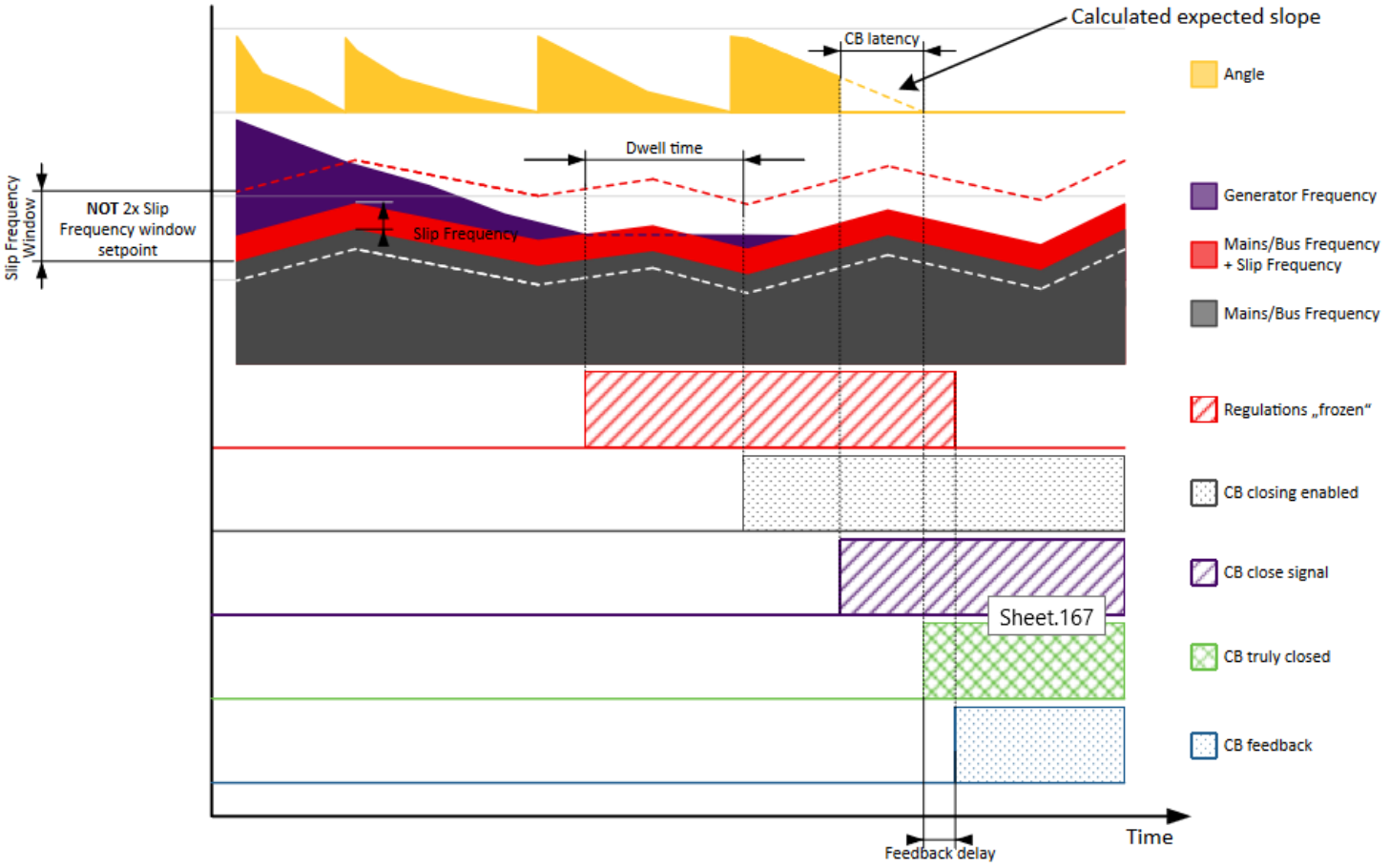
Slip synchronisation

If the generator frequency goes out of the window (either because generator frequency changes or Mains/Bus frequency changes or setpoint Sync/Load ctrl: *Slip Freq Win* changes) the controller will reactivate regulation loop and try to reach the target value again. The sync timeout timer runs regardless of this. If the generator frequency reaches the target frequency again the regulations are frozen and if the generator frequency remains in the window for the time longer than setpoint Sync/Load ctrl: *Dwell time* the controller will continue in the standard sequence as seen in the previous case. If the sync timeout elapses the controller will immediately stop synchronization.



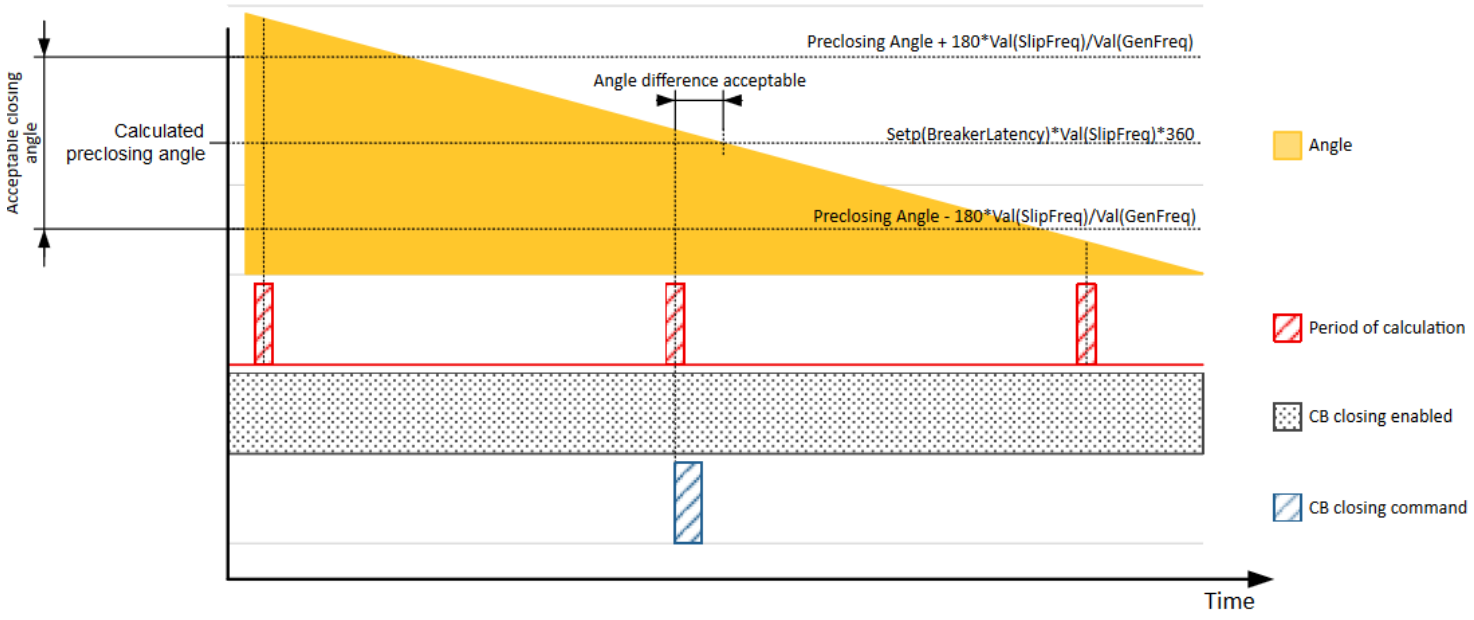
Slip synchronisation

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



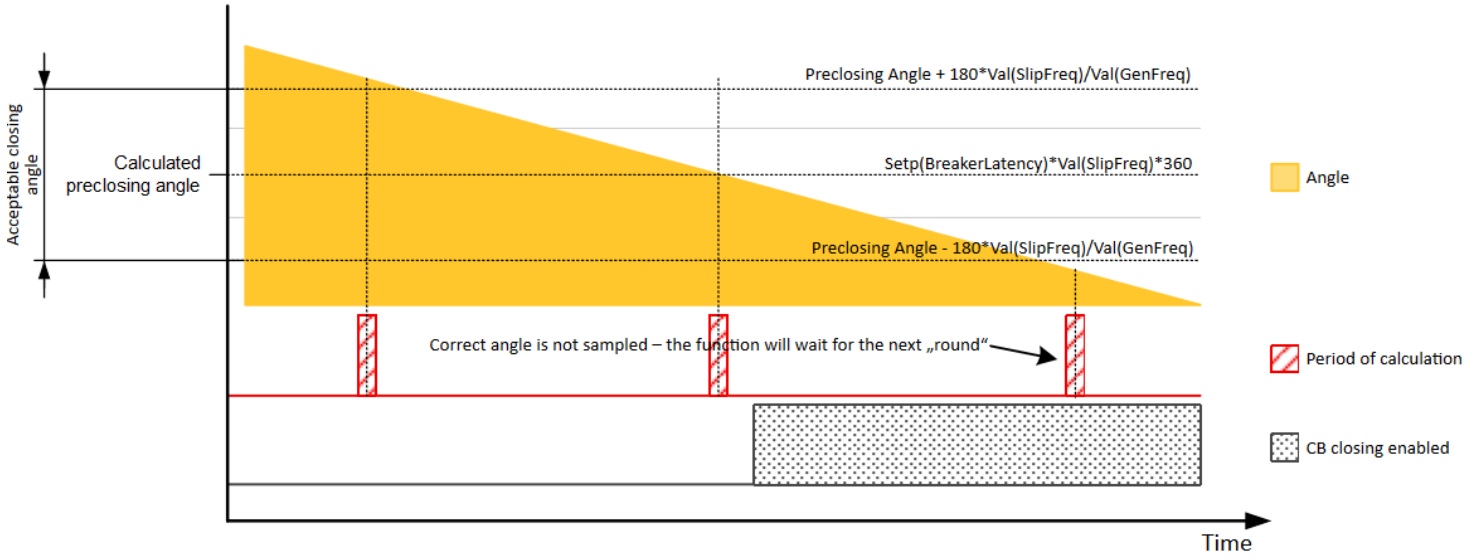
Slip synchronisation

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



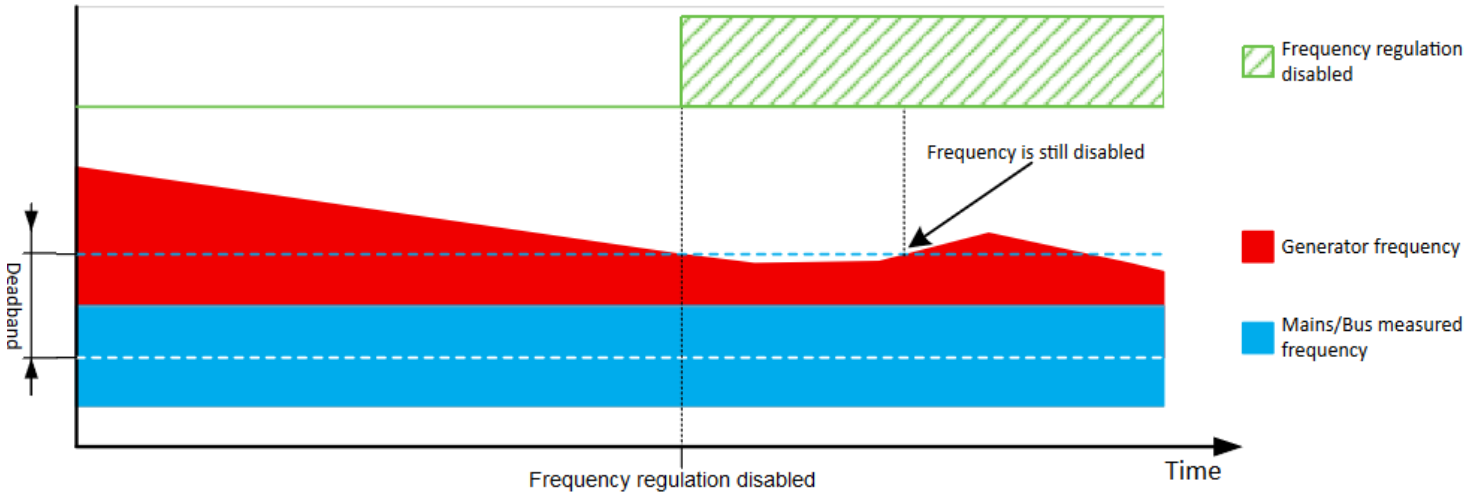
Slip synchronisation – acceptable angle difference

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



Slip synchronisation – not acceptable angle

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



Slip synchronisation – deadband

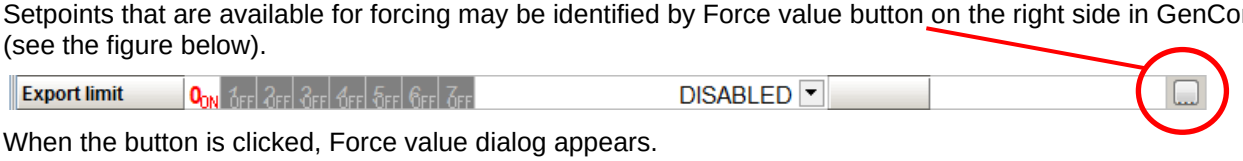
NOTE:
Due to the nature of this function it is possible that in limit cases the gen-set controller will regulate the generator frequency outside of protection limits. Example: Mains/Bus frequency is high, but within its protection limits (e.g. 50.9Hz, limit is 51Hz). Sync/Load ctrl: *Slip Frequency*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

Force value – step by step guide

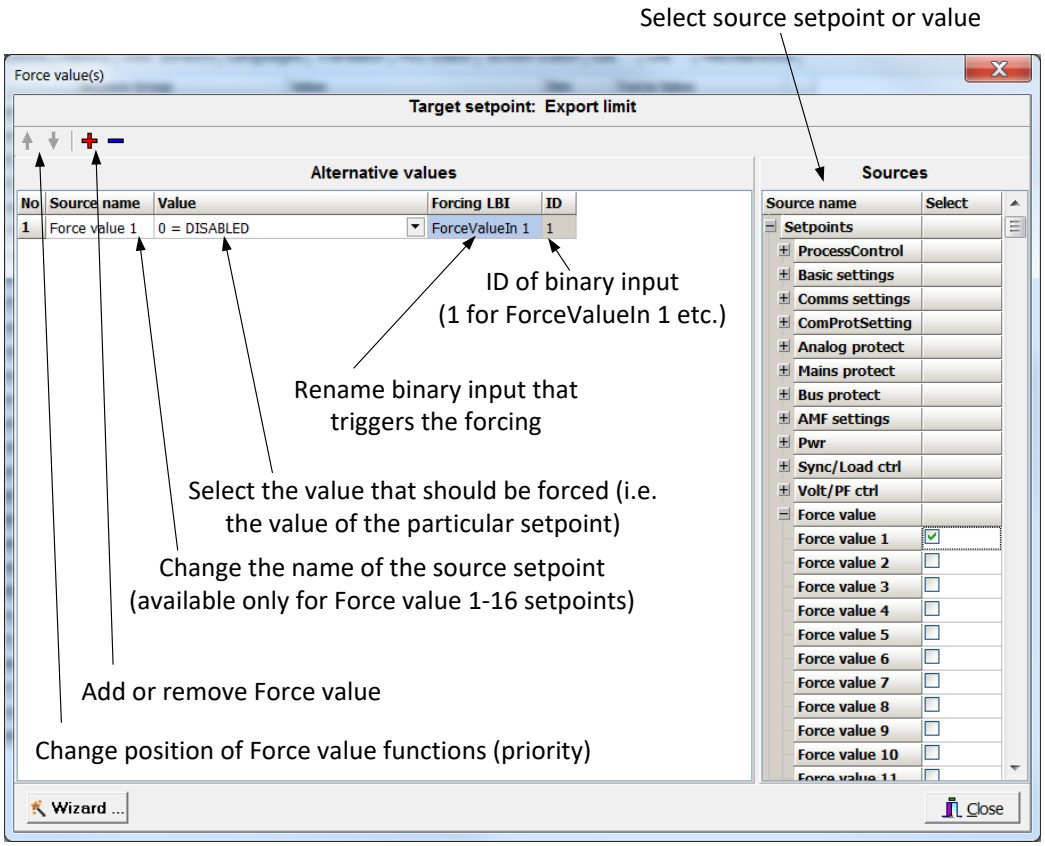
In this chapter there is complete step by step guide which shows how to use Force value function of the controller.
Forcing of values is used to change particular setpoint temporarily by activation of related Binary Input. This is used to change function of controller under given conditions (e.g. there 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.



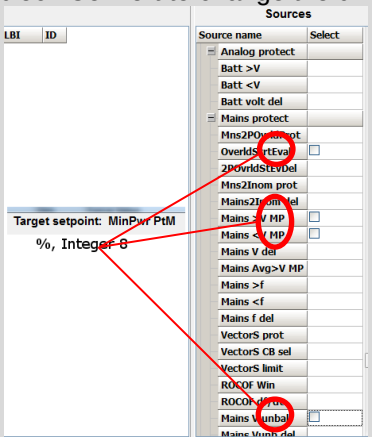
For example if we add **Force value:***Force value 1* to be forced to **ProcessControl:***Export limit* as value 0 (DISABLED) by Binary Input FORCEVALUEIN 1 we can change the function of Export limit from ENABLED to DISABLED by activation of FORCEVALUEIN 1. It is possible to rename the setpoint to e.g.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

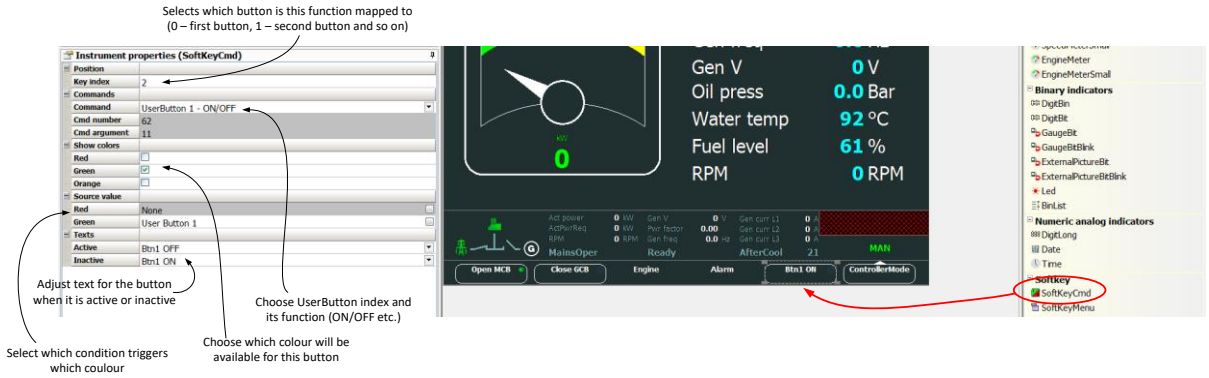
It is possible to use up to four different External values for continuous writing from external sources. The values are adjusted by setpoints in **Force value** group. Default (also initial) value may be adjusted, rate of change of *ExtValueX* (by Binary Inputs EXTVALUEX UP and EXTVALUEX DOWN) can be 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.

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.

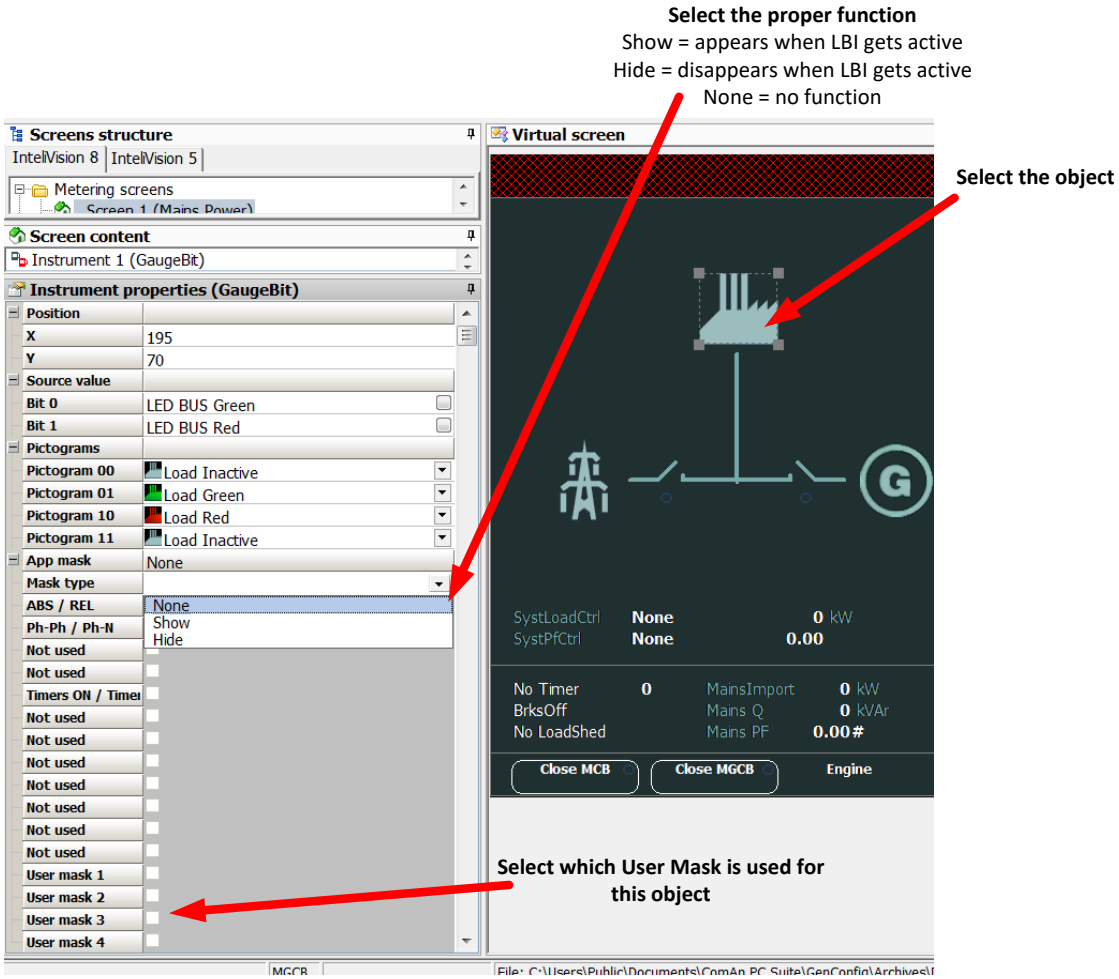
ON	Pressing the button changes the state of log. Binary Output USER BUTTON X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. Binary Output USER BUTTON X to opened. When the output is opened and the button is pressed 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.

User Mask function

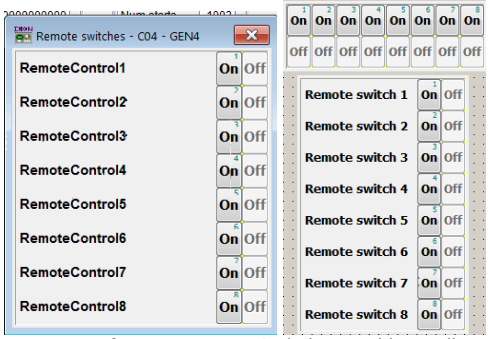
In GenConfig you can easily set any object in Screen Editor to show or hide based on activation of particular Logical Binary Input available for users. Below, there is diagram showing the setup of User Mask function in Screen Editor.



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).

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.

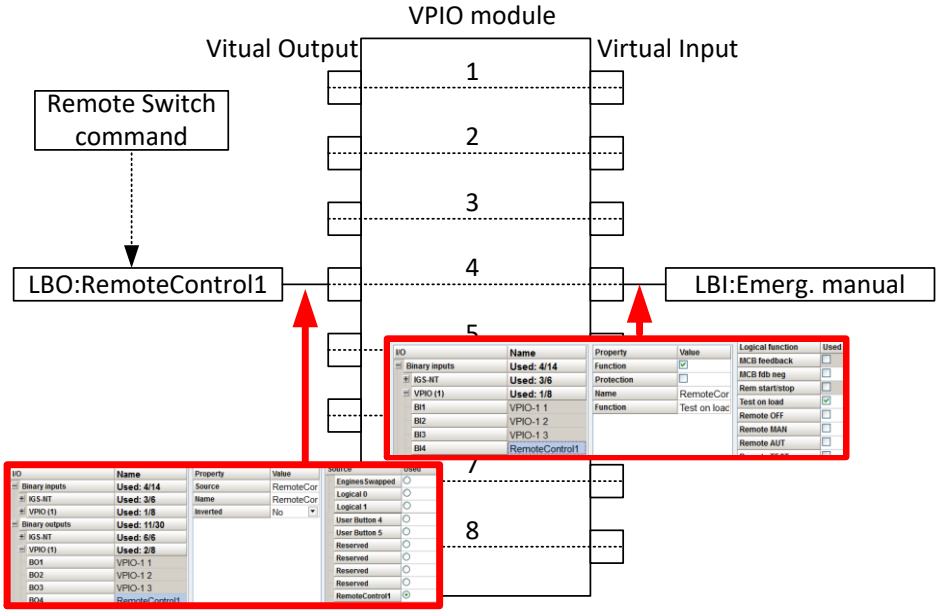


Figure: Using of Remote Switches to trigger logical binary inputs

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.

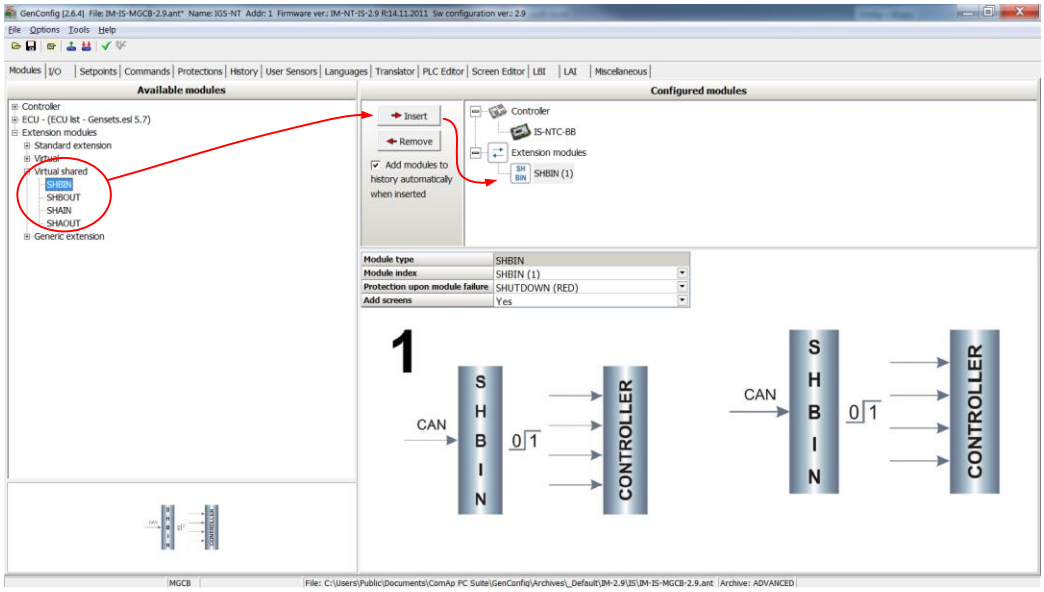


Figure: Adding of various modules

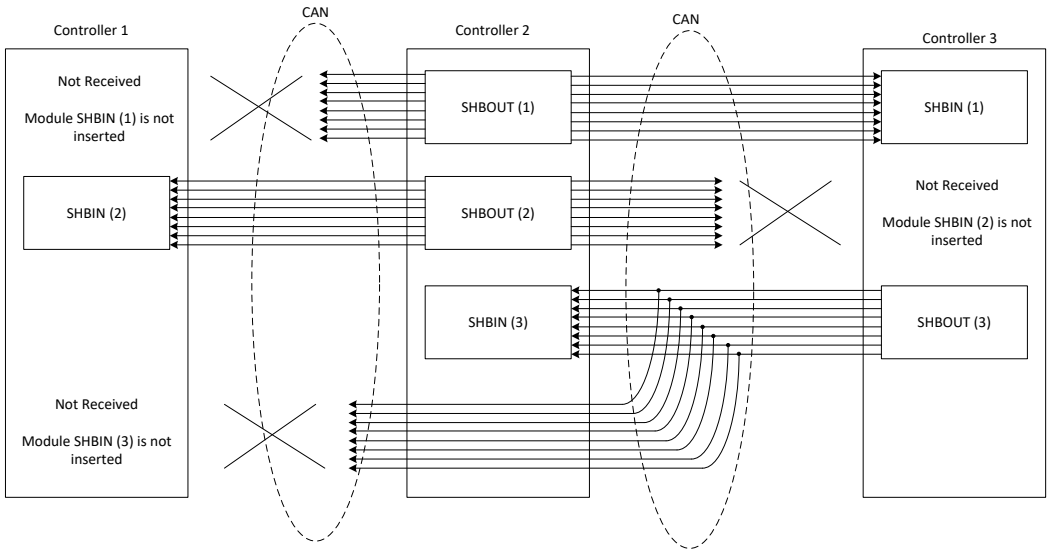


Figure: Principal Scheme (same for shared Binary I/O and shared Analogue I/O

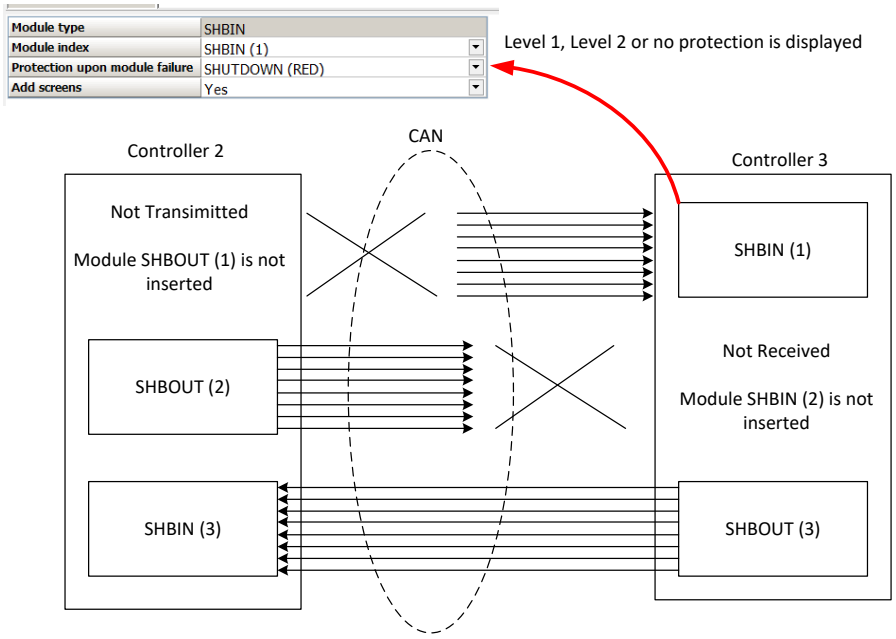
Shared Binary Inputs and Outputs may be used exactly in the same way as standard physical Inputs and Outputs. If SHBIN or SHAIN modules are configured, at least one corresponding module of SHBOUT or SHAOUT (respectively) is needed. If it is not configured, corresponding protection appears because SHBIN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

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).

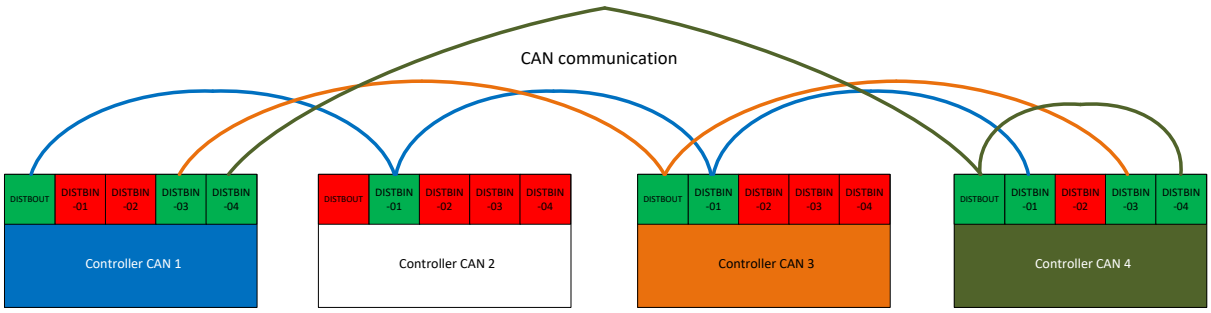
HINT

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.



NOTE:

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:
DISTBIN and DISTBOUT function is not available for IM-NT-GC and IG-NT(C)-GC controller.

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.

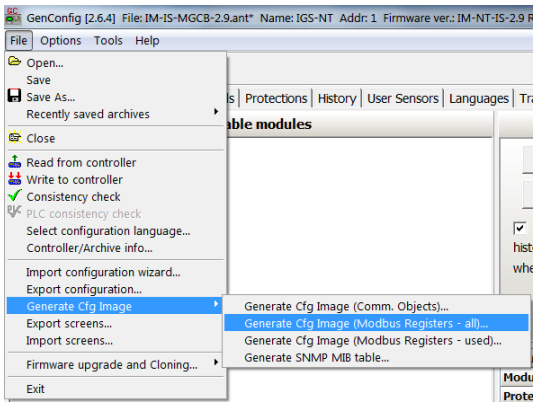
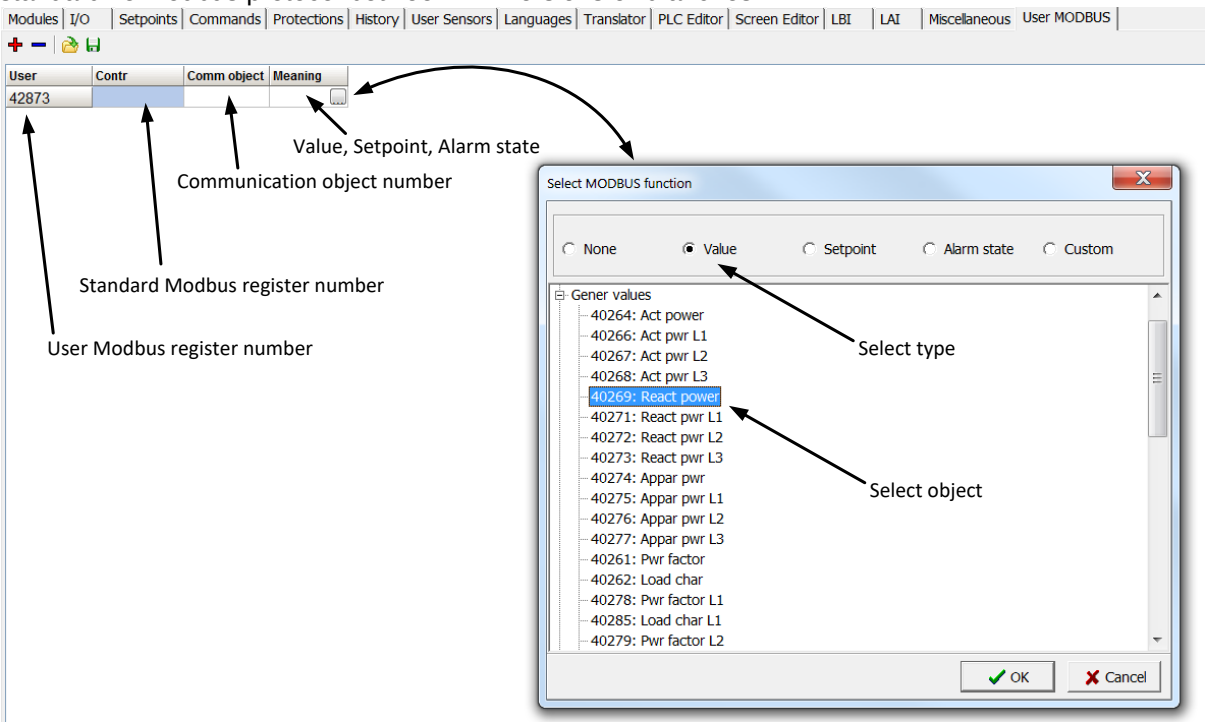


Figure: Exporting of Modbus registers

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

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.

PLC functions

Following functions are available in IGS-NT-GeCon-MARINE firmware.

Group	PLC Block	IS-NT-GeCon MARINE 3.5.0	IG-NT-GeCon MARINE 3.5.0

Logical function	OR/AND	**128**	**32**
	XOR/RS	**128**	**32**
Comparators	Comp Hyst	16	4
	Comp Time	16	4
	Comp Win	16	4
Math operations	Math Fc	16	2
	Ext Math Fc	8	2
	Interp. Fc'B'	8	1
	Math AxB/C	4	
Regulators	PID Ana B	4	2
	PID Bin	4	2
Ramp functions	Ramp	4	2
	Up/Down	4	2
	Inc/Dec	2	2
	Mov Avg	2	1
Time functions	Timer	4	1
	Delay	**16**	
	Delay „B“	**8**	**8**
Others	Ana Switch	16	2
	Force Hist	4	4
	Force Prot	4	4
	Jump	4	4
	Mux Const.	4	4
	Counter	4	1
	Decomp	4	4
	Convert	10	10

Multi language support

NT Family controllers support up to three 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.
In sw GeCon is possible to configure the any ECU communicating via J1939, but controller can read information only. Writing any information is not possible. ECUs comunicate via modbus are not supported.

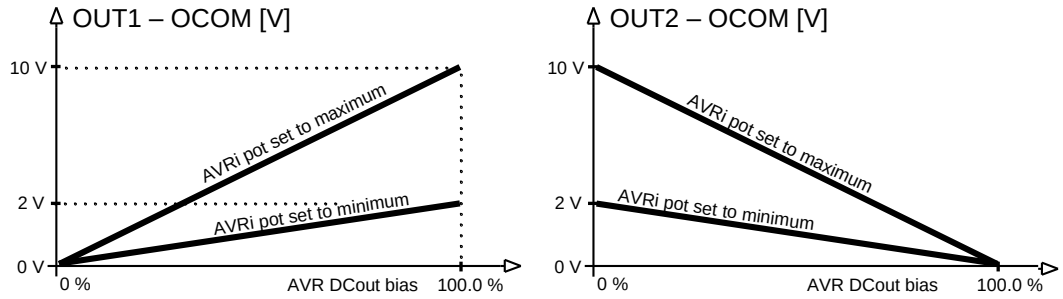
Volt/PF control adjustment

IG-AVRi output connection

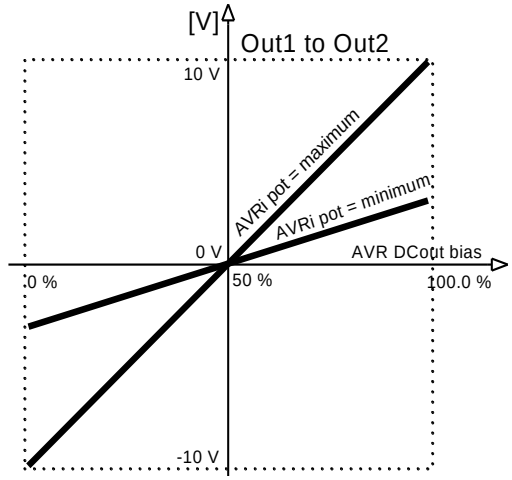
Every time refer to corresponding AVR manual before interface connecting. Use no droop AVR.
IG-AVRi-TRANS (AC power supply for AVRi) has to be supplied from gen-set voltage.
AVRi outputs can be connected as symmetrical: OUT1-OUT2 or unsymmetrical OUT1-OCOM or OUT2-OCOM.

- Potentiometer on the AVRi defines maximal OUT1, OUT2 voltage range.
- Use symmetrical (OUT1,OUT2) AVRi output to connect the AVRi to AVR auxiliary voltage input.

- Use unsymmetrical output if an external AVR potentiometer has to be replaced with AVRi.
- AVRi output voltage should change generator voltage typically in range ± 10 % of Nominal voltage.
- For more details please refer to Installation guide – chapter AVR interface examples.



AVRi Out1 or Out 2 to GND output voltage depends on AVRi trim setting



AVRi Out1 to Out 2 output voltage

AVRi output voltage

	Out1 - OCOM		Out2 - OCOM		Out1 – Out2	
Bias \ Pot	Min	Max	Min	Max	Min	Max
0 %	0	0	2	10	- 2 V	-10 V
50 %	1	5	1	5	0 V	0 V
100 %	2	10	0	0	+ 2 V	10 V

Voltage control adjustment

1) Set *Voltage gain*, *Voltage int* to zero and *AVR DCout bias* to 50%.
2) Start always with AVRi pot min adjustment (fully counterclockwise).
3) Start the gen-set in MAN Mode to nominal speed, without load.
4) Adjust generator voltage to nominal value by the potentiometer present on the AVR. If there is no potentiometer on the AVR, use *AVR DCout bias* to adjust the nominal voltage.
5) Change *AVR DCout bias* to 0% and 100% to check generator voltage control range (typically ± 10 % of nominal voltage). Adjust voltage control range by AVRi trim.
6) Set *AVR DCout bias* to be Nominal voltage on generator (50%).
7) When gen-set is running unloaded increase carefully *Voltage gain* to unstable point and then decrease value by 30 % to insure stable performance.
8) Adjust *Voltage int* (usually setting to 100% gives optimal performance).

HINT:
To judge optimal adjusting induce generator voltage jumps by AVR DCout bias change or by Nominal voltage change .
AVRi output OCOM is common output. GND was used instead of OCOM

PF control adjustment

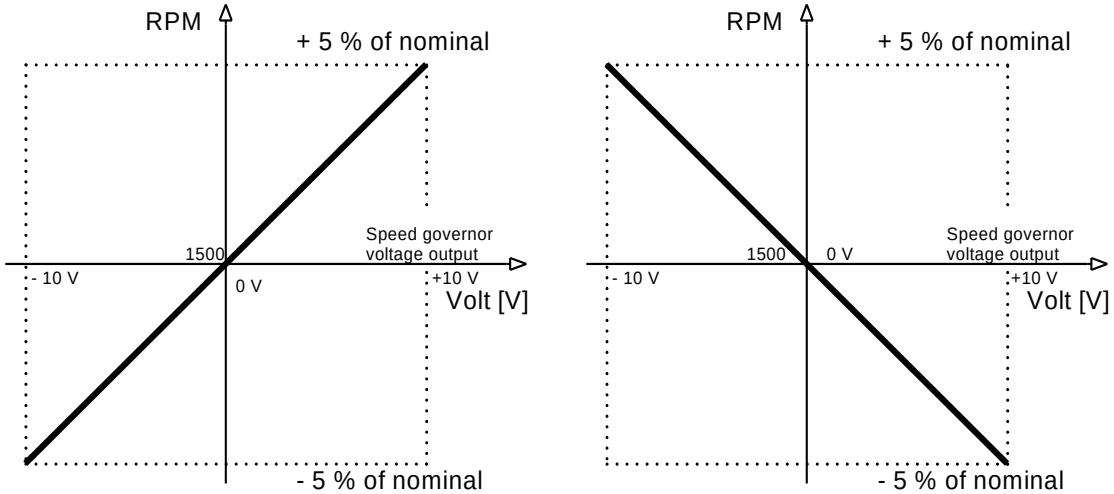
The genset should be cca 30 % loaded in parallel to mains and baseload mode.
1) Set the same values *PF gain, PF int* as in voltage control loop.
2) Set **Process control**: *#SysLdCtrl PtM* = BASELOAD, #Sys*BaseLoad* = 30 % of Nominal load, *#SysPFCtrl PtM* = BASEPF, *#SysPwrFactor* = 1.0.
3) Start and synchronize the gen-set in MAN Mode by pressing GCB ON/OFF
4) When running in parallel 30% loaded increase slowly *PF gain* to unstable point and then decrease value by 30 % to insure stable performance.
5) Adjust *PF int* (usually setting to 100% gives optimal performance).

Hint:
To judge optimal adjusting induce generator power jumps by *SysBaseLoad* change or by soft changes of *AVR DCout bias*.

Sync/load control adjustment

HINT:
Use isochronous speed governor.
Two wire shielded connection from IGS-NT SPEED GOVERNOR output (SG OUT, SG COM) to Speed governor auxiliary input is recommended.
A full range change of the IGS-NT speed governor output (from SpeedGovLowLim to SpeedGovHiLim) should cause 5-10% change of the engine speed (SpeedGovLowLim ~ 95% RPMnom, Speed gov bias ~ 100% RPMnom, SpeedGovHiLim ~ 105% RPMnom.

IMPORTANT
Speed governor has to be adjusted for optimum performance before Sync / load control adjusting.
Check generator phase sequence before the first GCB connection.



SpeedRegChar = POSITIVE *SpeedRegChar* = NEGATIVE

Before optimal Sync/load setpoints adjusting disconnect GCB OPEN/CLOSE output or set *Phase window* = 0 to avoid paralleling.

Synchronizer adjustment

1) Start the engine in MAN Mode.
2) Set the engine RPM by speed trim on speed governor or by *Speed gov bias* and *SpeedGovLowLim* and *SpeedGovHiLim* to Nominal frequency.
3) To start synchronizing press GCB ON/OFF button. GCB LED starts to flash to indicate synchronization. To stop synchronization press again GCB ON/OFF.

Slip control adjusting:

4) Adjust *Freq gain* to unstable speed control and decrease value by 30 % to insure stable performance.
5) Adjust *Freq int* to stable (fast and smooth) slip control. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because Angle control is off).

Angle control adjusting:

6) Set *Angle gain*. Synchroscope on the controller measure screen should move slowly and stop in “up“ position. Set *Angle gain* to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

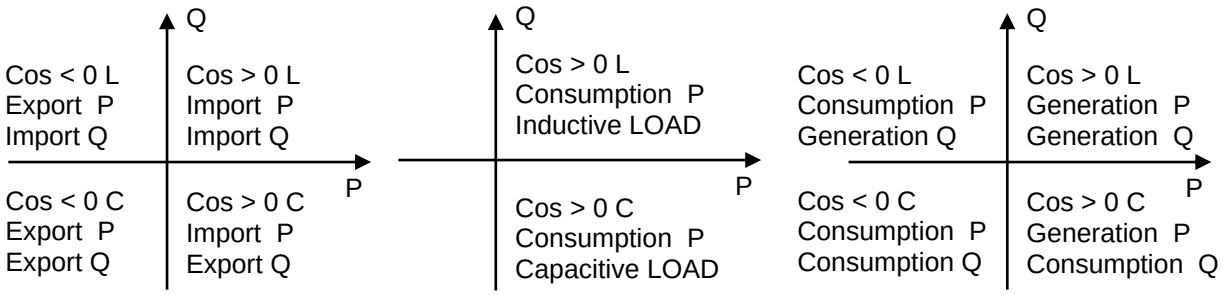
Load control adjustment

Prior to Sync/Load control adjustment, the Volt/PF control has to be adjusted! Load control loop is active in parallel to mains mode only (MCB feedback closed). Switch off other engines while adjusting.

1) Set *#SysLdCtrl PtM* = Baseload, set *Baseload* value to 30 % of Nominal power of one gen-set.
2) Set *Load gain* to the same value as *Slip freq gain*. Set *Load int* to zero.
3) Start the gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close gen-set to mains.
4) When GCB is closed, gen-set load slowly increases to *Base load* value. Check that gen-set power is positive (CT polarity!).
5) Increase *Load gain* to unstable load control and decrease value by 30 % to insure stable performance. When *Load int* factor is set to zero gen-set load can differ from required Baseload.
6) To adjust and optimize *Load int* change several times *Base load* between 30 and 70 % of Nominal power. Usually setting *Load int* to 100% gives optimal performance.
7) When gen-set is running full load check if
   a. Speed governor output voltage value is not limited (not reached *SpeedGovLowLim* or *SpeedGovHiLim*)
   b. Speed governor actuator isn't mechanically limited or operates in small section of throttle range.

Active and reactive power terminology

MAINS	LOAD	GEN
P > 0 Import	P > 0 Consumption	P> 0 Generation
Q> 0 Import	Q> 0 Consumption	Q> 0 Generation



Mains

Exported active power is supplied to the mains. It is displayed in negative numbers e.g. –20kW.
Imported active power is consumed from the mains. It is displayed in positive numbers e.g. +20kW.
When reactive power is imported (>0) InteliMains-NT displays L (inductive) character of the load.
When reactive power is exported (<0) InteliMains-NT displays C (capacitive) character of the load.

Load

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

Genset

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

Synchronizer adjustment

7) Start the engine in SEM Mode.

8) Set the engine RPM by speed trim on speed governor or by *Speed gov bias* and *SpeedGovLowLim* and *SpeedGovHiLim* to Nominal frequency.
9) To start synchronizing press GCB ON/OFF button. GCB LED starts to flash to indicate synchronization. To stop synchronization press again GCB ON/OFF.

Slip control adjusting:

10) Adjust *Freq gain* to unstable speed control and decrease value by 30 % to insure stable performance.
11) Adjust *Freq int* to stable (fast and smooth) slip control. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because Angle control is off).

Angle control adjusting:

12) Set *Angle gain*. Synchroscope on the controller measure screen should move slowly and stop in “up“ position. Set *Angle gain* to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

Protections and Alarm management

Protection groups

There are two groups of protections in the controller: fix and customer configurable.

		Setpoint group
Analog protections	Configurable	Analog protect
Generator protections	Configurable	Gener protect
Mains protections – *should not be used in MINT application*	Configurable	Mains protect
Fix protections	Fix	Gener protect – part of them, Analog protect – part of them

Protection types

Because of limited (adjustable) GeCon influence to the Engine and GCB (depends on configuration and wiring) the GeCon protection system is more focused to fail indication. All Protection types are available because of IGS-NT system compatibility even if some Protection types have the same result in GeCon (e.g. BO, Stp, Sd).

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 open the GCB (Stop pulse to Engine is not send) The GCB cant be closed 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 gen-set by the standard stop sequence, i.e. including unloading and cooling phase. The gen-set 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.

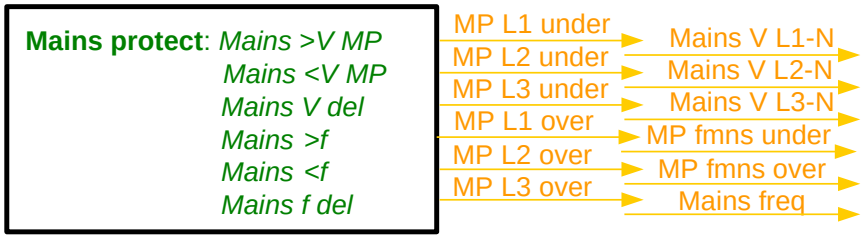
Off Load	2	The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, diappears by itself. It causes immediate opening of the GCB. In AUT and SEM modes the gen-set remains running for 60 seconds and then it is stopped by the standard stop sequence. In MAN mode the gen-set remains running until the operator changes it's operational state manually. If the controller is in AUT or SEM mode and all previously active Off load alarms disappeared the gen-set is automatically started back and connected to the load if the condition for the gen-set 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	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 gen-set 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. **Note:** Available in IS-NT only.
BrkOpen	2	The event appears in the Alarmlist and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and engine stays running (stop pulse is not send). The gen-set can't be started again while there is a BO alarm in the Alarmlist. Activates the output Common BO as well as the standard alarm outputs.
Mains Protect	2	The protection is only recorded into the history log. In applications which control the MCB this protection causes opening of the MCB. The gen-set can continue operation in island mode if required. The MCB can be closed back as soon as there isn't any mains protection active (including the built-in mains protections). In applications which do not control the MCB this protection causes opening of the GCB. The controller waits then for the MCB to open. After that the gen-set can continue operation in island mode if required. As soon as there isn't any mains protection active (including the built-in mains protections) the GCB is opened again and the controller waits for the MCB to close. After that the gen-set can continue operation in parallel-to-mains mode if required. Activates the output Common MP. This alarm type is not overriden by the input Sd Override.
Sd Override	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and engine stays running (stop pulse is not send). 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.

Default protections in SPTM

Fix – firmware based		
Generator:		Corresponding setpoints
IDMT overcurrent	BO	**Basic settings**: Nomin current; **Gener protect**: *2Inom del*
IDMT Active power	BO	**Gener protect**: *OverldStrtEval; 2POvrldStrtEvDel*
IDMT EarthFault Current	BO	**Gener protect:** *NomEthFltCurr, 2EthFltCurr del*
Shortcurrent	BO	**Gener protect**: *Ishort; Ishort del*
Generator voltage: Ug1>, Ug1<, Ug2>, Ug2<, Ug3>, Ug3<	BO	**Gener protect**: *Gen >V; Gen <V; Gen V del.*
Generator frequency: fg<, fg>	BO	**Gener protect**: *Gen >f; Gen <f; Gen V del*
Default – configurable		
Reverse power	BO	**Gener protect**: *Reverse power; ReversePwr del*
EarthFaultCurr	BO	**Gener protect**: *EarthFaultCurr; EthCurr del*
Excitation Loss	BO	Gener protect: ExcitationLoss, ExctLoss del
Gen Current unbalance	BO	**Gener protect**: *Gen I unbal; Gen I unb del*
Gen Voltage unbalance	BO	**Gener protect**: *Gen V unbal;Gen V unb del*
Mains:		
Vector shift	MP	**Mains protect**: *VectorS prot; Vector S limit*
Mains voltage	MP	**Mains protect**: *Mains >V MP; Mains <V MP; Mains V del*
Mains frequency	MP	**Mains protect**: *Mains >f; Mains <f; Mains f del*
Default - configurable		
Mains frequency	MP	**Mains protect**: *Mains >f; Mains <f; Mains f del*
Analog protection:		
Batt <V, Batt >V	Wrn	**Analog protect**: *Batt >V; Batt <V; Batt V del*

Mains voltage and frequency protections - limits and indications

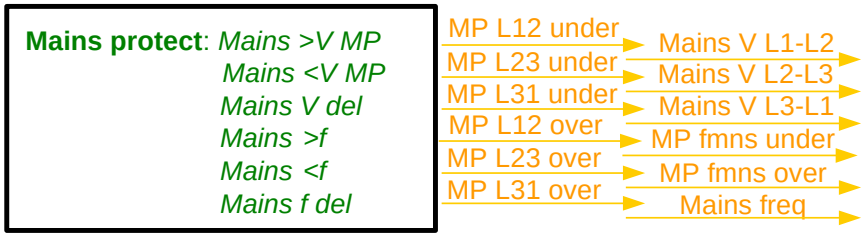
Basic settings:
VoltProtselect = PHASE-NEUTRAL



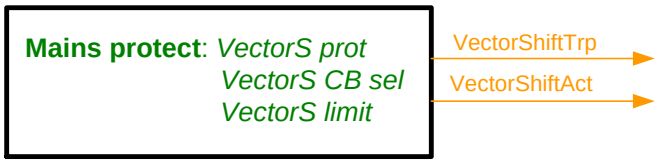
Hint

Mains protect is a setpoints group that contain setpoints related to mains protection evaluation. MP L1 under, Mains L1-N and etc. are alarms that occurs when mains protection is evaluated.
For more information about Mains protection see chapter *Setpoints / Mains protect* of this manual

Basic settings:
VoltProtselect = PHASE-PHASE



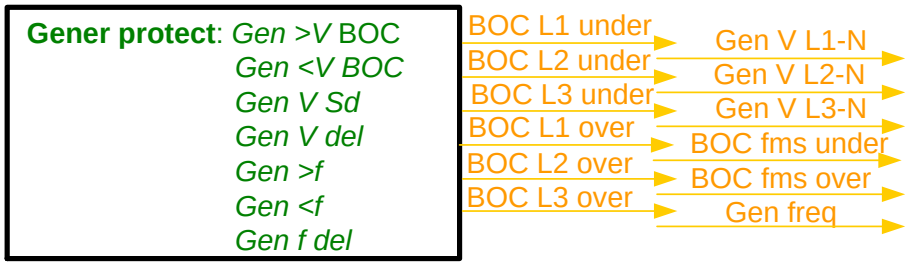
Vector shift protection - limits and indications



HINT
For more information about Vector Shift Protection see chapter *Setpoints / Mains protect* of this manual or chapter *Vector Shift Protection* of NPU User Guide 1.9.

Generator voltage and frequency protections - limits and indications

Basic settings:
VoltProtSelect = PHASE-NEUTRAL



HINT
Gener protect is a setpoints group that contain setpoints related to mains protection evaluation. BOC L1 under, Gen V L1-N and etc are alarms that occurs when genset protection is evaluated.
For more information about Genset protection see chapter *Setpoints / Gener protect* of this manual.

Basic settings:
VoltProtSelect = PHASE-PHASE

Shutdown override

If the Binary input 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.
Take in account, that the binary outputs, signalizing activation of the particular protection are active independently on the state of BI: SdOverride.
Hint:
All 2nd level protections are locked out, except of these:

- Emergency stop
- 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.

Circuit breakers operation sequence, GCB/MCB fail detection

Note:
In the following text, “CB” abbreviation is used for MCB or GCB respectively.

Related binary inputs:

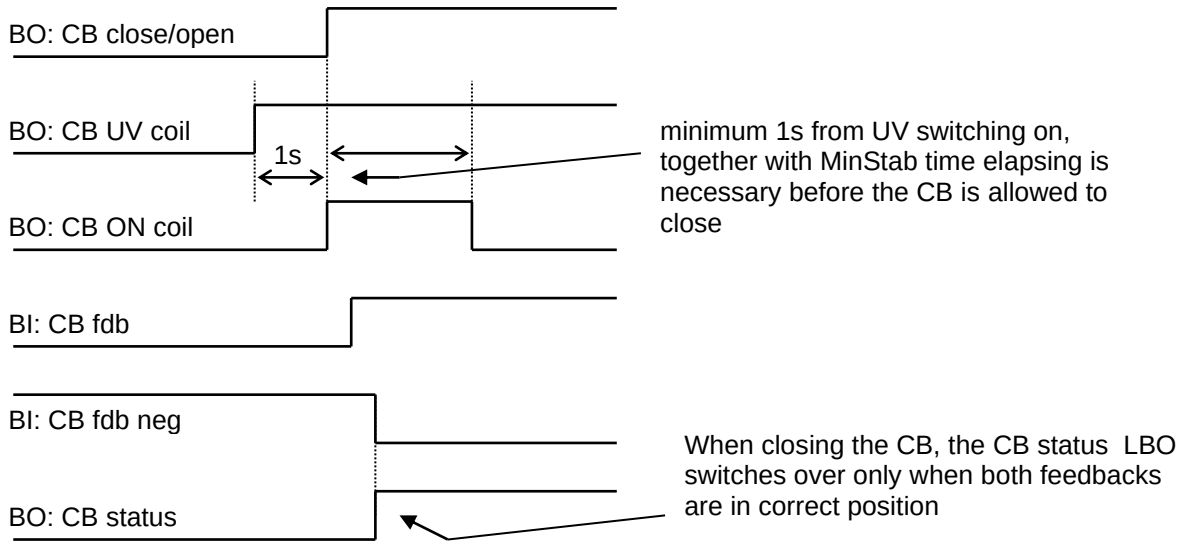
- CB fdb – CB feedback binary input
- CB fdb neg – negative CB feedback binary input. Used for increasing the reliability of CB status evaluated by the controller. In case that it is not configured, negative value of CB fdb is calculated internally within the controller.

Related binary outputs:

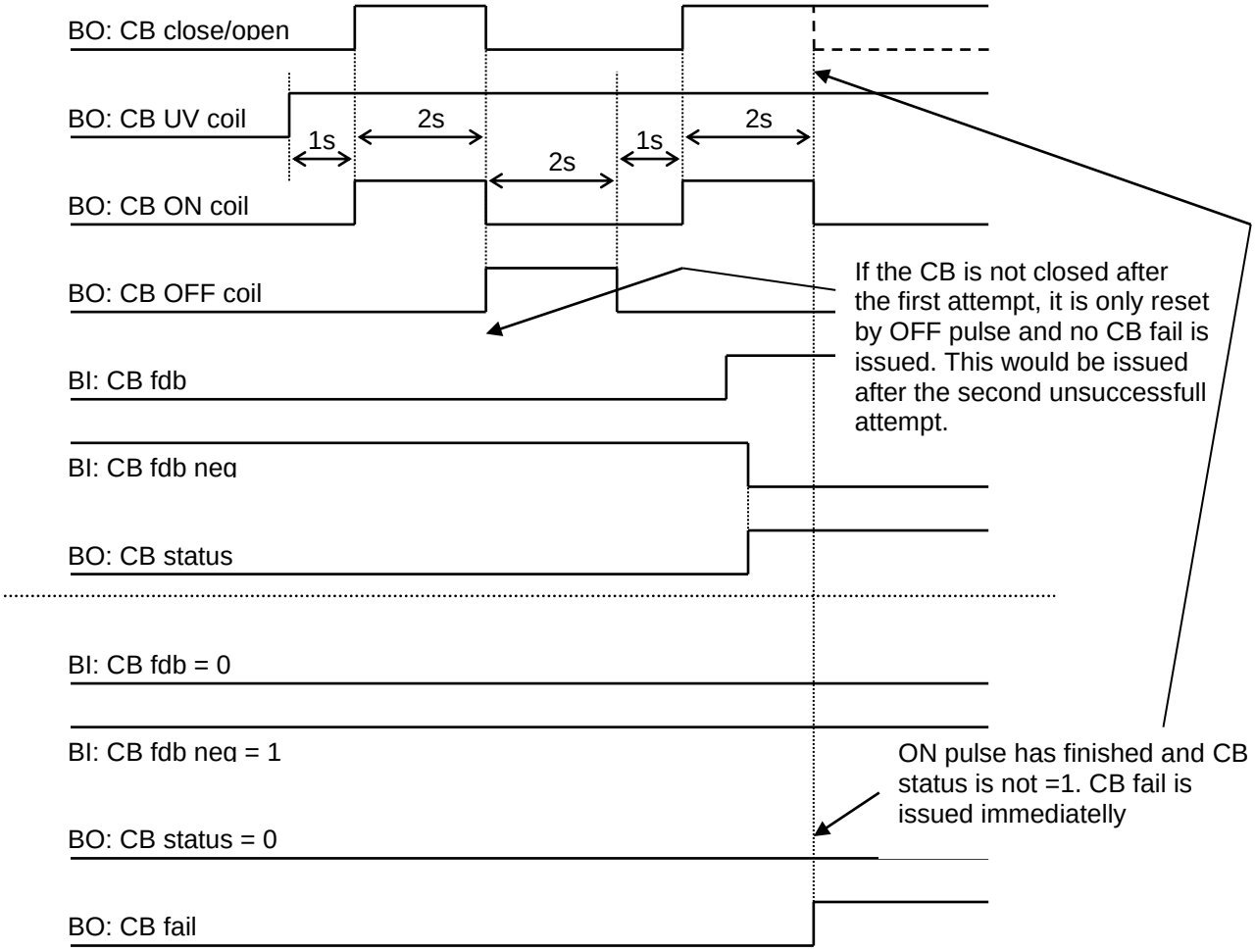
- CB close/open – output for circuit breaker. Equals to 1 during the time when CB is requested o be closed.
- CB ON coil – output for closing coil of the CB. 2s pulse (5s if synchronising is not provided by the particular CB) is used for closing the CB.
- CB OFF coil – output for opening coil of the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

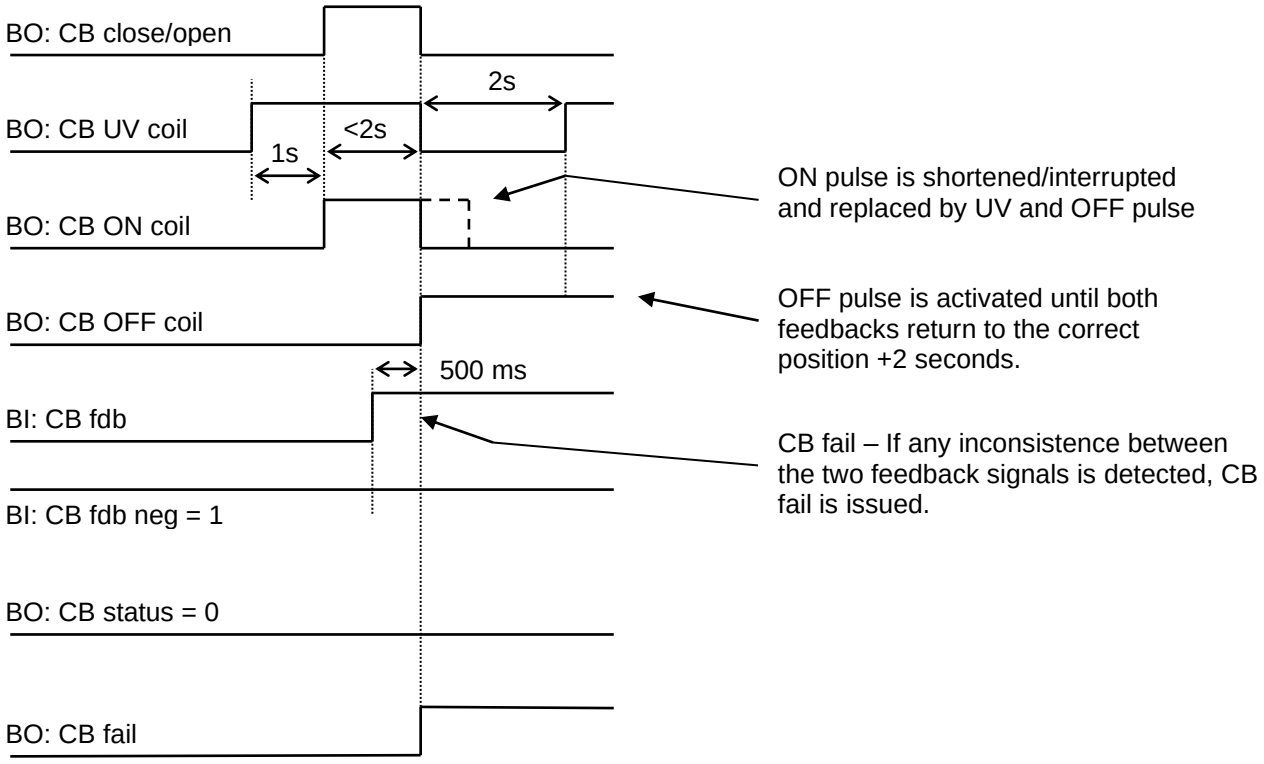
CB close command:



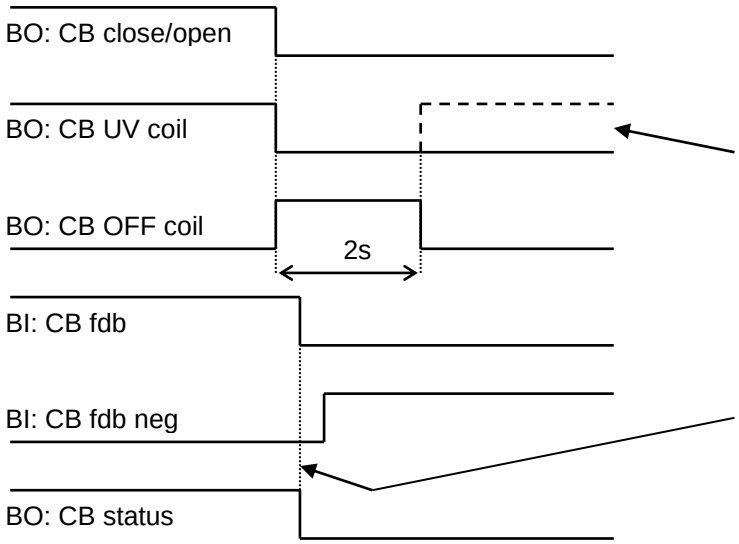
Repeated CB close command:



CB fail – fdb mismatch:



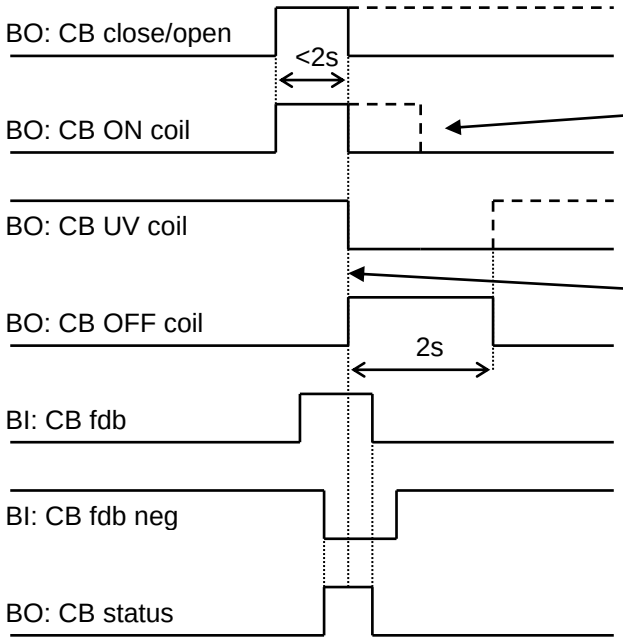
CB open command:



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

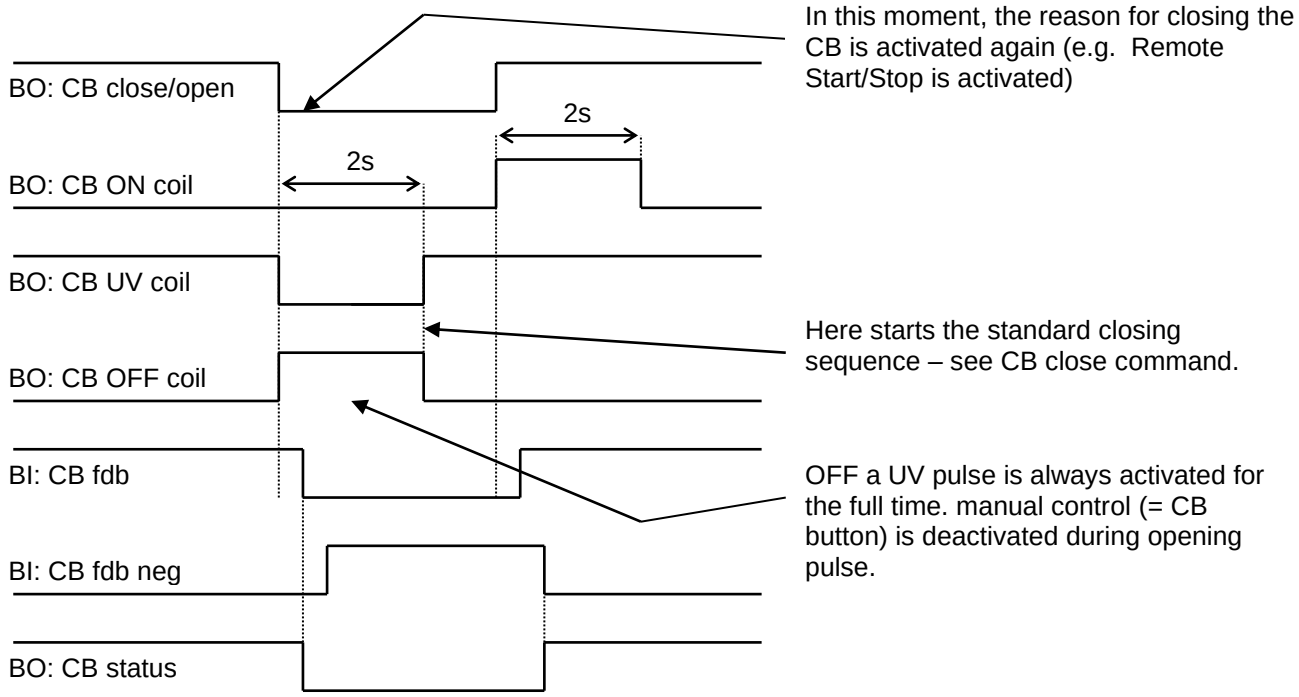
Transition closing -> opening (opening command is issued during closing pulse):



Closing pulse is shortened, opening sequence is started immediatelly

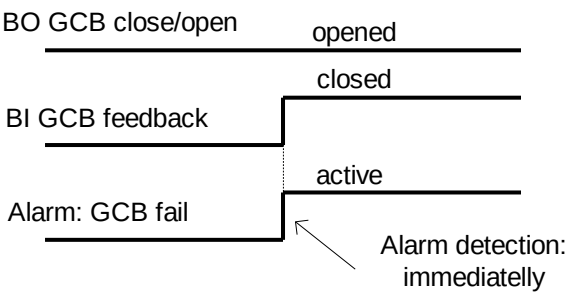
CB opening by protection or manual command (button pressed)

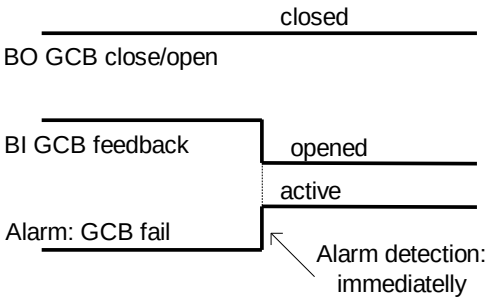
Transition opening -> closing (closing command is issued during opening pulse)



Other CB fail reasons:

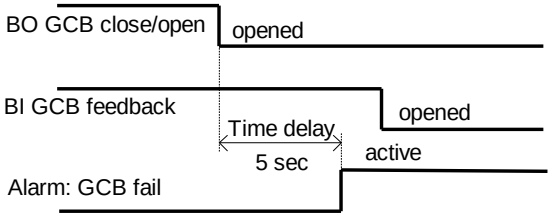
– When the BO CB close/open is in steady state and CB feedback is changed, the CB fail is detected immediately (no delay).





– 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 immediately.

Gen-set operation states

Gen-set can operate in following states

Not ready	Gen-set is not ready to start
Init	Fw and archive incompatibility or invalid values in setpoint – controller does not work
Starting	Waiting for ReadyToLoad signal
Running	Waiting for GCB connection or start synchronizing
Soft load	Gen-set power is ramping up
Loaded	Gen-set is loaded
Soft unld	Gen-set power is ramping down
Stopping	Stopping procedure before the BI ReadyToLoad is opened.
Stopped	Stopped - initial state – waiting for engine start. LBI:ReadytoLoad is deactived.

Breakers conditions

Brks Off	GCB opened
Synchro	Gen-set is synchronizing (Mains voltage OK, GCB or MCB is open)
MainsOper	Mains is present (MCB is closed, GCB is opened)
ParalOper	Gen-set is in parallel with mains (MCB is closed, GCB is closed)

SynchroScope mode

SychroScope mode is determinated for case, when you need synchroscope function only. For this request is suitable MINT application –MAN mode.

Configuration:
LBI: HotStandby is activated by Logical 1 – v card LBI
LBI: Gen sync is activated all the time by Logical 1 – in card LBI - Synchro check is active all the time

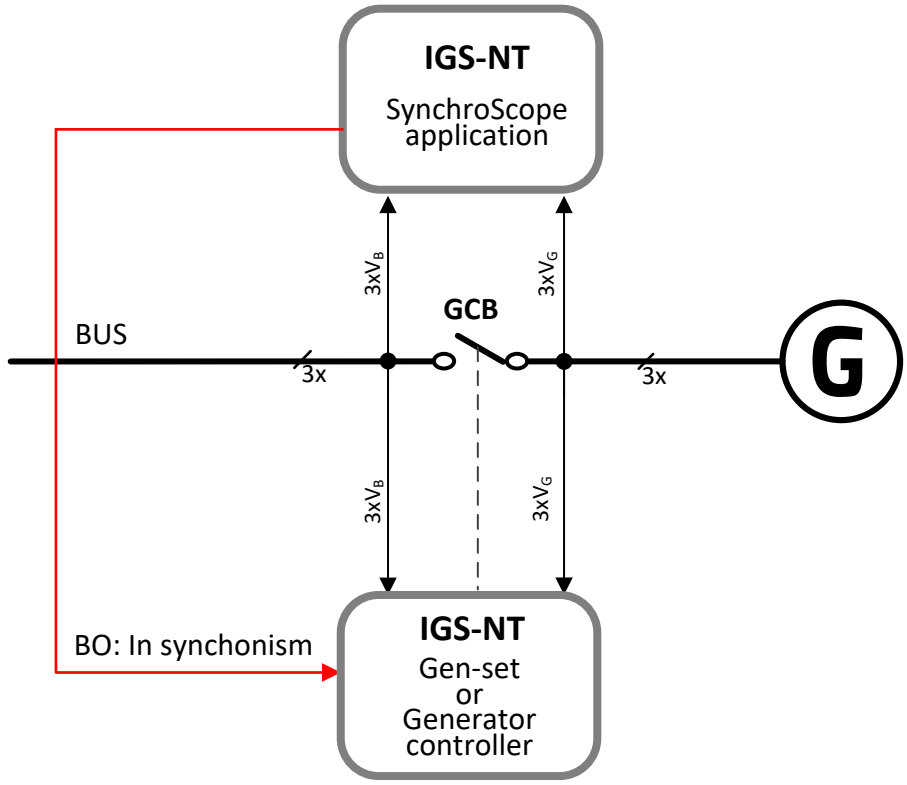
- In case that bus and generator voltage are in synchronism - Binary output “In synchronism” is activated
- Binary output signal “In synchronism” from SynchroScope controller is used in primary gen-set or generator controller for double check before closing breaker during synchronism

BI: In synchro is used for permit of closing breaker in primary gen-set or generator controller

This "SynchroScope controller" is used for evaluation of synchronism only.
This "SynchroScope controller" does not care about any protection, engine or generator.
It measures only bus and generator voltage (current and power are not measured) and in the case of both voltages synchronism it activates binary output “In synchronism”.

Double check in case of synchronisation process before closing breaker is strictly required for certification of ships according to several Marine certification (e.q. Germanischer Lloyd certification)

Correct connection for double check during synchronisation



SynchScope configuration you can find in IGS-NT-GeCon-Marine package.

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.
Inteli AIN8	-	-	8	-	2	
Inteli AIN8TC	-	-	8	-	-	
Inteli IO8/8	8	8	-	2	-	
Inteli IO16/0	16	0	-	2	-	
Inteli AIO9/1	-	-	2	1	-	
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 last version of IGS-NT-Application guide-x.x.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.

Analog outputs

IS-NT controller has one analogue output, free configurable. To this output there can be configured any analogue value, which is in the controller. To scale the output use the internal calculator in the GenConfig PC tool.
If the output range 4 to 20 mA is needed, the limits for analog output should be set according to an example in the following table:

Requested power range	Controller analog output setting
0 – 1000 kW	Low limit: -250 kW High limit: 1000 kW
Low – *High* kW	Low limit: *Low* - (*High* – *Low*)/4 kW High limit: *High* kW

This setting ensures that 0 kW (Low kW) will correspond to 4 mA.

No analog output is available on IG-NT controller. Use extension unit IGS-PTM (one analog output) or I-AOUT8 (eight analog outputs).

Setpoints

Password protection

Any setpoint can be password protected - 7 levels of password is available. The password is a four-digit number. Only setpoints associated with the entered password level can be modified.
Even though one level may have been set from the front panel, the affected setpoints are not accessible from InteliMonitor (direct or Modem) until this level is set in IMON (InteliMONitor). Setpoints opened from front panel are automatically closed 15 minutes after the last key has been pressed or when wrong value of password is set. Any password can be changed once that level password or higher has been entered.
The controller programming (configuration) requires the highest password - 7 level.

ProcessControl

BaseLoad [kW – MW*]

This setpoint is used for adjusting of the requested gen-set power in *Baseload* mode, i.e. if the setpoint *Load ctrl PtM* is set to BASELOAD
Step: 0,1 kW / 1 kW / 0,01 MW*
Range: 0,1 kW – 650,00 MW*
ForceValue possibility: No
**Note:*
The actual setpoint units and range depend on setting of the Power format (see GenConfig manual).
Hint:
If you set this setpoint to a higher value than the system is available to produce, the total produced power is limited with the sum of Nomin power setpoints of all gen-sets in the system.

Base PF [ ]

This setpoint is used for adjusting of the requested gen-set power factor value if the power factor control mode is set to BASEPF (setpoint *PF ctrl PtM*).
Values over 1.00 mean capacitive load character, i.e. setting 0.95 means 0.95L and setting 1.05 means 0.95C.
Step: 0,01
Range: 0,60 - 1,20

Import load [kW]

This setpoint is used for adjusting of the requested **mains import** if the gen-set load control mode is set to IMP/EXP (*Load ctrl PtM* = IMP/EXP)
This setpoint is also used for adjusting of the maximum allowed export if *export limit* function is active (*Export limit* = ENABLED).
Range: -32000 .. 32000 [kW]
NOTE:
Negative value of import is **export**, i.e. the power flows *into the mains*.

NOTE:
The actual setpoint units and range depend on setting of the Power format in GenConfig.

Import PF [-]

The setpoint is used to adjust the requested power factor at the mains when *PF ctrl PtM* = PF-IM/EX. Values over 1.00 mean capacitive load character.
Step: 0,01
Range: 0,60 - 1,20

EXAMPLE:
Setting 0.95 means 0.95L and setting 1.05 means 0.95C.

Load ctrl PtM [BASELOAD / IM/EX / ANEXT BASELOAD / ANEXT IM/EX / T BY PWR] (FV)

Load ctrl PtM selects control mode for parallel to mains operation.

BASELOAD	Gen-set is loaded at preadjusted level **ProcessControl:** *Base load*.
IM/EX	Gen-set is loaded according to imported/exported power from/to mains to achieve **ProcessControl:** *Import load*.
ANEXT BASELOAD	Gen-set is loaded according to the requested value given by an external device via Analog input LdCtrl:AnExBld.
ANEXT IM/EX	Gen-set is loaded according to imported/exported power from/to mains to achieve the requested value given by an external device via Analog input LdCtrl:AnExI/E.
T BY PWR	Gen-set power is changed to keep required temperature, measured via an analog input.

Force value possibility: Yes

Hint:

For "digital" external load control select mode ANEXT BASELOAD and as the source for LdCtrl:AnExBld select value *ExtValue1-4*. This value can be set using a command transmitted e.g. over CAN bus or ModBus.

PF ctrl PtM [BASEPF / PF-IM/EX ANEXT BASEPF / ANEXT PF-IM/EX] (FV)

PF ctrl PtM selects control mode of power factor for parallel to mains operation.

BASEPF	Gen-set power factor is kept at the level given by **Process control**:*Base PF.*
PF-IM/EX	Gen-set power factor is controlled according to imported/exported reactive power from/to mains to achieve **ProcessControl**: *Import PF*.
ANEXT BASEPF	Gen-set power factor is kept at the level given by an external device via Analog input PFCtrl:AnExBPF.
ANEXT PF-IM/EX	Gen-set power factor is controlled according to imported/exported reactive power from/to mains to achieve the requested value given by an external device via Analog input PFCtrl:AnExI/E.

Force value possibility: Yes

I/E-Pm meas [NONE / IM3 CT INPUT / ANALOG INPUT]

Import / Export measurement selection when one of power I/E modes selected.

NONE	No source for I/E active power measurement available. If selected, power control defaults to Baseload (BASELOAD, ANEXT BASELOAD, T BY PWR).
IM3 CT INPUT	Mains I/E active power (Pm) is measured and calculated from controller's Im3 current terminal. The value is multiplied by 3 to estimate the aggregate mains power.
ANALOG INPUT	Mains I/E active power is measured by an external device and the controller measures this value via analog input LdCtrl:I/E-Pm.

Hint:

Earth fault current protection may be used only if *I/E-Pm meas* = ANALOG INPUT or NONE.

I/E-Qm meas [NONE / IM3 CT INPUT / ANALOG INPUT]

Import / Export measurement selection when one of PF I/E modes selected.

NONE	No source for I/E reactive power measurement available. If selected, power factor control defaults to BasePF (BASEPF, ANEXT BASEPF).
IM3 CT INPUT	Mains I/E reactive power (Qm) is measured and calculated from controller's Im3 current terminal. The value is multiplied by 3 to estimate the aggregate mains reactive power.
ANALOG INPUT	Mains I/E reactive power is measured by an external device and the controller measures this value via analog input PFCtrl:I/E-Qm.

Hint:

Earth fault current protection may be used only if *I/E-Qm meas* = ANALOG INPUT or NONE.

If I/E-Pm meas is set to IM3 CT INPUT, then I/E-Qm meas should be logically set to IM3 CT INPUT as well, because IM3 CT INPUT is common input for both parameters.

PeakLevelStart [kW – MW*] (FV)

Load consumption level the gen-set has to stop at. Function is inactive when *PeakAutS/Sdel* = OFF. Genset start is *PeakAutS/Sdel* delayed after the consumption of the Load exceeds the *PeakLevelStar*t limit.
Step: 0,1 kW / 1 kW / 0,01 MW*
Range: *PeakLevelStop* to 320,00 MW*
Force value possibility: Yes
**Note:*

The actual setpoint units and range depend on setting of the Power format (see GenConfig manual).

PeakLevelStop [kW – MW*] (FV)

Load consumption level the gen-set has to start at. Genset stop is *PeakAutS/Sdel* delayed after *PeakLevelStop* limit is reached. Load consumption (P factory) is calculated (not directly measured) as a sum of gen-set (Act power) and mains (P mains) active power.
Step: 0,1 kW / 1 kW / 0,01 MW*
Range: 0,00 to *PeakLevelStart* MW*
Force value possibility: Yes
**Note:*

The actual setpoint units and range depend on setting of the Power format (see GenConfig manual).

PeakAutS/S del [s] (FV)

Delay for automatic Peak start/stop function. Set OFF to disable Peak aut start function.
Step: 1s
Range: OFF, 1 – 3200 s
Force value possibility: Yes

Export limit [DISABLED / ENABLED] (FV)

Protection against power export to the mains. The function limits gen-set requested power to hold import power higher or equal to the setpoint *Import Load.*
Force value possibility: Yes

Derating1 strt [X] (FV)

Derating2 strt [X] (FV)

The starting values for the power derating function. The gen-set nominal power is decreased according to the adjusted curve.
The setpoint actual physical dimension is given by the related analog input and the value assigned to it.
Step: 1 X
Range: ± 32000 X
Force value possibility: Yes

Hint:

DeratingX strt unit [X] depends on DeratingPowerX analog input unit.It can be e.g.°C in case of temperature derating function.

Derating1 end [X] (FV)

Derating2 end [X] (FV)

Ending value for power limitation – at this value the gen-set power is limited to *DeratedX pwr* value and it won't go lower for higher input values.
The setpoint actual physical dimension is given by the related analog input and the value assigned to it.
Step: 1 X
Range: ± 32000 X
Force value possibility: Yes
Hint:

To record the power derating activity into the History:
-Configure the binary output Derating X act to a virtual periphery input.
-Configure either "History record" or "Warning"-type alarm to this input to record power derating activity in History and optionally to indicate it in Alarmlist.

Derated1 pwr [%] (FV)

Derated2 pwr [%] (FV)

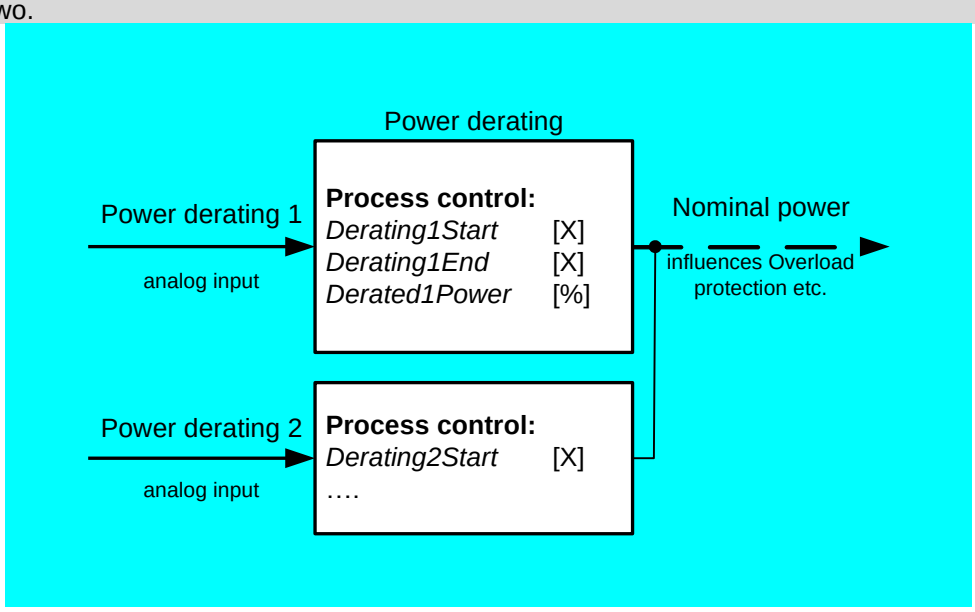
The ratio of decreasing of the gen-set nominal power at *DeratingX end* level.
Step: 1 % of *Nomin power*
Range: 0 - 100 % of *Nomin power*
Force value possibility: Yes
Hints:

DeratedX pwr = 90% means the nominal power reduction **to** 90%, not by 90%.

Derating ratio is set to zero and functions are not active when Analog inputs PowerDeratingX are not configured (e.g. in default configuration).

When Power derating function is active, the generator nominal power is decreased to *DeratedX pwr* and so Overload protection (BOC Overload) is based on this Derated power!

The generator nominal power is reduced according to the bigger restriction – the more reduced channel out of the two.



TempByPwr Treq [°C] (FV)

Requested temperature value for temperature control by generator power.
Before use, you have to configure the analog input LdCtrl:TbyPwr.
Step: 1 °C
Range: ± 32000 °C
Force value possibility: Yes

TempByPwr gain [%]

Gain factor for Temperature by generator power control loop.
Step: 0,01 %
Range: 0,00 – 100,0 %

TempByPwr int [%]

Integration factor for Temperature by generator power control loop.
Step: 0,01 %
Range: 0,00 – 100,0 %

Overheat prot [ENABLED / DISABLED] (FV)

ENABLED: If the temperature measured from analog input “LdCtrl:TbyPwr” exceeds the value *TbyPwr Treq* the gen-set power is decreased gradually to *Min Power PtM*. If the temperature decreases below *TbyPwr Treq* the gen-set increases the power gradually to the original requested value (Baseload, Imp/Exp....).
DISABLED: Overheat protection function is disabled. No power change if the temperature measured from analog input “LdCtrl:TbyPwr” exceeds the value *TbyPwr Treq*.
Force value possibility: Yes

Island enable [NO / YES] (FV)

NO, YES: Enables or disables island operation.
Force value possibility: Yes

The setpoint is used to enable/disable the island operation, i.e. supplying the load while the mains is disconnected.

- **Island mode** is recognized if the mains breaker is **open**, e.g. the feedback input *MCB feedback* is not active.
- **Parallel mode** is recognized if the mains breaker is **closed**, e.g. the feedback input *MCB feedback* is active.

If the island mode is recognized and island operation is disabled the controller will open the generator breaker, cool-down the gen-set and stop it. While this situation persists the controller behavior is following:

- The gen-set start in AUT mode is blocked, it can be started in MAN mode only.
- The GCB can't be closed.
- The message *OfL StartBlck* is present in the alarm list (see the alarm output *OfL StartBlck*).

ParallelEnable [NO / YES] (FV)

NO, YES: Enables or disables Mains parallel operation.
Force value possibility: Yes

The setpoint is used to enable/disable the parallel operation, i.e. supplying the load in parallel with the mains.

- **Island mode** is recognized if the mains breaker is **open**, e.g. the feedback input *MCB feedback* is not active.
- **Parallel mode** is recognized if the mains breaker is **closed**, e.g. the feedback input *MCB feedback* is active.

If the parallel mode is recognized and parallel operation is disabled the controller will open the generator breaker, cool-down the gen-set and stop it. While this situation persists the controller behavior is following:

- The gen-set start in AUT mode is blocked, it can be started in MAN mode only.

- The GCB can't be closed.
- The message *OfL StartBlck* is present in the alarm list (see the alarm output *OfL StartBlck*).

Synchro enable [NONE / FORWARD / REVERSE / BOTH] (FV)

Enable or disable forward/reverse synchronization.
NONE: No synchronizing is enabled.
FORWARD: GCB synchronizing is enabled.
REVERSE: MCB synchronizing is enabled.
BOTH: GCB and MCB synchronizing are enabled.
Force value possibility: Yes

MFStart enable [NO / YES] (FV)

NO, YES: Enables or disables automatic Mains failure start.
Force value possibility: Yes

Examples of settings:

MFStart enable	Parallel Enable	ForwSync Enable	RevSync Enable	Island enable	Description
-	OFF	-	-	-	Not Ready - ParalDisabled
OFF	ON	OFF	-	-	Gen-set starts after Rem start/stop is closed, doesn't close GCB
OFF	ON	ON	-	OFF	Gen-set starts after Rem start/stop is closed, synchronizes, closes GCB, at Mains fail both MCB and GCB are opened
OFF	ON	OFF	ON	OFF	Gen-set starts after Rem start/stop is closed, doesn't close GCB, if the Mains fails, MCB is opened, gen-set keeps running
OFF	ON	OFF	OFF	ON	Gen-set starts after Rem start/stop is closed, GCB is not closed, if Mains fails, MCB openes and GCB closes
OFF	ON	ON	OFF	ON	Gen-set starts after Rem start/stop is closed, synchronizes, closes GCB, if Mains fails, opens MCB, stays in Island
OFF	ON	ON	ON	ON	Gen-set starts after Rem start/stop is closed, synchronizes, closes GCB, if Mains fails, MCB is opened, gen-set runs in Island, reverse synchr., MCB closes
ON	ON	ON	OFF	OFF	Gen-set starts after Mains fail, doesn't close GCB - Island operation disabled
ON	ON	OFF	OFF	ON	Gen-set starts after Mains fail, goes to Island, if Mains returns, GCB is opened, MCB is closed
ON	ON	ON	OFF	ON	Gen-set starts after Mains fail, opens MCB, closes GCB, if Mains returns, opens GCB, closes MCB, synchronizes GCB, closes GCB
ON	ON	OFF	ON	ON	Gen-set starts after Mains fail, opens MCB, closes GCB, if the Mains returns, synchronizes, closes MCB
ON	ON	ON	ON	ON	Gen-set starts after Mains fail, synchronizes, closes GCB, if Mains fails, MCB is opened, gen-set runs in Island, reverse synchr., MCB closes

#Neutral cont. [EACH / COMMON]

Setpoint changes behavior of binary output Neutral CB C/O which is used for Neutral contactor control.
EACH: Four pole GCB's are supposed on the engine.

a) When GCB is opened (after start, before stop):
   Binary output Neutral CB C/O (Neutral contactor) closes when Generator voltage is higher than 75% of Nominal voltage.
   Binary output Neutral CB C/O (Neutral contactor) opens when Generator voltage is lower than 50% of Nominal voltage.

b) Binary output Neutral CB C/O (Neutral contactor) is opened when gen-set is running in parallel to the mains (MCB is closed) .

COMMON: Three pole GCB's are supposed for the gen-set.

a) When MCB is opened Neutral contactor closes when Generator voltage (at least one phase) is higher than 75% of Nominal voltage.
b) When MCB is opened Neutral contactor opens when all phases of Genset voltage are lower than 50% of Nominal voltage.
c) When MCB is closed Neutral contactor opens.

Hint:
Configure Binary output Neutral CB C/O and Binary input Neutral CB fdb Prior to Neutral contactor function is used.
Neutral contactor fail is detected when no feedback comes within 400ms or when MCB and Neutral contactor are closed for more than 400 ms.

WatchedContr

Range 1…..16 [controller CAN address]
This setpoint defines the address of the controller which is the master one in the redundancy controller system. Master controller has this setpoint adjusted to 0. The redundant controller has this setpoint adjusted to address of it's master. The slave evaluates the activity of the master via CAN bus. In case there is detected any problem with master, BO:CtrlHBeat FD on the slave controller is activated.

ProtectionMode [ACTIVE / NOT ACTIVE] (FV)

ACTIVE:
Standard setting – all protections are active.
2-nd level protections are evaluated, GCB or MCB is opened.
NOT ACTIVE:
2-nd level protections are just evaluated, but GCB or MCB is NOT opened (no actions).
Exceptions are Emergency Stop and alarms types Sd override.

Recommended settings

StartStopBtn= DISABLED ProtectionMode = NOT ACTIVE	Setting for systems where engine is started separately and protections are controlled externally (not from controller).
StartStopBtn= ENABLED ProtectionMode = ACTIVE	Standard settings for system where engine start/stop and GCB is controlled from controller.

StartStopBtn [ENABLED / DISABLED] (FV)

ENABLED: Standard settings for systems where engine start/stop and GCB is controlled from controller.
DISABLED: Disables the engine Start and Stop buttons and corresponding Binary start/stop signals.

GCB button [ENABLED / DISABLED] (FV)

ENABLED: GCB can be controlled using both controller/display front panel GCB button and LBI:GCBButton.
DISABLED: GCB control is disabled with both controller/display front panel GCB button and LBI:GCBButton.
Hint:
This setpoint is available only with IG-NT GC / IG-NTC GC controllers.

GCB ctrl mode [INTERNAL / FOLLOW / EXTERNAL] (FV)

Control modes for circuit breakers.
INTERNAL – GCB is controlled only by controller. GCB fail alarm is issued in case of unexpected GCB openning or closing.
FOLLOW – GCB is controlled by controller, but it can be opened by an external unit. No alarm is issued when GCB is opened externally and controller state changes accordingly.
EXTERNAL – GCB is fully controlled by an external unit, breaker control signals do not work. Controller reacts only to the breaker feedback changes.

MCB ctrl mode [INTERNAL / EXTERNAL] (FV)

Control modes for circuit breakers.
INTERNAL – MCB is controlled by controller, but it can be opened by an external unit. No alarm is issued when MCB is opened externally and controller state changes accordingly.. MCB fail alarm is issued in case of unexpected MCB closing.
EXTERNAL – MCB is fully controlled by an external unit, breaker control signals do not work. Controller reacts only to the breaker feedback changes.

Basic settings

Nomin power [kW] (FV)

Nominal power of the generator.
Step: 1 kW
Range: 1 – 32000 kW
Force value: Yes

Nomin current [A] (FV)

This is the current limit for the generator. IDMT over current and short current protections are based on this setpoint. See **Generator protections**: *2Inom del, Ishort* setpoints*. Nominal current* can be different from generator rated current value.
Step: 1 A
Range: 1 - 10000 A
Force value: Yes

!!! VERY IMPORTANT !!!
• The maximum input current to the controller current terminals is 11 Amps. Higher value is displayed as measured limit, e.g. 15 Amps from CT is measured and displayed as 11 Amps. • Take special care when selecting CT's. All available 5 Amp CT's do not have a range up to 11 Amps.

CT ratio prim [A]

Gen-set phases Current Transformers ratio – primary side.
Step: 1 A
Range: 1 – 10000 A
Force value: Yes

CT ratio sec [/5A / /1A]

Gen-set phases Current Transformers ratio – secondary side selection /5A or /1A. Available in IG-xxC and IS-NT versions. In standard IG-EE/NT units only 5 A range available.

Im3/ErFltCurCTp [A]

Earth Fault protection Current Transformer ratio – primary side.
Step: 1 A
Range: 1 – 10000 A

Im3/ErFltCurCTs [/5A / /1A]

Earth Fault protection Current Transformer ratio – secondary side selection /5A or /1A. Available in IG-xxC and IS-NT versions. In standard IG-EE/NT units only 5 A range available.

VT ratio [/1]

Gen-set Voltage Transformers ratio.
Step: 0,1 V / V
Range: 0,1 – 500,0 V / V

Vg InpRangeSel [277 V / 120 V]

Gen-set voltage sensing inputs range selection. Available in IG-xxC and IS-NT versions. In standard IG-EE/NT units only 277 V range available.
Hint:
The range 277 V is suitable for both European (230 V) and American (277 V) measurement.
The range 120 V is intended for high-voltage applications where voltage transformers with output range 100 V are used, or for alternative American (120 V) measurement.

Vb VT ratio [/1]

Bus Voltage Transformers ratio.
Step: 0,1 V / V
Range: 0,1 – 500,0 V / V
Hint:
Set VT ratio to 1,0 if no Voltage Transformers are used.

Vb InpRangeSel [277 V / 120 V]

Bus voltage sensing inputs range selection. Available in IG-xxC and IS-NT versions. In standard IG-EE/NT units only 277 V range available.

GenNomV [V] (FV)

Nominal generator voltage (phase to neutral).
Step: 1V
Range: 80 – 30000 V
Force value: Yes
Hint:
The nominal value can be externally changed using Force value function. However, it is intended for changes between standard nominal voltages only (230 / 120 V) using *Force value X* source setpoints.
It is prohibited to use another controller values as a source for Force value in this case!!!

GenNomVph-ph [V]

Nominal generator voltage (phase to phase).
Step: 1V
Range: 130 – 60000 V
Hint:
If one of the nominal voltages is changed, the other is automatically adjusted to correspond with the new value. E.g. if GenNomV is changed to 220 V, the GenNomVph-ph is changed to 220*1,73 = 381 V.

MainsNomV [V] (FV)

Nominal bus voltage (phase to neutral).
Step: 1V
Range: 80 – 30000 V
Force value: Yes
Hint:
The nominal value can be externally changed using Force value function. However, it is intended for changes between standard nominal voltages only (230 / 120 V) using *Force value X* source setpoints.
It is prohibited to use another controller values as a source for Force value in this case!!!

MainsNomVph-ph [V]

Nominal bus voltage (phase to phase).
Step: 1V
Range: 130 – 30000 V
Hint:
Both Gen and Bus nominal voltages must be set to the same value when no PT is used.

FixVoltProtSelect [PHASE-NEUTRAL / PHASE-PHASE]

PHASE-NEUTRAL: The generator and mains/bus voltage are displayed as phase-to-neutral voltages.
PHASE-PHASE: The generator and mains/bus voltage are displayed as phase-to-phase voltages.

Nominal freq [Hz] (FV)

Nominal generator frequency
Step: 1Hz
Range: 35 – 65 Hz
Force value: Yes

In case of change value of this setpoint, the setpoint is blocked for next change for time ForceBlock6Del.
Hint:
The nominal value can be externally changed using Force value function. However, it is intended for changes between standard nominal frequencies only (50 / 60 Hz) using *Force value X* source setpoints.
It is prohibited to use another controller values as a source for Force value in this case!!!

Nom frg offset [Hz] (FV)

Nominal generator frequency
Step: 0,01 [Hz]
Range: -2.00 .. 2.00 [Hz]
Force value: Yes

The setpoint adjusts offset of nominal system frequency (*Nominal Freq*) with step 0.01 Hz.
Controller regulates to the *Nominal Freq* + *Nom frq offset* frequency.

The value Nominal Freq + Nom frq offset is used as 100% for generator and mains/bus frequency protections and as requested value for frequency regulation (except synchronizing) if the setpoint Freq reg loop is set to ALL THE TIME.

Gear teeth [-]

Step: 1 [-]
Range: 1…500
Force value: No

Number of teeth on the engine's flywheel for the pick-up sensor.
This setpoint was added based on the customer's request to display RPM.
GeCon just shows RPM value, but this value is NOT used for control of system.

EngCoolTime [s]

Step: 1 [s]
Range: 0 …..3600s
Force value: No

Setpoint for setting of respecting time for Cooling.
In the case of a request to stop the engine the GeCon send Stop pulse (after opening GCB). This Stop pulse is send to the Engine controller (Engine controller should to be move from Running state to Cooling).
After the time EngCoolTime count down the GeCon send second Stop pulse which should move Engine controller from Cooling state to Stopped.
Hint:
Time in setpoint EngCoolTime must be longer than CoolingTime in EngineControler otherwise second Stop pulse from GeCon will shorten required Cooling time in Engine controller.

ReadyToLoad [INTERNAL / EXTERNAL] (FV)

Controller needs to know, if genset is ready to be loaded. Use this setpoint to switch between internal and external evaluation of gensets readiness for loading:
INTERNAL: Genset is considered as ready to be loaded, if LBO:*GenParams OK* is active for 1s (generator voltage/frequency are within protection limits and no 2nd level protection is active). Genset is considered as not ready to be loaded, if *GenParams OK* is inactive for 1s.
EXTERNAL: Genset is considered as ready to be loaded, if LBI: *ReadyToLoad* is active.
Force value: Yes

ControllerMode [OFF / SEM / AUT / MAN] (FV)

Equivalent to Controller mode changes by MODE→ or ←MODE buttons.
Force value: Yes
Hint:
Mode change can be separately password protected.

FltRes GoToSEM [DISABLED / ENABLED] (FV)

DISABLED: Controller stays in AUT mode after Fault reset .
ENABLED: Automatic switch from AUT to SEM mode after Fault reset to avoid automatic engine start. This function is active for all 2nd-level protections (Shut down, Slow stop, ElProt, Off-load).
Force value: Yes
Hint:
Set to ENABLED to avoid automatic engine start when Fault reset button is pressed after shut down in automatic mode.

Local buttons [PANEL / EXTBUTTONS / BOTH]

PANEL: Only the buttons on the controller front panel are enabled.
EXTBUTTONS: Only the external signals (copies of the panel buttons) are enabled.
BOTH: Both controller buttons and external signals are enabled.
Hint:
This switch is valid for these signals: GCBButton, MCBButton, FaultResButton, HornResButton, StartButton, StopButton.

DispBaklightTO [min] (FV)

Range [units] OFF, 1-240 min, NO TIMEOUT [min]
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

DispBlkStrtOff [-] (FV)

Range [units] DISABLED, ENABLED [-]
If this setpoint is in ENABLED position the display backlight is temporarily switched off during gen-set start.

UserBtn pulse [s] (FV)

Step: 0,1 [s]

Range: 0,2 …10 s
Force value: Yes
Setpoint UserBtn pulse allows user to choose the duration of UserButton pulse.

ResetActAlarms [DISABLED / ENABLED]

DISABLED: If Fault reset is activated (from any source), only inactive (normally displayed) alarms are reset. So only inactive alarms can be cleared from the Alarmlist.
ENABLED: If Fault reset is activated (from any source), all currently present (including inverse displayed = active) alarms are reset (asterisk in Alarmlist disappears for all present alarms). I.e. after an active (inverse displayed) alarm later on becomes inactive (normally displayed), it is cleared automatically from the Alarmlist if previously reset.
Hint:
ENABLED mode corresponds to the way that IG and IS controllers (previous generation) handled the alarms.

ConvCoefPulse1 - 4 [ ]

This setpoint adjusts the rate of increasing of the PulseCounter1 – 4 (integrating internal counters that can be seen at PulseCounter1-4). The setpoint assigns number of pulses (BI:PulseCounter1 – 4) to increase the PulseCounter integrating value by 1.
Step: 1/X
Range: 1 – 65000 1/X

Example:
Number of pulses on the physical input BI: PulseCounter1: 10
ConvCoefPulse1 = 2

Value of the PulseCounter1 integrating counter: 5

Comms settings

Gen-set name

User-defined name, used for controller identification at remote connections. *Gen-set name* is max 15 characters long and has to be entered using PC software.

Hint:

The setpoint can be changed using PC SW only (e.g. InteliMonitor). Gen-set name isn't affected by GenConfig SW.

LB/UART Log [ENABLED / DISABLED]

Enables history logging of IG-IB / I-LB connection.
Force value possibility: Yes

Hint:

If communication via IG-IB is interrupted for more than 5s, it is automatically terminated. If it is established again after this period, it is considered as a newly created connection and a new record "Terminal" is done into history in case of LB/UART Log = ENABLED. This may cause overfilling of the history in case of some monitoring tools, e.g. InteliSupervisor.

Contr. addr [ ]

Controller CAN bus and RS-485 identification number. Each controller in the group has to have its own unique number.

Step: 1
Range: 1 to 32

Hint:

When opening Direct or Modem connection to the controller (using PC monitoring/control SW), the *Contr. address* has to correspond to the Gen-set setting in PC SW.

RS232(1) mode [DIRECT / MODEM (HW) / MODEM (SW) / MODBUS-DIRECT / MODBUS-MDM(HW) / ECU link]

Communication protocol selection for RS232(1) line.

DIRECT:	Connection to a local PC running InteliMonitor. RS232 or RS485 (with internal or external converter) lines can be used. Set this also for IG-IB connected via RS232 line.
MODEM (HW):	Analog/GSM/ISDN modem connection. Select this for standard modems with HW flow control. If selected and no CTS signal is detected, communication may not work correctly.
MODEM (SW):	Analog/GSM/ISDN modem connection. Select this for modems without HW flow control – controller will use SW flow control signals XOn, Xoff, so only TxD and RxD signals need to be connected between the controller and the modem.
MODBUS-DIRECT	Modbus protocol for direct connection to PLC / external SCADA terminal. Communication speed can be selected via setpoint *RS232(1)MBCSpd*.
MODBUS-MDM(HW)	Modbus protocol for modem (remote) connection to PLC / external SCADA terminal. Communication speed can be selected via setpoint *RS232(1)MBCSpd*.
ECU-LINK	Port redirected to connect the ECU with special (not J1939) interface, e.g. Cummins Modbus.

Hint:

Detail description of Modbus protocol see in Communication guide.

RS232(2) mode [DIRECT / MODEM (HW) / MODEM (SW) / MODBUS-DIRECT / MODBUS-MDM(HW) / ECU-LINK]

Communication protocol selection for RS232(2) line.
Description is the same like for *RS232(1) mode*.
Available only in IS-NT and in IG-xxC versions.

RS232(1)MBCSpd [9600 bps / 19200 bps / 38400 bps / 57600 bps]

Defines the communication speed on RS232(1) line when ModBus mode is selected.

RS232(2)MBCSpd [9600 bps / 19200 bps / 38400 bps / 57600 bps]

Defines the communication speed on RS232(2) line when ModBus mode is selected. Available only in IS-NT and in IG-xxC versions.

RS232(1)MdmIni [ ]

Auxiliary modem initialization string – executed after the default modem initialization string. Used with modem connected to the RS232(1) communication port.

Hint:

Applicable only for MODEM(HW), MODEM(SW) and MODBUS-MDM(HW) modes.
Use for special AT command setting of your modem if default string does not initiate the modem properly. AT commands must be separated using semicolon ";", max. length 31 characters.
The setpoint can be changed only using PC SW when configuring IG-EE/NT.

RS232(2)MdmIni [ ]

Auxiliary modem initialization string – executed after the default modem initialization string. Used with modem connected to the RS232(2) communication port.
Available only in IS-NT and in IG-xxC versions.

Hint:

Applicable only for MODEM(HW), MODEM(SW) and MODBUS-MDM(HW) modes.
Use for special AT command setting of your modem if default string does not initiate the modem properly. AT commands must be separated using semicolon ";", max. length 31 characters.
The setpoint can be changed only using PC SW when configuring IG-EE/NT.

RS485(1) conv. [DISABLED / ENABLED]

If set to ENABLED, the communication RS232(1) port is redirected to the built-in RS485 converter. That means the remote display RS485 line (for IG-Disp connection) is blocked and the converter is used for communication with superior system or ECU.
Available in all controllers except of IS-NT.

Hint:

Applicable only for DIRECT, MODBUS-DIRECT modes.
This converter is not isolated!

RS485(2) conv. [DISABLED / ENABLED]

If set to ENABLED, the communication RS232(2) port is redirected to the built-in isolated RS485 converter.
Available only in IS-NT and in IG-xxC versions.

Hint:

Applicable only for DIRECT, MODBUS-DIRECT modes.

CAN bus mode [32C / 8C]

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.

Hint:

Low speed use for long distance connection only. Set all connected controllers to the same speed.
If having problems with needed CAN bus length, see Communication guide / I-CR module.

CAN2emptDetect [DISABLED / ENABLED] (FV)

Enables the detection of missing intercontroller CAN connection. If enabled and no other controllers are detected on the CAN bus (the complete bus, not only within the logical group), this protection activates.
Force value: Yes

CANAddrSwitch1

The setpoint selects function of the terminal address 122 at the CAN2 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.

CANAddrSwitch2

The setpoint selects function of the terminal address 125 at the CAN2 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

IP address

- 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).

IP Addr mode

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.

Net mask

- 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).

Gateway IP

- 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.

ComApProtoPort

Range [units] 1 .. 255 [-]

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.

AirGate

Range DISABLED, ENABLED [-]

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*.

AirGate IP

Range max. 32 characters [-]

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.

SMTP authent

Range DISABLED, ENABLED [-]

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.

SMTP user name

Range max. 32 characters [-]

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

SMTP password

Range max. 32 characters [-]

Use this setpoint to enter the password for the SMTP server if *SMTP authentification* is enabled.

SMTP address

Range max. 32 characters

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.

Contr mailbox

Range max. 32 characters
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.

Time zone

Range [units] - [-]
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.

DNS IP

Range [units] - [-]

- 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).

ECU Diag (FV)

Range [units] DISABLED, ENABLED [-]
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.

SHxOcol detect [DISABLED / ENABLED]

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.

Delays/Timers

Horn timeout [s] (FV)

The maximum amount of time the Binary output Horn is closed (horn, buzzer will sound). OFF = the output won't be activated, NO TIMEOUT = the output stays closed until the alarm has been reset.
Step: 1s
Range: OFF, 1 – 3600 s, NO TIMEOUT
Force value: Yes

RunOnlyBlkDel1 [s]

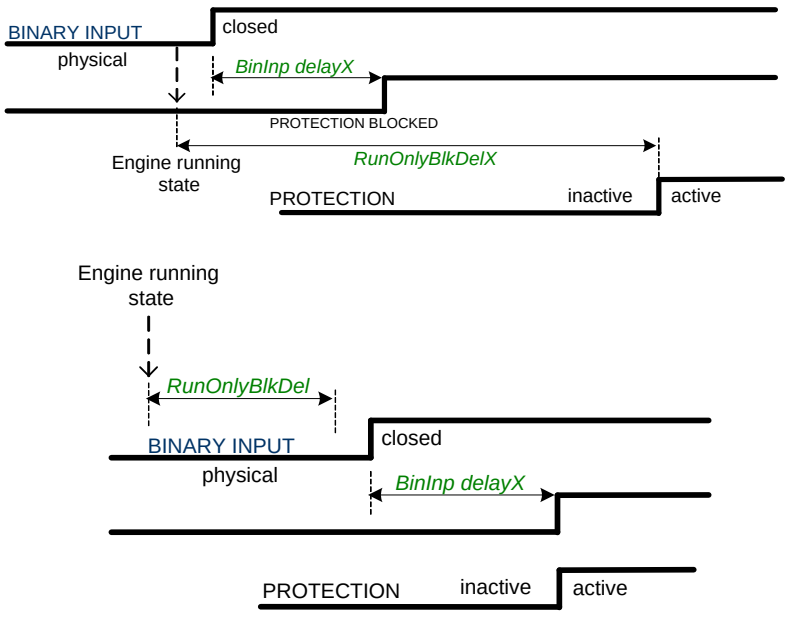
Delay for Engine running Alarms activation – group 1 – see drawing below.
Step: 0,1s
Range: 0,0 – 3000,0 s

RunOnlyBlkDel2 [s]

Delay for Engine running Alarms activation – group 2.
Step: 0,1s
Range: 0,0 – 3000,0 s

RunOnlyBlkDel3 [s] (FV)

Delay for Engine running Alarms activation – group 3.
Step: 0,1s
Range: 0,0 – 3000,0 s
Force value: Yes



BinInp delay 1 [s] (FV)

Binary input protection is activated when input is closed for longer time than *BinInp delay 1*. To use this delay, Binary input must be configured in GenConfig for Property – Delay = BinInp delay 1.

Step: 0,1s
Range: 0,0 – 600,0 s
Force value: Yes

BinInp delay 2 [s] (FV)

Binary input protection is activated when input is closed for longer time than *BinInp delay 2*. To use this delay Binary input must be configured in GenConfig for Property – Delay = BinInp delay 2.

Step: 0,1s
Range: 0,0 – 600,0 s
Force value: Yes

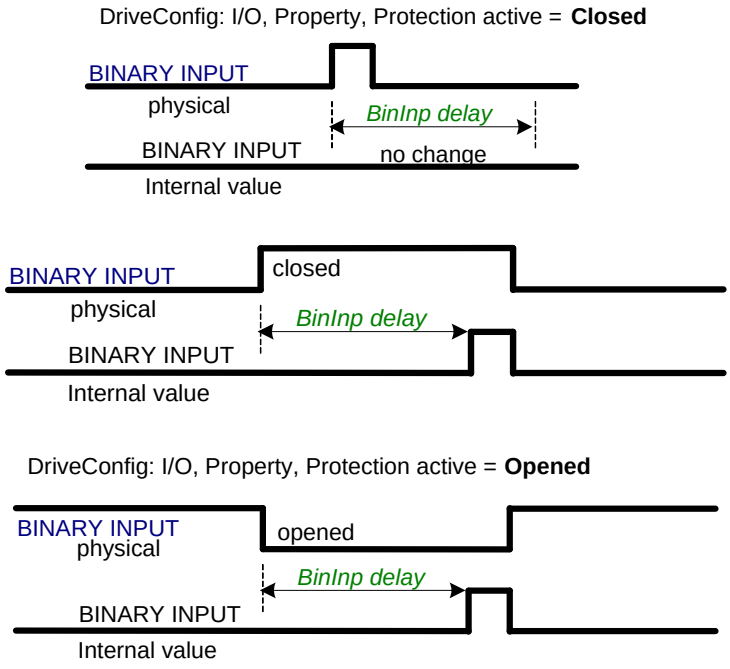
BinInp delay 3 [s] (FV)

Binary input protection is activated when input is closed for longer time than *BinInp delay 3*. To use this delay Binary input must be configured in GenConfig for Property – Delay = BinInp delay 3.

Step: 0,1s
Range: 0,0 – 600,0 s
Force value: Yes

Hint:

BinInp delay is active only for Binary inputs configured as protection.
If these setpoints are not used, default BI delay is 0,5s.



ForceBlockDel1 **[s]** **(FV)**

ForceBlockDel2 **[s]** **(FV)**

ForceBlockDel3 **[s]** **(FV)**

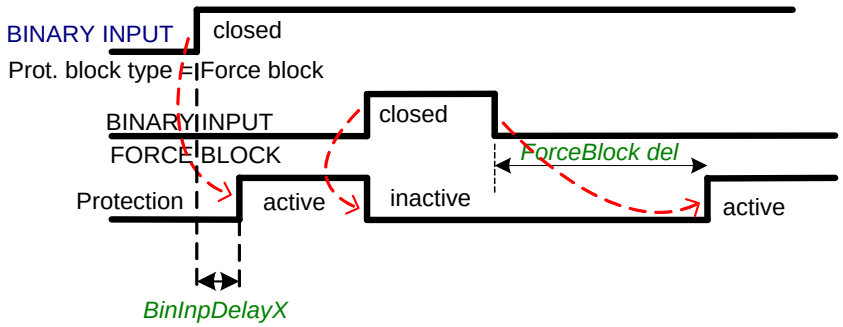
ForceBlockDel4 **[s]** **(FV)**

ForceBlockDel5 **[s]** **(FV)**

ForceBlockDel6 **[s]** **(FV)**

Delays for Force block protection activation after the corresponding Binary input Force block is opened. Protection deactivation is without delay. Protection is activated/deactivated independent on engine running or not running state – it depends only on the corresponding Force block X input.

Step: 0,1s
Range: 0,0 – 60,0 s
Force value: Yes



Service time 1 **[h]**

Service time 2 **[h]**

Service time 3 **[h]**

Service time 4 **[h]**

Running hours down counters are decremented when engine is running. Service alarm is indicated in Alarm list and History record is activated when at least one of the counters reaches zero. *Service time X* setpoints are actual counter values.

Step: 1 h
Range: 0 – 65535 h

Hint:

Once a service time has elapsed the corresponding *Service time X* setpoint must be adjusted again to a non-zero value to clear the alarm and begin a new countdown.
You can rename the particular timers using Translator to indicate specific service intervals – e.g. “OilChange time”, “SparkPlug time”, ...

Analog protect

The content depends on programmable protections settings. This list contains pre-set protections from default archives:

Batt >V [V]

Warning level for battery over voltage.
Step: 0,1 V
Range: 8,0 – 40,0 V

Batt <V [V]

Warning level for low battery voltage.
Step: 0,1 V
Range: 8,0 – 40,0 >V

Batt volt del [s]

Delay for battery voltage alarms.
Step: 1 s
Range: 0 – 600,0 s

Max+CylDifPmin [°C]

Max+CylDifPmin = Maximum positive Cylinder temperature Difference at minimal gen-set Power level. Maximum positive deviation of one cylinder temperature from the average at the *PminCylDifEval* load. Alarm can be activated depending on Block type (set in GenConfig ->Software configuration->Analog inputs) – all the time or after some time after start (depends on *RunOnlyBlkDelX* time).
Step: 1 °C
Range: ± 32000 °C

Max-CylDifPmin [°C]

Max-CylDifPmin = Maximum negative Cylinder temperature Difference at minimal gen-set Power level. Maximum negative deviation of one cylinder temperature from the average at the *PminCylDifEval.* load. Alarm can be activated depending on Block type (set in GenConfig ->Software configuration->Analog inputs) – all the time or after some time after start (depends on *RunOnlyBlkDelX* time).
Step: 1 °C
Range: ± 32000 °C

Max+CylDifPnom [°C]

Max-CylDifPnom = Maximum positive Cylinder temperature Difference at nominal gen-set Power level. Maximum positive deviation of one cylinder temperature from the average at the *Nomin power*. Alarm can be activated depending on Block type (set in GenConfig ->Software configuration->Analog inputs) – all the time or after some time after start (depends on *RunOnlyBlkDelX* time).
Step: 1 °C
Range: ± 32000 °C

Max-CylDifPnom [°C]

Max-CylDifPnom = Maximum negative Cylinder temperature Difference at nominal gen-set Power level. Maximum negative deviation of one cylinder temperature from the average at the *Nomin power*. Alarm can be activated depending on Block type (set in GenConfig ->Software configuration->Analog inputs) – all the time or after some time after start (depends on *RunOnlyBlkDelX* time).
Step: 1 °C
Range: ± 32000 °C

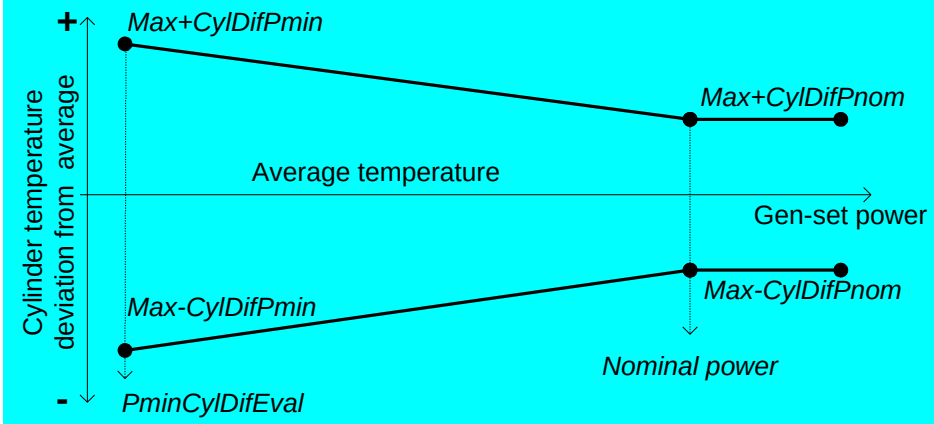
PminCylDifEval [kW – MW*]

Minimum gen-set Power for Cylinder temperature Difference evaluation. The protection is not evaluated, if the gen-set power is lower than this limit.

Step: 0,1 kW / 1 kW / 0,01 MW*
Range: 0,0 kW – *Nominal power**
Note:
The actual setpoint units and range depend on setting of the Power format (see GenConfig manual).

CylDifEvalDel [s]

Cylinder temperature Difference Evaluation Delay.
Step: 1s
Range: 0 – 600 s
Cylinder temperature deviation protection type: warning



Gener protect

Hint:

Generator protections are ignored when **Process control**: *ProtectionMode* = NOT ACTIVE. This is important in the case the GCB and engine is not controlled from controller.

The content depends on programmable protections (Universal states) settings. This list contains pre-set protections from default archives + fixed protections, which are always present.

Electric protection are evaluated when LBI:ReadyToLoad=1 and max stab time was finished.

OverldStrtEval [%] (FV)

Specifies the overload level, where the protection evaluation starts (see figure at *2PovrldStEvDel*). Under this level the protection is not active.

Step: 1 % of *Nomin power*
Range: OFF, 100 – 200 %
Force value: Yes

2POvrldStEvDel [s] (FV)

IDMT curve shape selection. *2PovrldStEvDel* is the Reaction time of IDMT protection for 200% overload Pgen = 2* *OverldStrtEval*.

Step: 0,1 s
Range: 0,0 - 600,0 s
Protection: BreakerOpen

IDMT is inverse proportional to the generator overload. The higher the overload gets the less time will elapse before the protection activates.

When the IDMT protection is activated the GCB is opened, the event is recorded in the Alarmlist and History, and the engine will cool down and stop.

$$\text{Reaction time} = \frac{\textit{2POvrldStEvDel} * \textit{OverldStrtEval}}{\text{Pgen} - \textit{OverldStrtEval}}$$

Where Reaction time is the amount of time from IDMT detection to the opening of the GCB.

Hint:

The maximum allowable Reaction time is 3600 sec.

Reaction time is the amount of time from IDMT detection to the opening of the GCB.

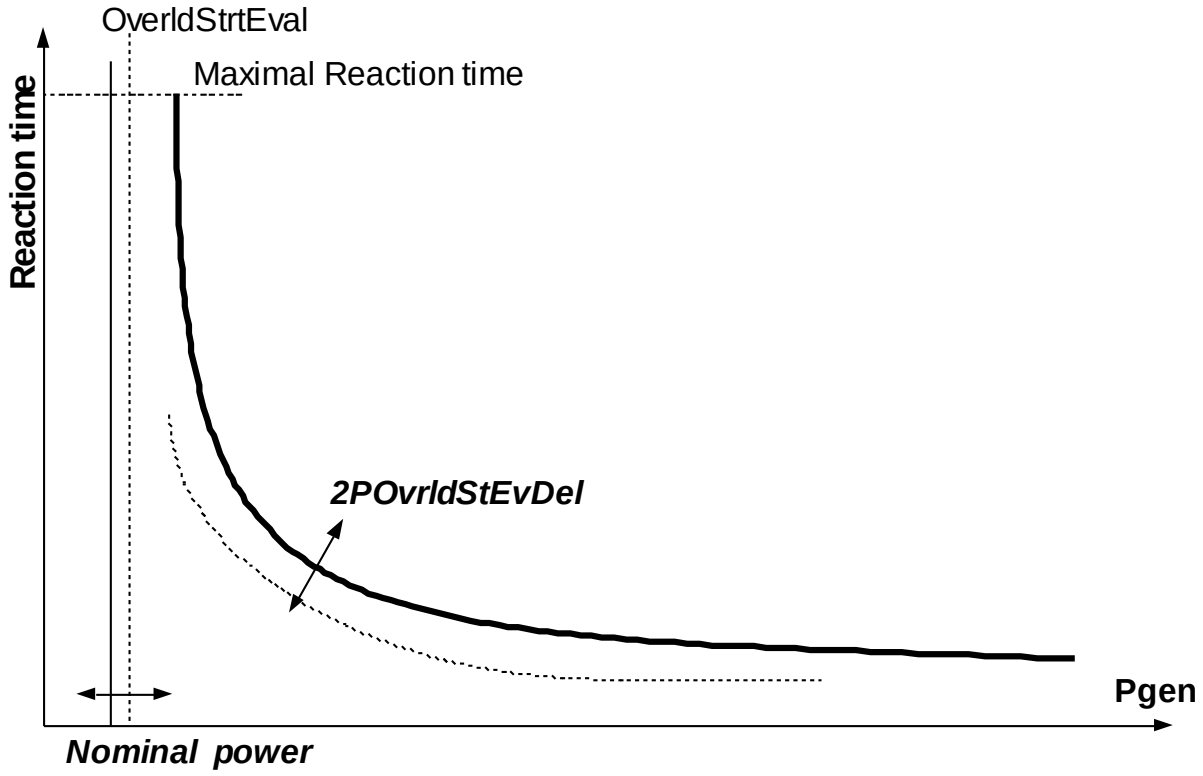
Following example shows reaction times for *OverldStrtEval* = 100% in dependence on generator power and setpoint *2PovrldStEvDel* value:

	Pgen [%]	<=100	101	102	105	110	120	150
2POvrldStEvDel [s]								
0,1		No action	10	5	2	1	0,5	0,2
0,2		No action	20	10	4	2	1	0,4
0,5		No action	50	25	10	5	2,5	1
1,0		No action	100	50	20	10	5	2
1,5		No action	150	75	30	15	7,5	3
2,0		No action	200	100	40	20	10	4
2,5		No action	250	125	50	25	12,5	5
5,0		No action	500	250	100	50	25	10
10,0		No action	1000	500	200	100	50	20

20,0		No action	2000	1000	400	200	100	40
50,0		No action	No action	2500	1000	500	250	100

Following example shows reaction times for *OverldStrtEval* = 110% in dependence on generator power and setpoint *2PovrldStEvDel* value:

	Pgen [%]	<=110	111	112	115	120	150	200
2POvrldStEvDel [s]								
0,1		No action	11	5,5	2,2	1,1	0,275	0,123
0,2		No action	22	11	4,4	2,2	0,55	0,245
0,5		No action	55	27,5	11	5,5	1,375	0,612
1,0		No action	110	55	22	11	2,75	1,223
1,5		No action	165	82,5	33	16,5	4,125	1,834
2,0		No action	220	110	44	22	5,5	2,445
2,5		No action	275	137,5	55	27,5	6,875	3,056
5,0		No action	550	275	110	55	13,75	6,112
10,0		No action	1100	550	220	110	27,5	12,223
20,0		No action	2200	1100	440	220	55	24,445
50,0		No action	No action	2750	1100	550	137,5	61,112



Min Power PtM [%] (FV)

Minimum Power in Parallel to the Mains is the minimal value of the gen-set power in parallel to the mains. Gen-set is never loaded below this level (even if the active load control loop requests a lower level). There is no indication or alarm when *Min Power PtM* level is reached.
Step: 1 % of *Nomin power*
Range: 0 – 100 % of *Nomin power*
Force value: Yes
Hint:
If the setpoint *Base load* is lower than setpoint **Gener protect**: *Min power PtM*, the gen-set requested load is set to **Gener protect**: *Min power PtM*.

The value of *Min Power PtM* is ignored during Warming procedure.
The setpoint is used as a limit for **Low power** protection: if it becomes active, the load is ramped-down using setpoint **Sync/Load strl:** *Load ramp*, to *Min power PtM*. After protection becomes inactive, the power limitation is automatically terminated.

Ishort [%] (FV)

If the level set in this setpoint is reached, the GCB is opened with delay defined in *Ishort del*. Intended for shortcurrent detection.
Step: 1 % of *Nomin current*
Range: OFF, 100 - 500 % of *Nomin current*
Protection: BreakerOpen

Ishort del [s] (FV)

Delay for generator shortcurrent protection.
Step: 0,02 s
Range: 0,00 – 10,00 s
Hint:
Ishort del can be set to 0,01 s but this value is rounded to the proximate controller evaluation period.

2Inom del [s] (FV)

IDMT curve shape selection. *2Inom del* is the Reaction time of IDMT protection for 200% overcurrent Igen = 2* *Nominal current*.

Step: 0,1 s
Range: 0,0 - 60,0 s
Protection: BreakerOpen
IDMT is inversely proportional to the generators overcurrent. The higher the overcurrent gets the less time will elapse before the protection is activated.

When the IDMT protection is activated the GCB is opened, the event is recorded in the Alarmlist and History, and the engine will cool down and stop.

$$\textbf{Reaction time} = \frac{\textbf{2Inom del * Nomin current}}{\textbf{Igen - Nomin current}}$$

Where Reaction time is the amount of time from IDMT detection to the opening of the GCB.
Hint:
The maximum allowable Reaction time is 900 sec.

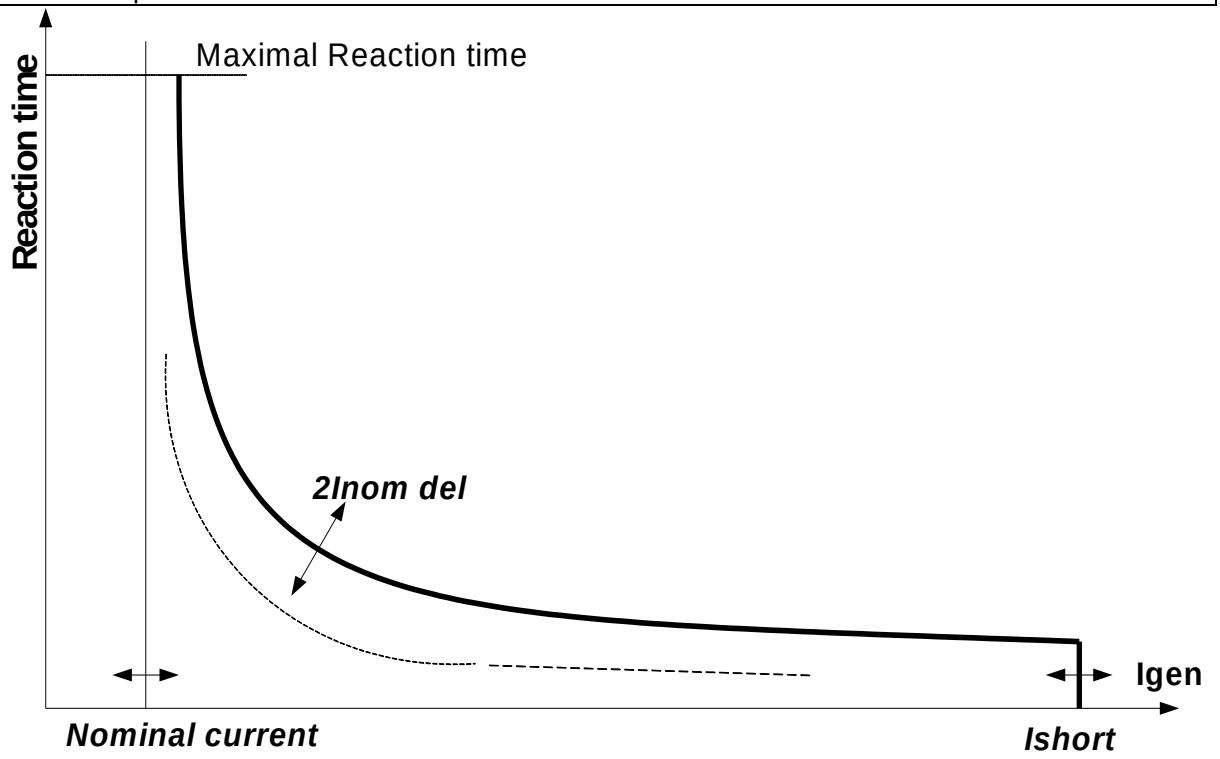
Reaction time is the amount of time from IDMT detection to the opening of the GCB.
Igen is the maximum current of the three phases of generator current.

EXAMPLE of Reaction time for different over current levels.

	Igen [%]	<=100	101	102	105	110	120	150	200
2Inom del									
0,1		No action	10	5	2	1	0,5	0,2	0,1
0,2		No action	20	10	4	2	1	0,4	0,2
0,5		No action	50	25	10	5	2,5	1	0,5
1,0		No action	100	50	20	10	5	2	1
2,0		No action	200	100	40	20	10	4	2
5,0		No action	500	250	100	50	25	10	5
10,0		No action	No action	500	200	100	50	20	10
20,0		No action	No action	No action	400	200	100	40	20

50,0		No action	No action	No action	No action	500	250	100	50

!!! VERY IMPORTANT !!!
• The maximum input range of the controller current terminals is 11 Amps. Anything over this value is displayed as measured limit, e.g. 15 Amps from CT is measured and displayed as 11 Amps. • Take special care when selecting CT's. All available 5 Amp CT's do not have a range up to 11 Amps.



IDMTCurrEval [ENABLED/DISABLED] (FV)

Use this setpoint to enable/disable the generator current IDMT protection, which is adjusted with the *2Inom del* setpoint.

Gen >V BO [%] (FV)

Threshold of the generator overvoltage breaker open protection. Breaker Open (BO) alarm is issued, if the generator voltage is above the threshold for the *Gen V del* time.
The protection evaluates phase-neutral or phase-phase voltages depending on *FixVoltProtSel* setting. Tripping threshold is calculated from the *GenNomV*, if *FixVoltProtSel* is set to Phase-Neutral. It is calculated from the *GenNomVph-ph*, if *FixVoltProtSel* is set to Phase-Phase.

Alarms *BO GenL1 over*, *BO GenL2 over* or *BO GenL3 over* are issued, if the *FixVoltProtSel* is set to Phase-Neutral.
Alarms *BO GenL12 over*, *BO GenL31 over* or *BO GenL23 over* are issued, if the *FixVoltProtSel* is set to Phase-Phase.

Step: 1 % of *GenNomV / GenNomVph-ph*
Range: OFF, 1 – 150
Force value: Yes
Hint:
All three phases are checked for generator voltage protection. Maximum out of the three is used.

Gen >V Wrn [%] (FV)

Threshold of the generator overvoltage warning protection. Warning (Wrn) alarm is issued, if the generator voltage is above the threshold for the *Gen V del* time.
The protection evaluates phase-neutral or phase-phase voltages depending on *FixVoltProtSel* setting.
Tripping threshold is calculated from the *GenNomV*, if *FixVoltProtSel* is set to Phase-Neutral. It is calculated from the *GenNomVph-ph*, if *FixVoltProtSel* is set to Phase-Phase.

Alarms *Wrn GenL1* over, *Wrn GenL2 over* or *Wrn GenL3 over* are issued, if the *FixVoltProtSel* is set to Phase-Neutral.
Alarms *Wrn GenL12 over*, *Wrn GenL31 over* or *Wrn GenL23 over* are issued, if the *FixVoltProtSel* is set to Phase-Phase.

Step: 1 % of *GenNomV / GenNomVph-ph*
Range: OFF, 1 – *Gen >V BO* setting
Force value: Yes
Hint:
All three phases are checked for generator voltage protection. Maximum out of the three is used.

Gen <V BO [%] (FV)

Threshold of the generator undervoltage breaker open protection. Breaker Open (BO) alarm is issued, if the generator voltage is under the threshold for the *Gen V del* time.
The protection evaluates phase-neutral or phase-phase voltages depending on *FixVoltProtSel* setting.
Tripping threshold is calculated from the *GenNomV*, if *FixVoltProtSel* is set to Phase-Neutral. It is calculated from the *GenNomVph-ph*, if *FixVoltProtSel* is set to Phase-Phase.

Alarms *BO GenL1 under*, *BO GenL2 under* or *BO GenL3 under* are issued, if the *FixVoltProtSel* is set to Phase-Neutral.
Alarms *BO GenL12 under*, *BO GenL31 under* or *BO GenL23 under* are issued, if the *FixVoltProtSel* is set to Phase-Phase.

Step: 1 % of *GenNomV / GenNomVph-ph*
Range: OFF, 1 – *Gen <V Wrn* setting
Force value: Yes
Hint:
All three phases are checked for generator voltage protection. Minimum out of the three is used.

Gen <V Wrn [%] (FV)

Threshold of the generator undervoltage warning protection. Warning (Wrn) alarm is issued, if the generator voltage is under the threshold for the *Gen V del* time.
The protection evaluates phase-neutral or phase-phase voltages depending on *FixVoltProtSel* setting.
Tripping threshold is calculated from the *GenNomV*, if *FixVoltProtSel* is set to Phase-Neutral. It is calculated from the *GenNomVph-ph*, if *FixVoltProtSel* is set to Phase-Phase.

Alarms *Wrn GenL1 under*, *Wrn GenL2 under* or *Wrn GenL3 under* are issued, if the *FixVoltProtSel* is set to Phase-Neutral.
Alarms *Wrn GenL12 under*, *Wrn GenL31 under* or *Wrn GenL23 under* are issued, if the *FixVoltProtSel* is set to Phase-Phase.

Step: 1 % of *GenNomV / GenNomVph-ph*
Range: OFF, 1 – *Gen >V Wrn* setting
Force value: Yes
Hint:
All three phases are checked for generator voltage protection. Minimum out of the three is used.

Gen V del [s] (FV)

Evaluation delay for generator under/over voltage protections

Step: 0,01 s

Range: 0,00 – 600,00 s
Force value: Yes

Gen >f BO [%] (FV)

Threshold of the generator overfrequency breaker open protection. Alarm *BO fgen over* is issued, if the generator frequency is above the threshold for the *Gen f del* time.

Step: 0,1 % of *Nominal freq*
Range: OFF, 0,1 – 150
Force value: Yes

Gen >f Wrn [%] (FV)

Threshold of the generator overfrequency warning protection. Alarm *Wrn fgen over* is issued, if the generator frequency is above the threshold for the *Gen f del* time.

Step: 0,1 % of *Nominal freq*
Range: OFF, 0,1 – *Gen >f BO* setting
Force value: Yes

Gen <f BO [%] (FV)

Threshold of the generator underfrequency breaker open protection. Alarm *BO fgen under* is issued, if the generator frequency is under the threshold for the *Gen f del* time..

Step: 0,1 % of *Nominal freq*
Range: OFF, 0,1 – *Gen <f Wrn* setting
Force value: Yes

Gen <f Wrn [%] (FV)

Threshold of the generator underfrequency warning protection. Alarm *Wrn fgen under* is issued, if the generator frequency is under the threshold for the *Gen f del* time..

Step: 0,1 % of *Nominal freq*
Range: OFF, 0,1 – *Gen >f Wrn* setting
Force value: Yes

Gen f del [s] (FV)

Evaluation delay of the generator under/over frequency protections.

Step: 0,01 s
Range: 0,00 - 600,00 s
Force value: Yes

Min stab time [s] (FV)

This is the minimum time the controller will wait, after switching the engine to nominal RPM, to close the GCB (the delay ensures that the GCB is closed with correct generator frequency/voltage).
Step: 1s
Range: 1 – *Max stab time* s
Force value: Yes

Max stab time [s] (FV)

This is the maximum time the controller will wait for generator voltage and frequency to build up, after switching the engine to nominal RPM.
Step: 1s
Range: *Min stab time* – 3600 s
Force value: Yes
Hint:
When generator voltage in *Max stab time* does not reach defined limits (see **Gener protect** group), an alarm

occurs and the gen-set will cool down and stop.

Reverse power [%] (FV)

Range OFF, 0 .. 100 [%]
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 (BO)* type.

ReversePwr del [s] (FV)

Range 0 .. 600.0 [s]
The setpoint adjusts the delay for generator reverse power protection. The threshold for the protection is adjusted by setpoint *Reverse power*.

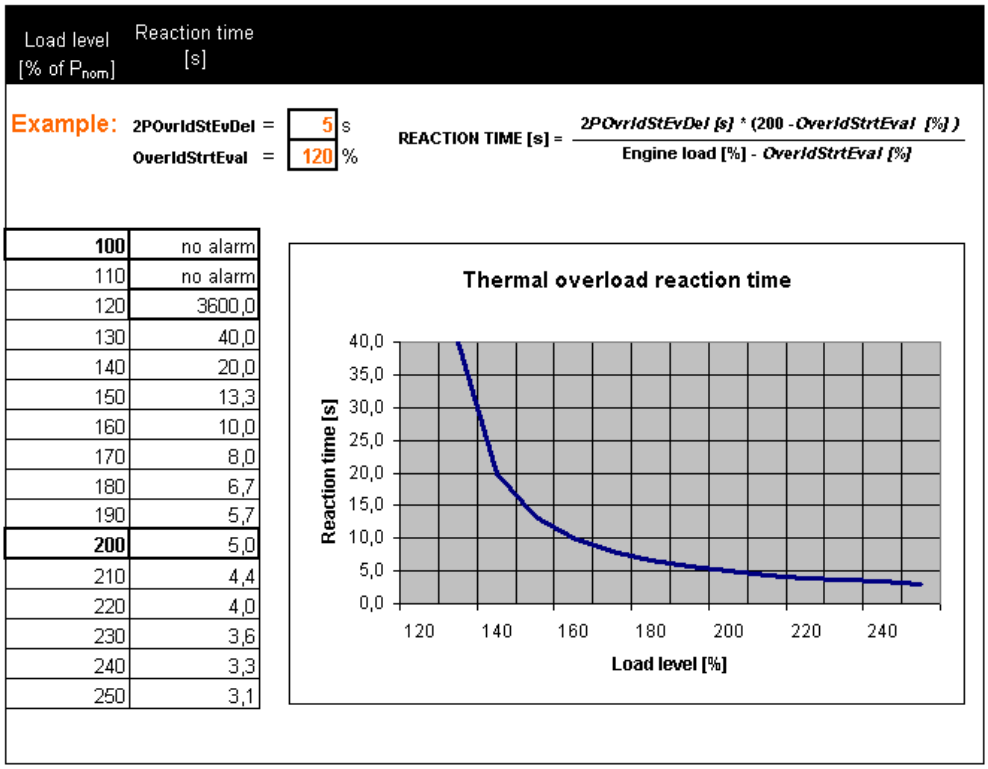
Nom EthFltCurr [A] (FV)

Range [units] 0 .. 10000 [A]
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*.

2EthFltCur del [A] (FV)

Range [units] OFF, 0.1 .. 600.0 [s]
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.



EXAMPLE OF IDMT CURRENT PROTECTION CURVE

NOTE:
The IDMT EarthFault Current protection is *Breaker open and cool down (BO)* 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.

ExcitationLoss [%] (FV)

Range [units] 0 .. 150 [%]
This setpoint adjusts excitation loss protection level. Corresponding level in kVAr is calculated from *nominal power* of gen-set as a negative percentage given by this setpoint (e.g. this setpoint is adjusted to 50% and nominal power of gen-set is 200 kW, therefore excitation loss protection level is set to -100 kVAr)

Delay for this protection is given by the setpoint *ExctLoss del*.

This protection is breaker off and cooldown type. For more information on protection types please refer to the section Alarm types.

ExctLoss del [s] (FV)

Range [units] OFF, 0.1 .. 600.0 [s]
This setpoint adjusts the delay for loss of excitation protection. Threshold of this protection is given by the setpoint *ExcitationLoss*.

EarthFaultCurr [A] (FV)

Threshold for generator Earth fault current protection. The value is measured via the 4th current terminal In / Im3.
Step: 1 A

Range: 0 – 10000 A
Protection: BreakerOpen.

EthFltCurr del [s] (FV)

Delay for generator Earth fault current protection.
Step: 0,1 s
Range: 0– 600,0 s
Hint:
Earth fault current protection based on limits above is active only if *I/E-Pm meas* = ANALOG INPUT or NONE.

Gen V unbal [%] (FV)

Threshold for generator voltage unbalance alarm in % of nominal voltage. The voltage unbalance is calculated as a maximum difference between phase voltages.
Step: 1%
Range: 0 – 200% of *GenNomV* or *GenNomVph-ph* respectively

Gen V unb del [s] (FV)

Delay for generator voltage unbalance alarm.
Step: 0,1s
Range: 0 – 600,0 s
Protection: BreakerOpen.

Gen I unbal [%] (FV)

Threshold for generator current asymmetry (unbalance) in % of nominal current. The current unbalance is calculated as a maximum difference between phase currents.
Step: 1%
Range: 0 – 200% of *Nomin current*

Gen I unb del [s] (FV)

Delay for generator current asymmetry (unbalance).
Step: 0,1 s
Range: 0 – 600,0 s
Protection: BreakerOpen.

PhaseRotation [CW/CCW] (FV)

Direction of the mains/generator phases rotation.
CW: Clockwise rotation is expected, corresponding alarm is issued and LBO: *WrongPhSeq* is activated with the counter clockwise rotation
CCW: Counter clockwise rotation is expected, corresponding alarm is issued and LBO: *WrongPhSeq* is activated with the clockwise rotation

Mains protect

The content depends on programmable protections settings. This list contains pre-set protections from default archives + fixed protections, which are always present:

Mains >V MP [%] (FV)

Threshold for mains over voltage.
Step: 1%
Range: *Mains<V MP* – 150 % of *MainsNomV* or *MainsNomVph-ph* respectively
Protection: Mains protection.
Force value possibility: Yes

Mains <V MP [%] (FV)

Threshold for mains under voltage.

Step: 1 %
Range: 50 – *Mains>V MP* % of *MainsNomV* or *MainsNomVph-ph* respectively
Protection: Mains protection.
Force value possibility: Yes

Hint:
All three phases are checked for mains voltage protection. Minimum or maximum out of three is used.

For high voltage applications, the *MainsNomVph-ph* can be used for nominal voltage setting.

Mains V del [s]

Delay for mains under and over voltage protection.
Step: 0,02 s
Range: 0,00 – 600,00 s

Mains >f [%] (FV)

Threshold for mains over frequency in % of nominal frequency.
Step: 0,1%
Range: *Mains<f* - 150,0 % of *Nominal freq*
Protection: Mains protection.
Force value possibility: Yes

Mains <f [%] (FV)

Threshold for mains under frequency in % of nominal frequency.
Step: 0,1%
Range: 50,0 - *Mains>f* % of *Nominal freq*
Protection: Mains protection.
Force value possibility: Yes

Hint:
The mains frequency is evaluated from the L3 phase.

Mains f del [s]

Delay for mains under frequency and over frequency protection.
Step: 0,02 s
Range: 0,00 – 600,00 s

VectorS prot [DISABLED / PARALLEL ONLY / ENABLED] (FV)

DISABLED: Vector shift protection is disabled.
PARALLEL ONLY: Vector shift protection is enabled only if the gen-set is running in parallel with mains (= MCB+GCB status active).
ENABLED: Vector shift protection is enabled if MCB status is active.
Force value possibility: Yes
Hint:
If ENABLED is selected, it is likely that Vector shift protection will trip the MCB before other mains protections. It senses the fast changes in mains voltage angle position, which occur with every mains failure, even if the gen-set is not running in parallel with mains.

VectorS CB sel [MCB / GCB] (FV)

MCB: MCB is tripped if Vector shift protection gets active.
GCB: GCB is tripped if Vector shift protection gets active.
Force value possibility: Yes
Hint:
If GCB is selected and mains failure comes up, it is likely that MCB trips as well later on because of other mains protections.

VectorS limit [°]

Vector shift protection threshold level.

Step: 1°
Range: 1 – 45°
Hint:
To be sure of proper adjusting of *VectorS limit,* check *Max VectorS* value on the controller or PC software screen. *Max VectorS* value is set to zero when transiting to parallel, and then accumulates the maximum reached value (positive only) during parallel operation. Thus, during the normal operation, only the "background noise" is accumulated (usually max 3°), and the protection level should be set to approximately twice the value of this "noise".

Mains V unbal [%]

Threshold for mains voltage unbalance alarm in % of nominal voltage. The voltage unbalance is calculated as a maximum difference between phase voltages.
Step: 1%
Range: 0 – 200% of *MainsNomV* or *MainsNomVph-ph* respectively

Mains Vunb del [s]

Delay for mains voltage unbalance alarm.
Step: 0,1s
Range: 0 – 600,0 s
Protection: Mains protection

AMF settings

EmergStart del [s] (FV)

Delay between the mains failure and the emergency start of the gen-set.
Step: 1 s
Range: 0 – 600 s
Force value possibility: Yes

MCB close del [s] (FV)

Delay after mains return to MCB closing, if gen-set is not running.
Step: 0,1 s
Range: 0 – 60,0 s
Force value possibility: Yes

MCB opens on [MAINSFAIL / GEN RUNNING] (FV)

Adjusting of condition when MCB opens after Mains fail:
MAINSFAIL: Controller opens the MCB when Mains fail is detected (24 VDC controlled circuit breaker or contactor expected).
GEN RUNNING: Controller opens the MCB only after the gen-set start, i.e. the generator voltage is present to open the MCB (230 VAC controlled breaker expected). In OFF mode, this means MCB stays closed all the time, regardless of the mains condition.
Force value possibility: Yes

ReturnWithIntr [ENABLED / DISABLED] (FV)

ENABLED: Enables break transfer of the load back to the mains if reverse synchronizing is not successful = opens GCB and after *FwRet break* delay closes MCB.
DISABLED: Gen-set stays running loaded in island when reverse synchronizing is not successful, even if mains is OK again.
Force value possibility: Yes

BreakerOverlap [s] (FV)

When limited time of running in parallel with mains is required, *BreakerOverlap* defines max time of running in parallel with mains. During this time soft transfer of load is activated. Used in AUT and TEST modes.
Step: 0,1 s
Range: 0,0 – 300,0 s
Force value possibility: Yes

RetFromIsland [MANUAL / AUTO] (FV)

MANUAL: Controller is automatically switched to SEM mode on each transition to Island operation. To activate the load transfer back to mains, the controller must be switched back to AUT mode.
AUTO: Load is automatically transferred in AUT mode after Mains return.
Hint:
Select *Ret fromIsland* = MANUAL when it is important at what time the load is transferred back to the mains.
Force value possibility: Yes

ReturnTo mains [DISABLED / ENABLED] (FV)

The setpoint influences the behavior of the TEST mode. If mains fail occurs during test (or is simulated using Test on load function), the controller opens the MCB and switches the load to generator.
DISABLED: Now if the mains recovers, the generator stays running loaded until TEST mode is abandoned, typically to AUT mode where reverse synchronizing and generator soft unloading follows.
ENABLED: After the mains recovers, the generator will reverse synchronize back to the mains, unloads and remains running without load until TEST mode is abandoned or another mains failure occurs.
Force value possibility: Yes

FwRet break [s] (FV)

Delay between GCB opening and MCB closing during the return to mains when reverse synchronizing is not enabled.
Delay between MCB opening and GCB closing in TEST Mode, when *Return To mains* = ENABLED and power cut comes.
Step: 0,1 s
Range: 0 – 60,0 s
Force value possibility: Yes

Mains ret del [s] (FV)

Delay after the mains return to the start of synchronizing of MCB (SPtM) or GCB (SPI).
Step: 1 s
Range: 0 – 3600 s
Force value possibility: Yes

Sync/Load ctrl

SpeedRegChar [POSITIVE / NEGATIVE]

Switch between speed governor characteristic.
POSITIVE: When the controller Speed governor output voltage increases – engine speed increases.
NEGATIVE: When the controller Speed governor output voltage decreases – engine speed increases.
Hint:
When set to NEGATIVE, Binary outputs Speed Up and Speed Dn still work without inversion.

Voltage window [%] (FV)

Maximum difference between generator and mains/bus voltage.
Step: 0,1 % of *GenNomV*
Range: 0,0 – 100,0 % of *GenNomV*
Force value: Yes
Hint:
See Voltage phases match indication on the controller Synchronizing screen.

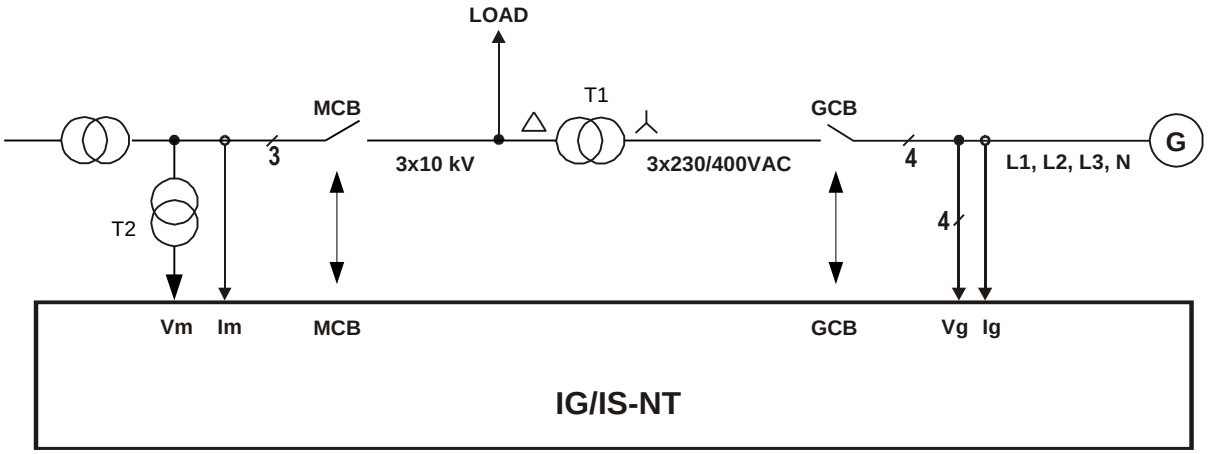
Example 1.
Voltage match 1 2 3 Note:
1 1 0 Phase L3 is out of voltage window

Example 2.
Voltage match 1 2 3 Note:
1 1 1 All phases are in voltage window

GtoM AngleReq [°]

Requested phase difference between generator and mains voltage during synchronizing. Use this setpoint for phase correction of potential transformers connection.
Step: 1°
Range: -45° to +45°

Following is an example of the controller connection to a high voltage system.
T1 shifts phase +30° and no shift is on T2.
GtoM AngleReq = +30° for this example.



Phase window [°] (FV)

Maximum phase angle (mains/bus x generator voltage) ±difference between requested and actual angle for synchronizing.
Step: 1°
Range: 0° – 90°

Force value: Yes
Hint:
If you want to lock out the GCB closing during synchronizing loop test, set *Phase window* = 0. This allows the control loop to be tested while actual GCB closing is blocked.

Dwell time [s] (FV)

The period of time that the phase angle must be within *Phase window* and voltage difference within *Voltage window* before a breaker (GCB/MCB) is closed.
Step: 0,1 s
Range: 0,0 – 25,0 s
Force value: Yes

Freq gain [%]

Gain of frequency control loop.
Step: 0,1 %
Range: 0,0 % - 200,0 %

Freq int [%]

Relative integration factor of frequency control loop.
Step: 1 %
Range: 0 % – 100 %

Freq reg loop [GCB OPEN / SYNC ONLY] (FV)

GCB OPEN: Frequency control is active during running unloaded period and during synchronizing.
SYNC ONLY: Frequency control is active during synchronizing only.
Force value: Yes

Angle gain [%]

Gain of angle control loop.
Step: 0,1%
Range: 0,0 % to +200,0 %

Speed gov bias [V] (FV)

Speed control DC output bias level of SPEED GOVERNOR voltage output.
Step: 0,01 V
Range: *SpeedGovLowLim* to *SpeedGovHiLim* V
Force value: Yes

SpdGovPWM rate [Hz]

Pulse-Width Modulation rate of the Speed Regulator pulse output.
Step: 1 Hz
Range: 500 – 3000 Hz
Hint:
This adjusting can be used for some Cummins and CAT engines speed governor interfaces. We recommend to keep the default setting (1200 Hz) for all other speed governor types (coming out through the analog interface +/- 10V).

SpeedGovLowLim [V]

Low limit for voltage on analog output of Speed Regulator.
Step: 0,01 V
Range: -10,00 V – *SpeedGovHiLim*

SpeedGovHiLim [V]

High limit for voltage on analog output of Speed Regulator.
Step: 0,01 V
Range: SpeedGovLowLim - 10,00 V

RevPowerTest [V]

Constant speed regulator output (SRO) level used when the LBI: *RevPowerTest* is activated to test the reverse power protection.
Step: 0,01 V
Range: -10,00 - 10,00 V

TauSpeedActuat [s]

Time constant of the speed actuator connected to the binary Up/Down outputs. This is to match the reaction of the controller's regulator with the actual reaction time of the actuator.
Step: 0,1 s
Range: 1,0 - 300,0 s

Load ramp [s] (FV)

Increasing or decreasing load rate. In seconds / *Nomin power*.
Step: 1 s
Range: 0 – *GCB open del* s
Force value: Yes
When the timer is countdown then the state soft load or unload is terminated.

Load gain [%]

Gain of power control loop.
Step: 0,1 %
Range: 0 – 200,0 %

Load int [%]

Relative integration factor of power control loop.
Step: 1 %
Range: 0 – 100 %
Hint:
Load gain and *Load int* setpoints are active only when gen-set operates in parallel to the mains, when GCB and MCB are closed. This is valid for both single and multiple applications.

RampStartLevel [%]

Value of initial load, on which starts the load ramping according to *Load ramp* setting.
Step: 1 %
Range: 0 – 100 %

GCB open level [%] (FV)

Power level for opening the GCB while soft unload is in progress. If this level isn't reached, the GCB opens after *GCB open del* time.Setting = NO LEVEL disables this GCB open criteria.
Step: % of *Nomin power*
Range: NO LEVEL, 1 to 100 %

GCB open del [s] (FV)

The timeout to unload the gen-set. Should the load ramp fail to bring the gen-set power down to *GCB open level* to allow the opening of GCB, the breaker will open after *GCB open del*. Setting = NO TIMEOUT disables this GCB open timeout criteria.
Step: 1 s
Range: *Load ramp* – 1800, NO TIMEOUT
Force value: Yes
Hint:
It is possible to open GCB by panel button or externally.

Sync timeout [s] (FV)

Maximum allowed time for forward or reverse synchronization.
Step: 1 s

Range: 1 – 1800 s, NO TIMEOUT

Hint:

If the synchronizing does not succeed within (*Sync timeout* / 10, but minimum 60) s, the speed regulator output is reset and synchronisation is automatically started again. So if you set the Sync timeout to sufficiently high value, the synchronizing cycle can be internally repeated up to 10 times.

If NO TIMEOUT is selected, then the time for synchronizing has no limitation and can only be interrupted by pressing the GCB or STOP button in SEM mode or removing a corresponding request input in AUT mode. In the NO TIMEOUT case, the synchronization is restarted every 1800 / 10 = 180 s.

Sync type [PHASE MATCH / SLIP SYNC]

PHASE MATCH: This type of synchronization is based on voltage and phase shift match. Limits are adjusted via setpoints *Voltage window* and *Phase window*. When voltage and phase shift are match, *Dwell time* starts countdown. After that the command for breaker closing is activated.

SLIP SYNC: This type of synchronization regulates the value of frequency to the value Mains/Bus frequency + *SlipFrequency*. When this frequency is reached, *Dwell time* countdown is started. After that the command for breaker closing is activated. The closing breaker command is issued in advance due to latency of breakers (adjusted via setpoints *GCB Latency* and *MCB Latency*).

Force value: No

Slip Frequency [Hz]

Setpoint related to slip synchronization (*Sync type* = Slip Synchro).The gen-set controller regulates to (Mains/Bus Frequency + *Slip Frequency*) value and the window is set to *Slip Freq Win* to each direction from this value. When the generator frequency reaches (Mains/Bus Frequency + *Slip Frequency*) value, regulation loop is stopped (output is frozen at the actual value).
If the generator frequency remains inside the window for the time longer than *Dwell time* the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value *Slip frequency* and CB closing delay given by the CB Latency).
When the preclosing angle is reached the controller issues CB closing command. The breaker will close and CB feedback confirms that to the controller. When the breaker is closed the controller goes to parallel and activates regulation loops again (parallel to Mains regulation loop).

Step: 0,01 Hz
Range: -0,50 – 0,50 Hz

Slip Freq Win [Hz]

Window of slip frequency for slip synchronization (*Sync type* = Slip Synchro).
If the generator frequency goes out of the window (either because generator frequency changes or Mains/Bus frequency changes or *SlipFreqWin* changes) the controller will reactivate regulation loop and try to reach the target value again. The sync timeout timer runs regardless of this.
If the generator frequency reaches the target frequency again, the regulations are frozen and if the generator frequency remains in the window for the time longer than *Dwell time* the controller will continue in the standard sequence as seen in the previous case.
Step: 0,01 Hz
Range: 0,01 – 0,50 Hz

GCB Latency [ms]

Setpoint related to slip synchronization (*Sync type* = Slip Synchro).The controller calculates periodically so called preclosing angle (based on the actual value *Slip freq* and GCB closing delay given by the setpoint *GCB Latency*). When the preclosing angle is reached, the controller issues GCB closing command. The breaker will close and GCB feedback confirms that to the controller.
Step: 1 ms
Range: 20 – 1000 ms

MCB Latency [ms]

Setpoint related to slip synchronization (*Sync type* = Slip Synchro).The controller calculates periodically so called preclosing angle (based on the actual value *Slip freq* and MCB closing delay given by the setpoint *MCB Latency*). When the preclosing angle is reached, the controller issues MCB closing command. The breaker will close and MCB feedback confirms that to the controller.
Step: 1 ms
Range: 20 – 1000 ms

Volt/PF ctrl

AVRRegChar [POSITIVE / NEGATIVE]

Switch between AVR characteristic.
POSITIVE: When the controller and AVRi output voltage increases – generator voltage increases.
NEGATIVE: When the controller and AVRi output voltage decreases – generator voltage increases.
Hint:
When set to NEGATIVE, Binary outputs AVR Up and AVR Dn still work without inversion.

Voltage gain [%]

Gain of voltage control loop.
Step: 0,1 %
Range: 0,0 to +200,0 %

Voltage int [%]

Relative integration factor of voltage control loop. Increasing of integration value causes quicker response.
Step: 1 %
Range: 0 – 100 %
Hint:
Voltage gain and *Voltage int* setpoints are active (adjust AVR) when GCB is open to maintain the Nominal voltage or to match voltage during synchronizing. Voltage loop operates as well in single island operation.

Voltage reg loop [ALL THE TIME / SYNC ONLY]

This setpoint selects when is the voltage regulation loop active.The P and I factors of the voltage regulation loop are adjusted by setpoints **Voltage gain** and **Voltage int**.

SYNC ONLY	The voltage regulation loop is active only during synchronizing to match the generator and mains voltages together. It is assumed that in all other situations where the voltage is to be regulated the Automatic Voltage Regulator (AVR) maintains it itself. *Hint:* This option is suitable with most AVR's.
ALL THE TIME	This option activates the voltage regulation loop also while the genset is running without load and during the island operation. The controller maintains generator voltage at the **GenNom V** level.

PF gain [%]

Gain of power factor control loop.
Step: 0,1 %
Range: 0,0 – 200,0 %

PF int [%]

Relative integration factor of power factor control loop. Increasing of integration value causes quicker response.
Step: 1 %

Range: 0 – 100 %
Hint:
When any gain setpoint is set to zero, the corresponding control loop is switched OFF.
PF gain and *PF int* setpoints are active only when the gen-set runs parallel to mains.

VoltRegOut behaviour in single-gen-set applications

Operation mode	Island		Parallel to mains	
Gen-set state	**Running, GCB opened**	**Loaded island GCB closed MCB opened**	**Synchronizing**	**Loaded in parallel GCB closed**
	Active loop: Volt gain, int;	Active loop: Volt gain, int;	Active loop: Volt gain, int;	Active loop: PF control

AVR DCout bias [%] (FV)

AVRi voltage output bias level. This is a basic voltage level of the output if there is no regulation loop active.
Step: 0,1 %
Range: 0 – 100,0 %
Force value: Yes
Hint:
Real voltage level depends on AVRi outputs connection and output level potentiometer setting. Maximum range is ± 10 V.

TauVoltActuat [s]

Time constant of the voltage regulator connected to the binary Up/Down outputs. This is to match the reaction of the controller‘s regulator with the actual reaction time of the voltage regulator.
Step: 0,1 s
Range: 1,0 - 300,0 s
Force value: Yes
Hint:
Use this for older generators where motorised potentiometer is used for voltage adjust to the AVR.

Force value

Force value 1-16 [X]

„Source“ setpoints containing the alternative values for selected „target“ setpoints. The setpoint with index X corresponds to the Force value Xth function. Procedure description see in GenConfig-x.y User guide.

Hint:

As the “source” for Force value channel can be used any compatible value in the controller (in general all values and setpoints of types integer8,16,32). In that case the corresponding Force value X setpoint is unused on that channel.

ExtValue1LoLim [X]

ExtValue2LoLim [X]

ExtValue3LoLim [X]

ExtValue4LoLim [X]

ExtValueX low limit. The value is not decreased under this limit, even if the request still exists (via binary input ExtValueX down).

Step: 1 X

Range: -32000 – *ExtValueXHiLim* X

ExtValue1HiLim [X]

ExtValue2HiLim [X]

ExtValue3HiLim [X]

ExtValue4HiLim [X]

ExtValueX high limit. The value is not increased above this limit, even if the request still exists (via binary input ExtValueX up).

Step: 1 X

Range: *ExtValueXLoLim* – 32000 X

ExtValue1 rate [X/s] (FV)

ExtValue2 rate [X/s] (FV)

ExtValue3 rate [X/s] (FV)

ExtValue4 rate [X/s] (FV)

ExtValueX rate of change per second. If the binary input *ExtValueX down* or *ExtValueX up* is active, the value is changed according to this rate.

Step: 1 X/s

Range: 1 – 10000 X/s

Hint:

If binary input *ExtValueXreset* is active, the corresponding *ExtValueX* is held at its default value, regardless of the activity of inputs Up and Down and regardless of incoming external set commands.

Using this function in combination with Force value you can externally control selected setpoints’ values and achieve some special behaviour of the controller.

ExtValue1deflt [X] (FV)

ExtValue2deflt [X] (FV)

ExtValue3deflt [X] (FV)

ExtValue4deflt [X] (FV)

ExtValueX default (starting) value. If *ExtValueX* is changed from this default value using Modbus command, the new value is kept in *ExtValueX* until another command arrives or until the controller has been switched off. If the binary input *ExtValueXreset* is active, the *ExtValueX* is held at this value regardless of other conditions.
Step: 1 X
Range: -32000 – 32000 X

Load shedding

PwrLdShedAct [DISABLED / ISLAND ONLY / ISL+TRIP PARAL / ALL THE TIME] (FV)

Use this setpoint to select if and when is the active power (value *Act power*) based load shedding active:

DISABLED The load shedding function is disabled. All the load shedding outputs are open.
ISLAND ONLY Load shedding function is active only when genset operates in island. Load shedding outputs (e.g. LdShed stage 1) are controlled by the load shedding function.
ISL+TRIP PARAL This option works in the same way like ISLAND ONLY. In addition to that all load shedding outputs are activated with transition from the mains parallel to the island operation.
ALL THE TIME The load shedding function always works when genset is in operation.

Force value: Yes

PwrLdShedLvl [%] (FV)

Next load shedding stage is activated, if relative genset load (in percentage of the *Nomin power* setting) is above this level for the *Shed delay* time.
Step: 1 % of *Nomin power*
Range: *PwrLdRecLvl* - 200 % of *Nomin power*
Force value: Yes

PwrLdRecLvl [%] (FV)

Highest active load shedding stage is deactivated, if relative genset load (in percentage of the *Nomin power* setting) is below this level for the *Recon delay* time.
Step: 1 % of *Nomin power*
Range: 0 – *PwrLdShedLvl*
Force value: Yes

CurLdShedAct [DISABLED / ISLAND ONLY / ISL+TRIP PARAL / ALL THE TIME] (FV)

DISABLED Current Load shedding is switched off at all
ISLAND ONLY Current Load shedding is active only in island operation; before GCB closing all the LdShed outputs get closed; in parallel operation with mains is always switched off
ISL+TRIP PARAL The same functionality as ISLAND ONLY, but in additional it closes all the LdShed outputs during the power failure (=change from parallel to island operation); according to the Load in island operation it can be potentially reconnected beck
ALL THE TIME Current Load Shedding works only according to gen-set Power, it works without reference to operation type (island, parallel or any transitions)

Force value possibility: Yes

CurLdShedLvl [%] (FV)

When generator current in any phase exceeds this level for more than *Shed delay* time, controller proceeds to the next Load shedding stage - the next binary output Load shed x is closed.
Step: 1 % of *Nomin Current*
Range: *Ld recon level* - 200 % of *Nomin current*
Force value: Yes

CurLdRecLvl [%] (FV)

When gen-set current in all phases drops under this level for more than *Recon delay* time, controller proceeds to the lower Load shedding stage. The binary output for higher stage is opened (Load shed x). Automatic load reconnection works only when *AutoLd recon* = ENABLED.
Step: 1 % of *Nomin current*
Range: 0 - *Ld shed level*
Force value: Yes

FreqLdShedAct [DISABLED / ISLAND ONLY / ISL+TRIP PARAL / ALL THE TIME] (FV)

DISABLED Frequency Load shedding is switched off at all
ISLAND ONLY Frequency Load shedding is active only in island operation; before GCB closing all the LdShed outputs get closed; in parallel operation with mains is always switched off
ISL+TRIP PARAL The same functionality as ISLAND ONLY, but in additional it closes all the LdShed outputs during the power failure (=change from parallel to island operation); according to the Load in island operation it can be potentially reconnected beck
ALL THE TIME Frequency Load Shedding works only according to gen-set Power, it works without reference to operation type (island, parallel or any transitions)
Force value possibility: Yes

FreqLdShedLvl [%] (FV)

When generator frequency drops below this level for more than *Shed delay* time, controller proceeds to the next Load shedding stage - the next binary output Load shed x is closed.
Step: 1 % of Nomin freq
Range: 0 % of Nomin freq - Ld recon level
Force value: Yes

FreqLdRecLvl [%] (FV)

When generator frequency exceeds this level for more than *Recon delay* time, controller proceeds to the lower Load shedding stage. The binary output for higher stage is opened (Load shed x). Automatic load reconnection works only when *AutoLd recon* = ENABLED.
Step: 1 % of Nomin freq
Range: Ld shed level - 200 % of Nomin freq
Force value: Yes

VoltLdShedAct [DISABLED / ISLAND ONLY / ISL+TRIP PARAL / ALL THE TIME] (FV)

Use this setpoint to select if and when is the generator voltage based load shedding active:

DISABLED The load shedding function is disabled. All the load shedding outputs are open.
ISLAND ONLY Load shedding function is active only when genset operates in island. Load shedding outputs (e.g. LdShed stage 1) are controlled by the load shedding function.
ISL+TRIP PARAL This option works in the same way like ISLAND ONLY. In addition to that all load shedding outputs are activated with transition from the mains parallel to the island operation.
ALL THE TIME The load shedding function always works when genset is in operation.

Force value: Yes

VoltLdShedLvl [%] (FV)

Voltage load shedding functionality depends on *FixVoltProtSel* setting:

PHASE-NEUTRAL Load shedding evaluation is based on the lowest generator phase-neutral voltage. Next load shedding stage is activated, if generator voltage (in percentage of the *GenNomV* setting) is below this level for the *Shed delay* time.

PHASE-PHASE Load shedding evaluation is based on the lowest generator phase-phase voltage. Next load shedding stage is activated, if generator voltage (in percentage of the *GenNomVph-ph* setting) is below this level for the *Shed delay* time.

Step: 1 % of *GenNomV* or *GenNomVph-ph*
Range: *0 - VoltLdRecLvl*
Force value: Yes

VoltLdRecLvl [%] (FV)

Voltage load shedding functionality depends on *FixVoltProtSel* setting:

PHASE-NEUTRAL Load shedding evaluation is based on the lowest generator phase-neutral voltage. Highest active load shedding stage is deactivated, if generator voltage (in percentage of the *GenNomV* setting) is above this level for the *Recon delay* time.

PHASE-PHASE Load shedding evaluation is based on the lowest generator phase-phase voltage. Highest active load shedding stage is deactivated, if generator voltage (in percentage of the *GenNomVph-ph* setting) is above this level for the *Recon delay* time.

Step: 1 % of *GenNomV* or *GenNomVph-ph*
Range: *VoltLdShedLvl - 200*
Force value: Yes

Shed delay [s] (FV)

Time delay for both current and frequency *LD shed level* limit.
Step: 0,1 s
Range: 0,0 – 600,0 s
Force value possibility: Yes

Recon delay [s] (FV)

The amount of time that the current/frequency has to be under/above *recon level* before the next part of the load is reconnected.
Step: 1 s
Range: 0 - 600 s
Force value: Yes

AutoLd recon [DISABLED / ENABLED] (FV)

Switch between manual and automatic reconnection of shedded load.
DISABLED Rising edge on this input resets controller to the lower stage, but only if the load is under the *Ld recon level*. *Ld recon delay* is not important in this case.
ENABLED Load reconnection is automatic and depends on setpoints *Ld recon level* and *Ld recon delay*. Binary input MAN load recon has no function.

Hint:
Load shadding contains 10 levels for connect/disconnect of Loads. Now only configured Load shedding levels are used in system. In case of configure Load shedding levels 2,3,4 – system will operate with Load shedding levels 1,2,3 and 4 only. Important is the highest number of configured level of Load shedding.

Timer settings

TimerChannel1 … TimerChannel16

Defines the setting of particular timer channel.
There is 16 channels, each defines occurrence date and time (year, month, day, hour, minute), duration time (in minutes, maximum is 24*60), repeating period (day, week, month, once). In case of week – day of the week selection, when should be executed + selection of repeating (every 1st, 2nd, 3rd or 4th week); In case of month – day of the month selection (e.g. every 3rd day or every 2nd Monday)
Every channel can be disabled by blocking input (physical input or logical output). If blocking input is active then the timer is not activated.
All the channels are divided into groups of 4. Every group can have independent binary input. There is also one common input for all 16 channels.

Act. calls/SMS

History record [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a History record type “protection” occurs.
Force value: Yes
Hint:
If enabled for an SMS type active call, an empty Alarmlist would be sent, as this type of protection does not appear there. So together with the Alarmlist content, the prefix of the History record (“Hst” in English) is sent to indicate the reason for the active call (available in future SW versions).

Alarm only [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when an Alarm only type protection occurs.
Force value: Yes

Warning [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a Warning type protection occurs.
Force value: Yes

Off load [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when an Off load type protection occurs.
Force value: Yes
Hint:
If enabled for an SMS type active call, an empty Alarmlist would be sent, as this type of protection does not appear there. So together with the Alarmlist content, the prefix of the Off load protection (“OfL” in English) is sent to indicate the reason for the active call (available in future SW versions).

BrkOpen [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a BrkOpen type protection occurs.
Force value: Yes

Mains protect [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a Mains protect type protection occurs.
Force value: Yes
Hint:
If enabled for an SMS type active call, an empty Alarmlist would be sent, as this type of protection does not appear there. So together with the Alarmlist content, the prefix of the Mains protection (“MP” in English) is sent to indicate the reason for the active call (available in future SW versions).

Slow stop [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a Slow stop type protection occurs.
Force value: Yes

Shutdown [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a Shutdown type protection occurs.
Force value: Yes

ShutdownOvr [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a Shutdown Override type protection occurs.
Force value: Yes

AcallCH1..3-Type (FV)

Up to three separate channels are available for any of the following types of messages:
DISABLED: Channel is disabled.
DATA-ANA: Standard analog modem connection to monitoring SW.
DATA-GSM: Standard GSM modem connection to monitoring SW.
DATA-ISDN: Standard ISDN modem connection to monitoring SW.
DATA-CDMA: CDMA modem connection to monitoring SW.
SMS-GSM: Channel sends SMS message via GSM network. Only with GSM modem connected.
SMS-CDMA: Channel sends SMS message via CDMA network. Only with CDMA modem connected.
IB-E-MAIL: Channel sends E-mail. Only when IG-IB connected.
IB-EML-SMS: Channel sends E-mail in short format (SMS). Only when IG-IB connected.

An Email contains
- header with serial number and application info
- Alarm list contents
- latest 20 History records (reason, date, time)

Example of EML-SMS:
```
AL=(Sd Water Temp,Wrn Water Temp,!Emerg Stop,ActCallCH1Fail)
```

Hint:
GSM modem must be connected to controller for Active GSM call or SMS.
IG-IB does not support direct SMS, just as an email.
Connected device type (Analog / GSM / ISDN / CDMA modem) is recognized automatically.

AcallCH1..3-Addr

Address for channel 1...3 active call. Each above message type has either a phone number or an e-mail address associated to it.

For more details see PC software guide chapter IG-IB Internet communication.

Hint:
To receive active call run InteliMonitor – Type of connection = Active call. Active call window contains list of received ANT files. Each list item contains *Gen-set name*, Date, Time, controller serial number.

NumberRings AA [ ]

Number of rings prior to answering the modem connection from PC to controller.
Step: 1
Range: 1 – 30
Hint:
NumberRings AA change is not accepted immediately but after controller is switched on or when modem is connected to controller.

ActCallAttempt [1 to 250]

When an active call is issued, this setpoint defines the number of attempts to deliver the message.
Step: 1
Range: 1 to 250
Hint:
Timeout for connection is 90 sec and after 120 sec controller starts the next attempt. During the time the controller is trying to issue an active call, incoming calls are blocked.

Acall+SMS lang [1 to 7]

The setpoint specifies in which language the SMS and e-mail messages are issued in case of active call. Adjusted number corresponds to the order of a language as configured in GenConfig. If the selected number is out of range of possible languages of the controller, the first language is selected as default.

Date/Time

Time stamp act [DISABLED / ENGINE RUNNING / ALWAYS] (FV)

Defines the activity of time stamp function:
DISABLED No periodic records are made.
ENGINE RUNNING Records are made with period given by *Time stamp per* only if engine is running.
ALWAYS Records are made with period given by Time stamp per regardless of the engine state.
Force value: Yes

Time stamp per

Time interval for periodic history records.
Step: 1 min
Range: 1 - 240 min

#SummerTimeMd [DISABLED / WINTER / SUMMER, WINTER-S, SUMMER-S]

DISABLED: Automatic switching between summer and wintertime is disabled.
WINTER (SUMMER) : Automatic switching between summer and wintertime is enabled and it is set to winter (summer) season.
WINTER-S (SUMMER-S) : Modification for southern hemisphere.

PremortHistPer [s]

Range: [100ms – 200ms – 300ms – 1s – 3s]

This setpoint adjusts the period with which fast history records are written. Fast history is triggered if level 2 alarm (for more information on alarm levels please refer to this section) is issued and the LBI:ReadyToLoad=1 (at least one condition from this list is fullfiled). For any setting of this setpoint Fast History contains 50 records.

#Time [HHMMSS]

Real time clock adjustment.

#Date [DDMMYYYY]

Actual date adjustment.
Hint:
#Time and *#Date* setpoints are synchronized via CAN bus each hour with the lowest address controller. *#Time* or *#Date* change in any controller changes Time or Date in all controllers on CAN bus.

Table of values

Group: Gener values

Value: Act power

Group	Generator
Units	kW
Related FW	3.5.0
Description	Generator total active power.

Value: Act pwr L1

Group	Gener values
Units	kW
Related FW	3.5.0
Description	Generator active power in phase L1.

Value: Act pwr L2

Group	Gener values
Units	kW
Related FW	3.5.0
Description	Generator active power in phase L2.

Value: Act pwr L3

Group	Gener values
Units	kW
Related FW	3.5.0
Description	Generator active power in phase L3.

Value: React power

Group	Gener values
Units	kVAr
Related FW	3.5.0
Description	Generator total reactive power.

Value: React pwr L1

Group	Gener values

Units	kVAr
Related FW	3.5.0
Description	Generator reactive power in phase L1.

Value: React pwr L2

Group	Gener values
Units	kVAr
Related FW	3.5.0
Description	Generator reactive power in phase L2.

Value: React pwr L3

Group	Gener values
Units	kVAr
Related FW	3.5.0
Description	Generator reactive power in phase L3.

Value: Appar pwr

Group	Gener values
Units	kVA
Related FW	3.5.0
Description	Generator total apparent power.

Value: Appar pwr L1

Group	Gener values
Units	kVA
Related FW	3.5.0
Description	Generator apparent power in phase L1.

Value: Appar pwr L2

Group	Gener values
Units	kVA
Related FW	3.5.0
Description	Generator apparent power in phase L2.

Value: Appar pwr L3

Group	Gener values

Units	kVA
Related FW	3.5.0
Description	Generator apparent power in phase L3.

Value: Pwr factor

Group	Gener values
Units	-
Related FW	3.5.0
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	Gener values
Units	-
Related FW	3.5.0
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	Gener values
Units	-
Related FW	3.5.0
Description	Generator power factor in phase L1.

Value: Load char L1

Group	Gener values
Units	-
Related FW	3.5.0
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	Gener values
Units	-

Related FW	3.5.0
Description	Generator power factor in phase L2.

Value: Load char L2

Group	Gener values
Units	-
Related FW	3.5.0
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	Gener values
Units	-
Related FW	3.5.0
Description	Generator power factor in phase L3.

Value: Load char L3

Group	Gener values
Units	-
Related FW	3.5.0
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: Gen freq

Group	Gener values
Units	Hz
Related FW	3.5.0
Description	Generator frequency. The frequency is measured in the phase L3.

Value: Gen V L1-N

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator voltage in phase L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L2-N

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator voltage in phase L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L3-N

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator voltage in phase L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator voltage. Average from all three phases. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V ph-ph

Group	Gener values
Units	V
Related FW	3.5.0
Description	Average generator phase to phase voltage calculated from Gen V L1-L2, Gen V L2-L3 and Gen V L3-L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L1-L2

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator 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: Gen V L2-L3

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator 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: Gen V L3-L1

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator 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: Gen curr L1

Group	Gener values
Units	A
Related FW	3.5.0
Description	Generator current in phase L1. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Gen curr L2

Group	Gener values
Units	A
Related FW	3.5.0
Description	Generator current in phase L2. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Gen curr L3

Group	Gener values

Units	A
Related FW	3.5.0
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: Gen V unbal

Group	Gener values
Units	%
Related FW	3.5.0
Description	Generator voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the nominal voltage. **NOTE:** This value can be used for creating the generator voltage unbalance protection using the "universal analog protections".

Value: Gen I unbal

Group	Gener values
Units	V
Related FW	3.5.0
Description	Generator current unbalance. The value is calculated as maximal difference of two phase currents at one moment and expressed in % of the nominal current. **NOTE:** This value can be used for creating the generator current unbalance protection using the "universal analog protections".

Value: Slip freq

Group	Gener values
Units	Hz
Related FW	3.5.0
Description	Differential frequency between the generator and the mains/bus.

Value: Angle

Group	Gener values
Units	°
Related FW	3.5.0
Description	The angle between the phasors of the generator and mains/bus voltage.

Group: Mains values

Value: Mains freq

Group	Mains values
Units	Hz
Related FW	3.5.0
Description	Mains frequency. The frequency is measured in the phase L3.

Value: Mains V L1-N

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage in phase L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Mains V L2-N

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage in phase L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Mains V L3-N

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage in phase L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Mains V

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage. Average from all three phases. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Mains V ph-ph

Group	Mains values
Units	V
Related FW	3.5.0
Description	Average mains phase to phase voltage calculated from Mains V L1-L2, Mains V L2-L3 and Mains V L3-L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Mains V L1-L2

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage phase L1 to L2.

Value: Mains V L2-L3

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage phase L2 to L3.

Value: Mains V L3-L1

Group	Mains values
Units	V
Related FW	3.5.0
Description	Mains voltage phase L3 to L1.

Value: Mains V unbal

Group	Bus values
Units	V
Related FW	3.5.0
Description	Mains voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the Mains nominal voltage.

Value: Im3/EarthFC

Group	Mains values
Units	A
Related FW	3.5.0
Description	This value contains the current measured at the current input labeled "IN". This input is used either for measurement of the mains current in phase L3 or for earth

	fault current. The function depends on the setpoint *I/E-Pm meas*. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *EarthFltCurCTp* and *Im3/ErFlCurCTs*.

Value: Im3/EarthFC

Group	Mains values
Units	A
Related FW	3.5.0
Description	This value contains the current measured at the current input labeled "IN". This input is used either for measurement of the mains current in phase L3 or for earth fault current. The function depends on the setpoint *I/E-Pm meas*. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *Im3/ErFlCurCTp* and *Im3/ErFlCurCTs*.

Value: P mains

Group	Mains values
Units	kW
Related FW	3.5.0
Description	Actual active power imported from the mains. Method of the mains import measurement is adjusted by the setpoint *I/E-Pm meas*.

Value: Q mains

Group	Mains values
Units	kVAr
Related FW	3.5.0
Description	Actual reactive power imported from the mains. Method of the mains import measurement is adjusted by the setpoint *I/E-Qm meas*.

Value: Mains PF

Group	Mains values
Units	-
Related FW	3.5.0
Description	Cos-phi factor at the mains inlet.

Value: Mains LChr

Group	Mains values
Units	-
Related FW	3.5.0
Description	Character of the load as it is seen from the mains side at the mains inlet. "L" means inductive load, "C" is capacitive and "R" is resistive load.

Value: Object P

Group	Mains values
Units	kW
Related FW	3.5.0
Description	Actual active power consumed by the object. This value is calculated as sum of the *genset active power* and the *active power imported from the mains*.

Value: Object Q

Group	Mains values
Units	kVAr
Related FW	3.5.0
Description	Actual reactive power consumed by the object. This value is calculated as sum of the *genset reactive power* and the *reactive power imported from the mains*.

Value: Object PF

Group	Mains values
Units	-
Related FW	3.5.0
Description	Cos-phi factor at the load. This value is computed indirectly from the values *Object P* and *Object Q*.

Value: Object LChr

Group	Mains values
Units	-
Related FW	3.5.0
Description	Character of the object load. This value is computed indirectly from the values *Object P* and *Object Q*.

Value: MaxVectorS

Group	Mains values
Units	º
Related FW	3.5.0
Description	This is maximal measured value of vector shift of the generator voltage. The value is reset to 0 automatically in the moment of closing the GCB.

Group: Sync/Load ctrl

Value: ActPwrReq

Group	Sync/Load ctrl
Units	kW
Related FW	3.5.0
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: SpdRegOut

Group	Sync/Load ctrl
Units	V
Related FW	3.5.0
Description	This is the actual voltage on the speed governor output of the controller. In case the output is switched to PWM mode, the relation is 10V ~ 100% PWM.

Value: Speed request

Group	Sync/Load ctrl
Units	%
Related FW	3.5.0
Description	This value contains the speed control signal expressed in %. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed in %. The relation between *Speed request* and *SpdRegOut* is following: • 0% is sent for SpeedRegOut = -10V • 100% is sent for SpeedRegOut = 10V **NOTE:** Most of ECU units use the J1939 TSC1 frame for speed control, where the requested speed is expressed directly in RPM. Use the value *SpeedReq RPM* for this purpose.

Value: SpeedReq RPM

Group	Sync/Load ctrl
Units	RPM
Related FW	3.5.0
Description	This value contains the speed which is currently requested by the controller from the Engine unit. The relation between *SpeedReq RPM* and *Speed request* is following: • 0.9 * Nominal RPM is sent for 0%

	• 1.1 * Nominal RPM is sent for 100%

Value: SystLoadCtrl

Group	Sync/Load ctrl
Units	-
Related FW	3.5.0
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*.

Group: Volt/PF ctrl

Value: VoltRegOut

Group	Volt/PF ctrl
Units	%
Related FW	3.5.0
Description	This is the actual PWM percentage on the AVRi output of the controller.

Value: ReactPwrReq

Group	Volt/PF ctrl
Units	kVAr
Related FW	3.5.0
Description	ReactPwrReq (Reactive Power Request) is reactive power, which is used as requested value by the power factor regulation (when genset operates in parallel with mains).

Value: SystPfCtrl

Group	Volt/PF ctrl
Units	-
Related FW	3.5.0
Description	Code of the current power factor control mode..

Group: Force value

Value: ExtValue1

Group	Force value
Units	-
Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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: RPM In

Group	Engine values
Units	1/min
Description	Current engine speed. This value is showed in case of pick up connection. Controller does not use this value for control.

Value: UBat

Group	Analog CU
Units	V
Related FW	3.5.0
Description	Voltage at the controller power supply terminals.

Value: CPU Temp

Group	Analog CU
Units	ºC
Related FW	3.5.0
Description	Temperature inside the controller (on the CPU).

Value: D+

Group	Analog CU
Units	V
Related FW	3.5.0
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 input 1

Group	Analog CU
Units	configurable
Related FW	3.5.0
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 input 2

Group	Analog CU
Units	configurable
Related FW	3.5.0
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 input 3

Group	Analog CU
Units	configurable
Related FW	3.5.0
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 input 4

Group	Analog CU

Units	configurable
Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
Description	This is a bit array containing status of the binary outputs *Remote control1* ... *Remote control8*.

Value: ModbusSw1, ModbusSw2

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.

Group: Info

Value: Controller mode

Group	Info
Units	-
Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0

Description	Firmware branch code. Contains 1 in case of standard branches.

Value: PasswordDecode

Group	Info
Units	-
Related FW	3.5.0
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	3.5.0
Description	Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16. **NOTE:** The bit which corresponds to the own controller is always set to "1".

Value: CAN32

Group	Info
Units	-
Related FW	3.5.0
Description	Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32. **NOTE:** The bit which corresponds to the own controller is always set to "1".

Value: Reg16

Group	Info
Units	-
Related FW	3.5.0
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	3.5.0
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	3.5.0
Description	Bits of this value show "1" if the controller which has address corresponding with the bit position has GCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.

Value: GL32

Group	Info
Units	-
Related FW	3.5.0
Description	Bits of this value show "1" if the controller which has address corresponding with the bit position has GCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 17-32.

Value: Engine state

Group	Info
Units	-
Related FW	3.5.0
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	3.5.0

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	3.5.0
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	3.5.0
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: NextTime1-4

Group	Info
Units	-
Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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.

Value: GPS Speed

Group	Info
Units	kts
Related FW	3.5.0
Description	This value contains GPS Speed 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	3.5.0
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	3.5.0
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	3.5.0
Description	Engine operation hours counter. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: Num starts

Group	Statistics
Units	-
Related FW	3.5.0
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: Service time 1

Group	Statistics
Units	h
Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0

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	3.5.0
Description	This is the value of *PulseCounter #1* module. See the binary input *PulseCounter 1*.

Value: PulseCounter 2

Group	Statistics
Units	-
Related FW	3.5.0
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	3.5.0
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	3.5.0
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: GCB feedback

Related FW	3.5.0
Description	This input is used for connection of the normally open feedback contact from the generator circuit breaker or contactor. If the input is active, the controller will consider the GCB as closed and vice versa. • If the feedback does not respond to a change of the control output *GCB close/open* within 2s, the alarm *GCB Fail* will be issued. • If the feedback changes it's position unexpectedly without any command given by the control output, the alarm *GCB Fail* will be issued immediately. **NOTE:** This input is obligatory.

Binary input: MCB feedback

Related FW	3.5.0
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: Emergency Stop

Related FW	3.5.0
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 OFF

Related FW	3.5.0
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 SEM

Related FW	3.5.0
Description	The controller is forced into SEM 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 SEM mode is forced by this input.

Binary input: Remote AUT

Related FW	3.5.0
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:Remote TEST

Related FW	3.5.0
Description	The controller is forced into TEST mode while this input is active. This input can be used, among others, for following purposes: • In combination with a timer module for periodic testing of the engine. • In combination with the input *Test on load* for forcing the genset to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)

Binary input: AccessLock int

Related FW	3.5.0
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	3.5.0

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: Startblocking

Related FW	3.5.0
Description	Engine start is disabled while this input is active. *NotReady* state is displayed on the controller main screen and the message *Start blocking* is displayed in the Alarmlist. Use this input to disable temporarily the genset to be started e.g. from an higher-level automation device such as PLC. **NOTE:** The genset will not be stopped if the input is activated while the genset is running.

Binary input: Sd override

Related FW	3.5.0
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 • 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: GCB disable

Related FW	3.5.0

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

Binary input: GCB fdb neg

Related FW	3.5.0
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 *GCB feedback*. Maximal allowed time the both inputs are in the same position is 500ms, after this time the alarm *GCB Fail* is issued.

Binary input: MCB fdb neg

Related FW	3.5.0
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: HotStandBy

Related FW	3.5.0
Description	The controller behaves like when switched to OFF mode if input is closed. Opens all binary outputs but the output terminals that are configured with inversion are closed. Detection of "running engine" condition and subsequent alarm message "Sd Stop fail" is blocked. The controller shows "HotStandby" state and the engine can not be started from GeCon panel. Generator current and power (energy) measurement is active in this mode, regardless of the actual state of the engine. After the binary input HotStndBy is open again, the controller recovers to previous mode and behaves according to the actual situation. Should the engine run and any of the conditions to start the engine was active, it will keep the engine running. Function is active in any controller mode and activation of this input is written to history.

Binary input: ManualLdRecon

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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: GCBButton

Related FW	3.5.0
Description	This input is used for an external GCB button mounted on the switchboard. The function of the input is identical as function of the GCB button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: MCBButton

Related FW	3.5.0
Description	This input is used for an external MCB button mounted on the switchboard. The function of the input is identical as function of the MCB button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: ECUComFailBlck

Related FW	3.5.0
Description	The input disables issuing of the ECU communication failure alarm and all other alarms related to values that are being read from the ECU.

Binary input: PulseCounter 1

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0

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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
Description	This input is used to disable temporarily evaluation of the alarms caused by cylinder temperatures deviations. **NOTE:** For IS-NT only.

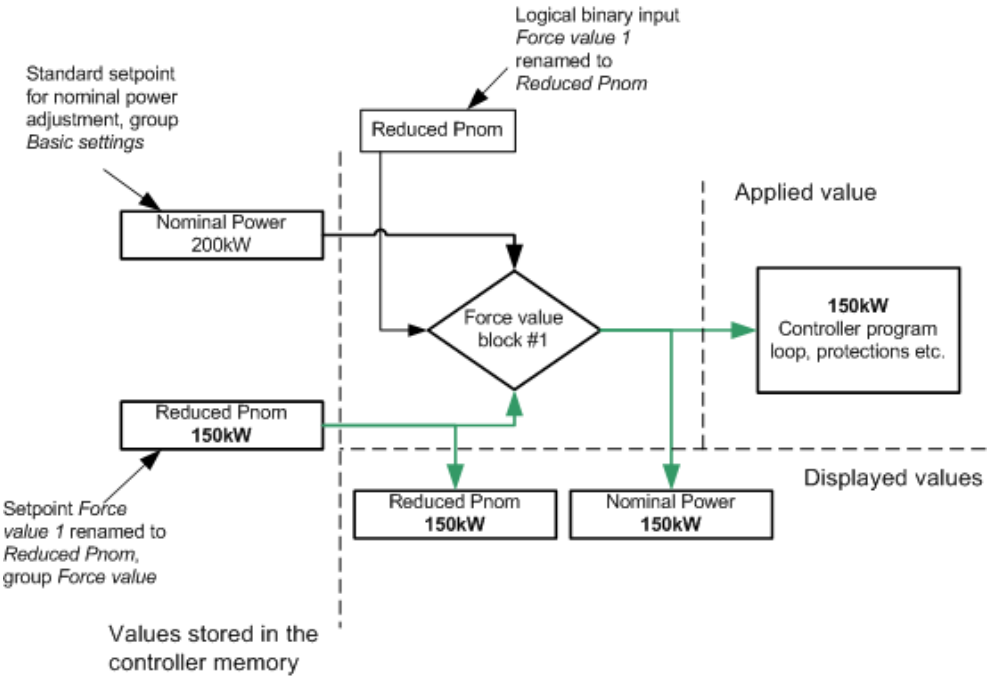
Binary input: CtrlHBeat sens

Related FW	3.5.0
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.

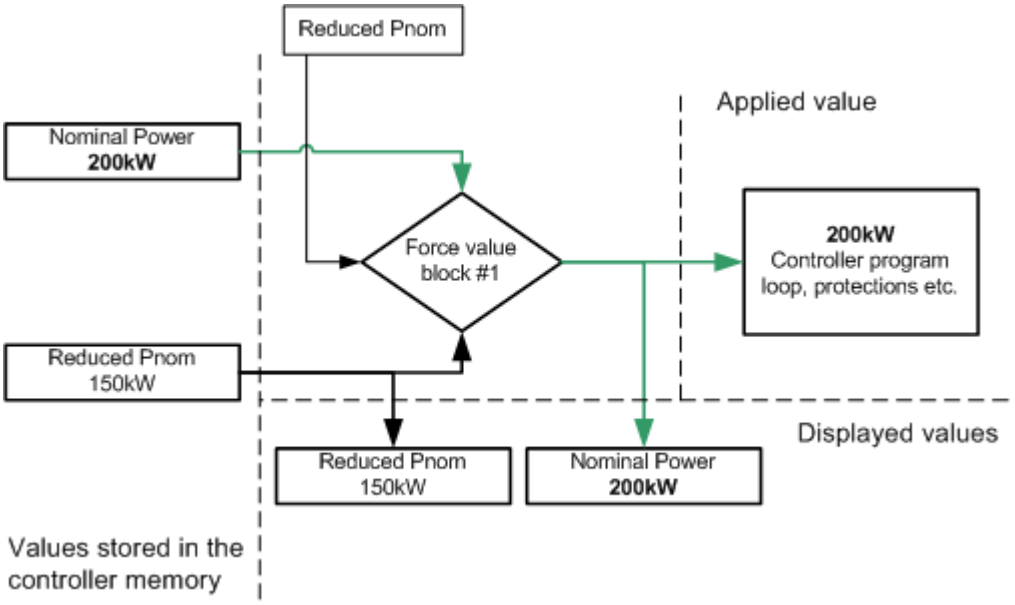
Binary input: ForceValueIn 1

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
Description	This is one of six 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	3.5.0
Description	This is one of six 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	3.5.0
Description	This is one of six 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: Force block 4

Related FW	3.5.0
Description	This is one of six 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 4* block type are blocked (i.e. temporarily disabled).

Binary input: Force block 5

Related FW	3.5.0
Description	This is one of six 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 5* block type are blocked (i.e. temporarily disabled).

Binary input: Force block 6

Related FW	3.5.0
Description	This is one of six 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 6* block type are blocked (i.e. temporarily disabled).

Binary input: Lang sel int A

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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 2

Related FW	3.5.0
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	3.5.0
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	3.5.0
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: ReadyToLoad

Related FW	3.5.0
Description	This input is determinated for signal from Engine unit. This Input indicates that engine unit is ready for Load, if the setpoint *ReadyToLoad* is set to EXTERNAL. **When the input is deactivated then the GCB is opened.** When this input is activated then Min Stab Time start is counted down.

Binary input: GCB close

Related FW	3.5.0
Description	This input is determinated for safety hand control in SEM mode. LBI: GCB close is accepted in SEM mode when LBI:ReadyToLoad=1 ,there are no alarms 2nd level in alarmlist and Gen voltage and frequency are in limits . - In case of no voltage on BUS bar – GCB is closed. - In case of correct voltage and frequency on the bus – Synchronisation is activated and subsequently GCB is closed. **NOTE:** LBI: GCB open has higher priority, in case of activation LBI:GCB open – the LBI:GCB closed will be suppressed.

Binary input: GCB open

Related FW	3.5.0
Description	Active *GCB open* input blocks GCB closing or initiates the soft unload procedure. GCB open command is issued, if the generator load is below the *GCB open level* or the *GCB open del* time has elapsed. In case genset does not operate in parallel with mains, the GCB is opened immediately. It works in this way with all modes except the OFF mode.

Binary input: Gen sync

Related FW	3.5.0
Description	This input is determinated for activation Synchronisation process, supported in SEM mode only. LBI:Gen sync = 1 – regulations for synchronisation are activated. LBI:Gen sync = 0 – regulations for synchronisation are deactivated. This function is designed for holding the generator In synchronism (according phase and voltage limits –set by setpoints).

	This function **NEVER** closes the GCB. **NOTE:** This function can by blocked by LBI:Sync disable.

Binary input: Sync disable

Related FW	3.5.0
Description	This function blocks synchronisation process – in SEM and AUT mode.

Binary input: Gen unload / Load/Unload

Related FW	3.5.0
Description	This function is designed for control of unloading/loading – for example when the user needs manually open the GCB (the by this function can make unloading and open breaker without big floating current. Function is control by level: - Active: Generator starts unloading (according the ramp) and stays on zero load - Deactivate: Generator is loading back according to ramp to require value from system - This function does not control the breaker.

Binary input: Test on load

Related FW	3.5.0
Description	This input is used to force the genset to take over the load in TEST mode. **NOTE:** This logical input can be configured together with the input *Remote TEST* onto one controller terminal and then the "test with load" function can be activated by one signal. That means e.g. if a mains supply interruption is expected, the controller can be forced to start, take the load over and disconnect the mains prior to the interruption occurs. Then, after the mains has been restored, the signal is removed and the controller transfers the load back to the mains.

Binary input: MCB disable

Related FW	3.5.0
Description	The input is used to disable issuing the MCB closing command. • If the input is active during synchronizing, the controller will keep the loaded genset synchronized with the mains without issuing the MCB closing command until the input is deactivated or *Sync timeout* is elapsed. • If the input is active and the MCB button is pressed in MAN mode to close the MCB to dead bus, the MCB will not be closed until the input is deactivated and the MCB button pressed again. • If the input is active and the MCB is to be closed to dead bus

	automatically, the MCB will not be closed until the input is deactivated.

Binary input: RevPowerTest

Related FW	3.5.0
Description	The input is used for the reverse power protection testing. It is done by forcing the speed regulator output (SRO) to the level given by the *RevPowerTest* setpoint: • LBI: *RevPowerTest* is activated - currently used regulation is stopped and the SRO output is forced to the *RevPowerTest* setpoint level • LBI: *RevPowerTest* is deactivated - SRO related regulation is started at the *RevPowerTest* setpoint level and regulates to a requested power/frequency

Table of analog input functions

Analog input: Act power

Related FW	3.5.0
Description	Use this input to measure value *Act power* (generator active power) using an external power meter. This LAI is used to measure the power instead of the internal measurement, if a source signal is configured to this LAI. These protections do not work, if LAI: *Act power* is configured: • active power IDMT protection - setpoints *OverldStrtEval* and *2POvrldStEvDel* • excitation loss protection - setpoints *ExcitationLoss* and *ExctLoss del* **NOTE:** Act power is the only generator power related value, which is available, when this function is used! The other power related values (active, reactive, apparent power, PF etc.) are always 0.

Analog input: Gen curr L1

Related FW	3.5.0
Description	Use this input to measure value *Gen curr L1* (generator current in phase L1) using an external meter. This LAI is used to measure the current instead of the internal measurement, if a source signal is configured to this LAI. These protections do not work, if LAI: *Gen curr L1* is configured: • short current protection - setpoints *Ishort* and *I*short *del* • IDMT current protection - setpoints *2Inom del* and *IDMTCurrEval* **NOTE:** Act power is the only generator power related value, which is available, when this function is used! The other power related values (active, reactive, apparent power, PF etc.) are always 0.

Analog input: Gen curr L2

Related FW	3.5.0
Description	Use this input to measure value *Gen curr L2* (generator current in phase L2) using an external meter. This LAI is used to measure the current instead of the internal measurement, if a source signal is configured to this LAI. These protections do not work, if LAI: *Gen curr L2* is configured: • short current protection - setpoints *Ishort* and *I*short *del* • IDMT current protection - setpoints *2Inom del* and *IDMTCurrEval* **NOTE:** Act power is the only generator power related value, which is available, when this function is used! The other power related values (active, reactive, apparent power,

	PF etc.) are always 0.

Analog input: Gen curr L3

Related FW	3.5.0
Description	Use this input to measure value *Gen curr L3* (generator current in phase L3) using an external meter. This LAI is used to measure the current instead of the internal measurement, if a source signal is configured to this LAI. These protections do not work, if LAI: *Gen curr L3* is configured: • short current protection - setpoints *Ishort* and *I*short *del* • IDMT current protection - setpoints *2Inom del* and *IDMTCurrEval* **NOTE:** Act power is the only generator power related value, which is available, when this function is used! The other power related values (active, reactive, apparent power, PF etc.) are always 0.

Analog input: LCD brightness

Related FW	3.5.0
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: PowerDerating1

Related FW	3.5.0
Description	This is the input into the *Power derating* block #1. See details about the function in the chapter Power derating.

Analog input: PowerDerating2

Related FW	3.5.0
Description	This is the input into the *Power derating* block #2. See details about the function in the chapter Power derating.

Analog input: LdCtrl:AnExBld

Related FW	3.5.0
Description	This functional input is used for requesting the **gen-set baseload** externally by an analog input. The setpoint *Load ctrl PtM* must be set to ANEXT BASELOAD position.

Analog input: LdCtrl:AnExI/E

Related FW	3.5.0
Description	This functional input is used for requesting the **mains import** value externally by an analog input. The setpoint *Load ctrl PtM* must be set to ANEXT IM/EX position.

Analog input: PFCtrl:AnExBPF

Related FW	3.5.0
Description	This functional input is used for requesting the **gen-set cos phi** factor externally by an analog input. The setpoint *PF ctrl PtM* must be set to ANEXT BASEPF position. The analog value is transformed to the requested cos phi factor following way: **ANALOG VALUE** / **COS PHI FACTOR** <60 / 0.6L 60 .. 100 / 0.6L .. 1.00 101 .. 120 / 0.99C .. 0.80C

Analog input: PFCtrl:AnExI/E

Related FW	3.5.0
Description	This functional input is used for requesting the **mains cos phi factor** externally by an analog input. The setpoint *PF ctrl PtM* must be set to ANEXT PF-IM/EX position. The analog value is transformed to the requested cos phi factor following way: **ANALOG VALUE** / **COS PHI FACTOR** <60 / 0.6L 60 .. 100 / 0.6L .. 1.00 101 .. 120 / 0.99C .. 0.80C

Analog input: LdCtrl:I/E-Pm

Related FW	3.5.0
Description	This functional input is used for connecting of an external device, which measures the **active** power imported from the mains. The device is connected to the controller via an analog input (e.g. -20 .. 20mA). The setpoint *I/E-Pm meas* must be set to the ANALOG INPUT position for this case.

Analog input: PFCtrl:I/E-Qm

Related FW	3.5.0
Description	This functional input is used for connecting of an external device, which measures the **reactive** power imported from the mains. The device is connected to the controller via an analog input (e.g. -20 .. 20mA). The setpoint *I/E-Qm meas* must be set to the ANALOG INPUT position for this case.

Analog input: Cyl temp 1

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #1. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 2

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #2. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 3

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #3. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 4

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #4. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 5

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #5. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 6

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #6. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 7

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #7. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 8

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #8. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 9

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #9. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 10

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #10. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 11

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #11. Used for computing of values *T*

	Cyl aver, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 12

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #12. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 13

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #13. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 14

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #14. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 15

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #15. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 16

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #16. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 17

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #17. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 18

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #18. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 19

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #19. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 20

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #20. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 21

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #21. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 22

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #22. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:**

	Available in IS-NT only.

Analog input: Cyl temp 23

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #23. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 24

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #24. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 25

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #25. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 26

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #26. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 27

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #27. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 28

Related FW	3.5.0

Description	Logical analog input for cylinder temperature #28. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 29

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #29. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 30

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #30. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 31

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #31. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 32

Related FW	3.5.0
Description	Logical analog input for cylinder temperature #32. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cold temp 1

Related FW	3.5.0
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	3.5.0
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	3.5.0
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

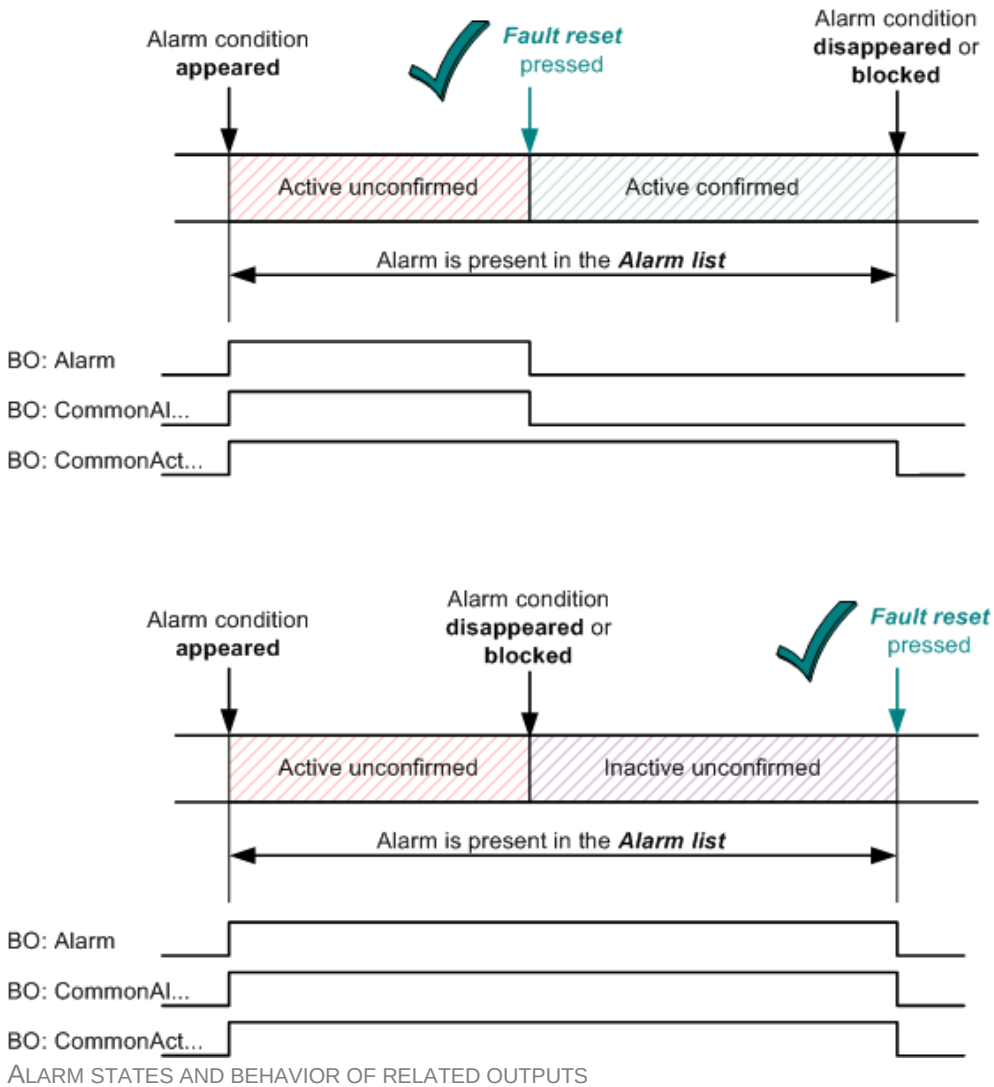
Related FW	3.5.0
Description	If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature 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.

Analog input: LdCtrl:TByPwr

Related FW	3.5.0
Description	This functional input is used as the temperature input into the load control loop if the loop is switched into "T BY PWR" position. More information is available at the setpoint *Load ctrl PtM*.

Table of binary output functions

Binary output: Alarm

Related FW	3.5.0
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	3.5.0
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.

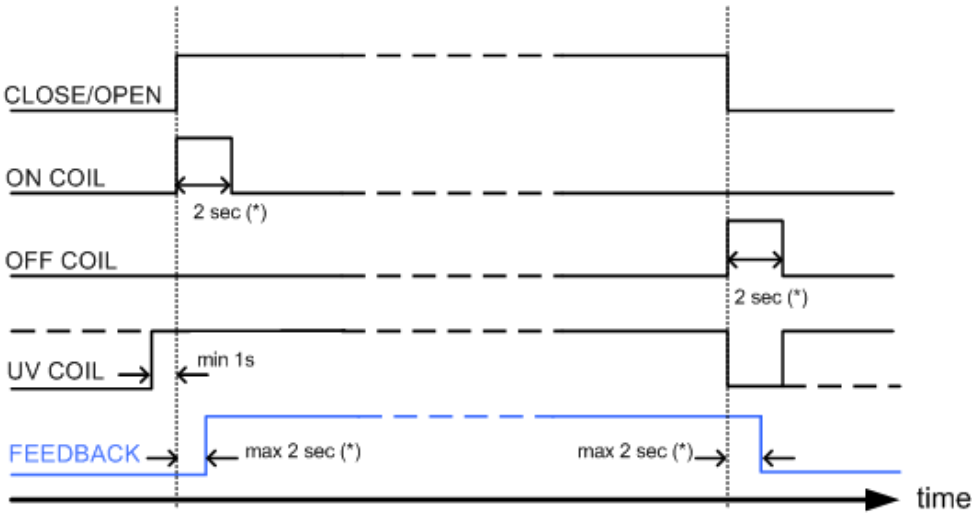
Binary output: CommonAlLev 1

Related FW	3.5.0
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	3.5.0
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: GCB Close/Open

Related FW	3.5.0
Description	This output is intended for control of the GCB if a **contactor** is used as GCB. The output provides continuous signal while the GCB has to be closed. There are also other outputs availabe for GCB control: • *GCB ON coil* • *GCB OFF coil* • *GCB UV coil*  (*) 5 sec if synchronizing with the particular breaker is disabled. TIMING OF BREAKER CONTROL OUTPUTS

Binary output: GCB ON Coil

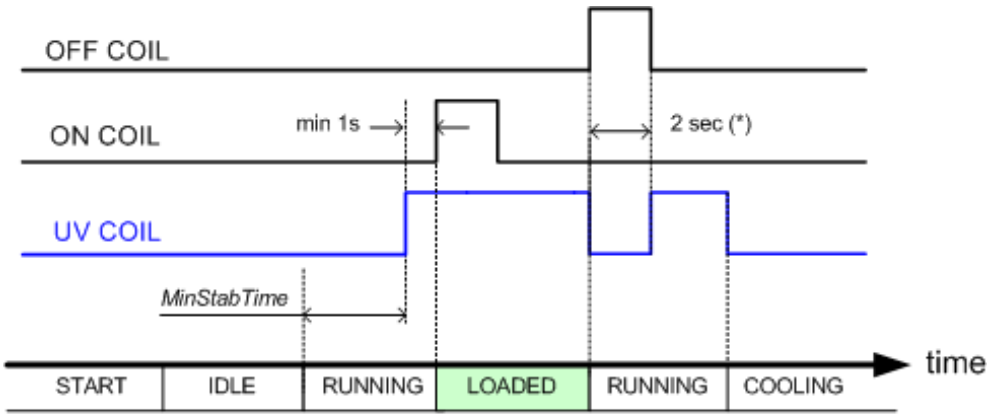
Related FW	3.5.0
Description	This output is intended for closing of the GCB using ON coil if a **circuit breaker** is used as GCB. The output provides 2 sec pulse when the GCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for GCB control: • *GCB close/open* • *GCB OFF coil* • *GCB UV coil*

Binary output: GCB OFF Coil

Related FW	3.5.0
Description	This output is intended for opening of the GCB using OFF coil if a **circuit breaker** is used as GCB. The output provides 2 sec pulse when the GCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for GCB control: • *GCB close/open* • *GCB ON coil* • *GCB UV coil*

Binary output: GCB UV Coil

Related FW	3.5.0
Description	This output is intended for opening of the GCB using an undervoltage coil if a **circuit breaker** is used as GCB. • The output is closed after the gen-set has been started, *Min stab time* has elapsed and the generator voltage and frequency has got into limits. GCB closing command is blocked for 1 sec after the UV coil has been closed to allow the breaker mechanical system getting ready for closing. • The output is opened for 2 sec when the GCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 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 GCB (e.g. in MAN). • The output remains opened if the *Cooling* phase follows after opening of the GCB.



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

GCB UV COIL OUTPUT TIMING

There are also other outputs availabe for GCB control:

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

Binary output: MCB Close/Open

Related FW	3.5.0
Description	This output is intended for control of the MCB if a **contactor** is used as MCB. The output provides continuous signal while the MCB has to be closed. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. **NOTE:** Use *invert* function when configuring the output in GenConfig to obtain **inverted function** of the output, i.e. output is closed while the MCB has to be open. There are also other outputs availabe for MCB control: • *MCB ON coil* • *MCB OFF coil* • *MCB UV coil*

Binary output: MCB ON Coil

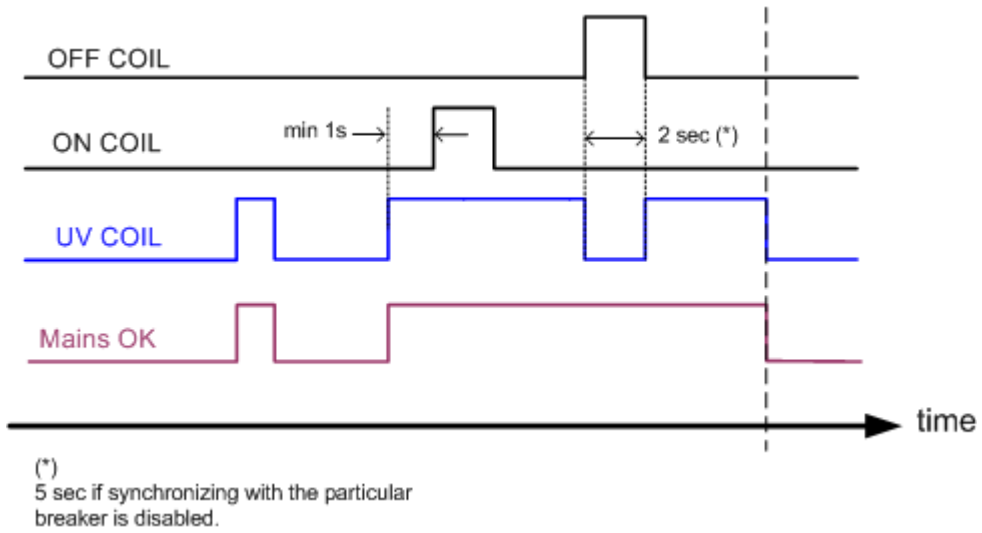
Related FW	3.5.0
Description	This output is intended for closing of the MCB using ON coil if a **circuit breaker** is used as MCB. The output provides 2 sec pulse when the MCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for MCB control:

	• MCB close/open • MCB OFF coil • MCB UV coil

Binary output: MCB OFF Coil

Related FW	3.5.0
Description	This output is intended for opening of the MCB using OFF coil if a **circuit breaker** is used as MCB. The output provides 2 sec pulse when the MCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the GCB close/open output. There are also other outputs availabe for MCB control: • MCB close/open • MCB ON coil • MCB UV coil

Binary output: MCB UV Coil

Related FW	3.5.0
Description	This output is intended for opening of the MCB using an undervoltage coil if a **circuit breaker** is used as MCB. • The output is closed while mains values are within limits. MCB closing command is blocked for 1 sec after the UV coil has been closed to allow the breaker mechanical system getting ready for closing. • The output is opened for 2 sec when the MCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 5sec. 

	MCB UV COIL OUTPUT TIMING There are also other outputs availabe for GCB control: • *MCB close/open* • *MCB ON coil* • *MCB OFF coil*

Binary output: Stop Pulse

Related FW	3.5.0
Description	One second pulse is issued at this output when the engine is required to start

Binary output: Stop Pulse

Related FW	3.5.0
Description	One second pulse is issued at this output when the engine is required to stop (i.e. this pulse does not commence stopping sequence but it is rather an actual command to engine physical stopping). The output is especially intended to be used as stop command for ECU-controlled engines, which support stop command via the communication bus (e.g. J1939).

Binary output: Speed up

Related FW	3.5.0
Description	This output together with the complementary output *Speed dn* are designed for speed and power control at gen-sets where the speed governor does not support analogue control. **NOTE:** The governor is recommended to be configured for droop function when these outputs are used for power control. **NOTE:** The alarm *Wrn SpdRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: Speed dn

Related FW	3.5.0
Description	This output together with the complementary output *Speed up* are designed for speed and power control at gen-sets where the speed governor does not support

	analogue control. **NOTE:** The governor is recommended to be configured for droop function when these outputs are used for power control. **NOTE:** The alarm *Wrn SpdRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: AVR up

Related FW	3.5.0
Description	This output together with the complementary output *AVR dn* are designed for voltage and power factor control at gen-sets where the AVR does not support analogue control. **NOTE:** The AVR is recommended to be configured for droop function when these outputs are used for power factor control. **NOTE:** The alarm *Wrn VoltRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: AVR dn

Related FW	3.5.0
Description	This output together with the complementary output *AVR up* are designed for voltage and power factor control at gen-sets where the AVR does not support analogue control. **NOTE:** The AVR is recommended to be configured for droop function when these outputs are used for power factor control. **NOTE:** The alarm *Wrn VoltRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: Vgen <>

Related FW	3.5.0
Description	The output is closed while the *generator over/under voltage* alarm is present in the alarm list.

Binary output: Vmains <>

Related FW	3.5.0
Description	The output is closed while the *mains over/under voltage* alarm is present in the alarm list.

Binary output: VectorShiftTrp

Related FW	3.5.0
Description	The output closes if the *Vector shift* protection gets active and the controller trips the selected breaker. The output stays closed for 3s, then opens again. **NOTE:** See also the output *VectorShiftAct*.

Binary output: VectorShiftAct

Related FW	3.5.0
Description	The output closes if the Vector shift protection gets active. It stays closed for 3s, then opens again. This output is activated even if the selected breaker is actually not tripped because of the input *Sd override* is active. **NOTE:** See also the output *VectorShiftTrp*.

Binary output: PeriphCommErr

Related FW	3.5.0
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: Overcurrent

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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 BO

Related FW	3.5.0
Description	The output is closed while there is at least one alarm of the *Breaker open* 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 MP

Related FW	3.5.0
Description	The output is closed while there is at least one alarm of the *Mains protection* type present in the alarm list. See the chapter Alarm management for more information.

Binary output: Common AI

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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: T cyl differ

Related FW	3.5.0
Description	IS-NT specific function! The output is closed while the alarm *cylinder temperature difference* alarm is active.

Binary output: FaultButnEcho

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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: GCBButnEcho

Related FW	3.5.0
Description	This output provides 1s pulse when: • *GCB* button is pressed on the controller front panel or • *GCB* button is pressed on any of external local/remote terminals or • *GCB close/open* command is received via communication line or • the input *GCBButton* is activated.

Binary output: MCBButnEcho

Related FW	3.5.0
Description	This output provides 1s pulse when: • *MCB* button is pressed on the controller front panel or • *MCB* button is pressed on any of external local/remote terminals or • *MCB close/open* command is received via communication line or • the input *MCBButton* is activated.

Binary output: GCB status

Related FW	3.5.0
Description	This output indicates the GCB position, how it is internally considered in the controller. The position is based on *GCB feedback* input and optionally also on the *GCB 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 GCB position according to the feedbacks. • If both feedbacks are used, however they do not match each other, the output remains in previous position when they matched. The output can be used for indication of the GCB position.

Binary output: MCB status

Related FW	3.5.0
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: Gen params OK

Related FW	3.5.0
Description	This output indicates that the generator actually provides proper voltage and frequency. The output is closed while the gen-set is running (regardless of whether GCB is closed or not) and **all generator electrical parameters** are in limits. **NOTE:** This output combined with a PLC block *Delay* can be used for switching on/off of some auxiliary devices (e.g. cooling pump), that are supplied directly from generator (before GCB). The delay is reccommended to allow the generator getting stable and avoid unnecessary switching the auxiliary device on and off just after start.

Binary output: MainsParams OK

Related FW	3.5.0
Description	This output indicates that the mains is healthy. The output is closed while **all mains electrical parameters** are in limits.

Binary output: kWh pulse

Related FW	3.5.0
Description	This output generates 100ms pulse always when the internal kWh counter incremented.

Binary output: In synchronism

Related FW	3.5.0
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: Derating 1 act

Related FW	3.5.0
Description	IS-NT specific funtion! This output is closed when level 1 derating is active. For more information on power derating see chapter Power derating.

Binary output: Derating 2 act

Related FW	3.5.0
Description	IS-NT specific funtion! This output is closed when level 2 derating is active. For more information on power derating see chapter Power derating.

Binary output: Neutral CB C/O

Related FW	3.5.0
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: ECU Comm Error

Related FW	3.5.0
Description	The output is closed while there is an error in the communication with ECU, i.e. while there is the alarm *ECU comm error* present in the alarm list.

Binary output: PeriphCommErr

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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 3-10

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
Description	This is combined output from all timer channels. The output is active if at least one timer channel is active.

Binary output: MODES: Off mode

Related FW	3.5.0
Description	The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input *Remote OFF*).

Binary output: MODES: Sem mode

Related FW	3.5.0
Description	The output is closed while the controller is currently in SEM mode.

Binary output: MODES: TEST mode

Related FW	3.5.0
Description	The output is closed while the controller is currently in TEST mode.

Binary output: MODES: Aut mode

Related FW	3.5.0

Description	The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input *Remote AUT*).

Binary output: Ready for Load

Related FW	3.5.0
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	3.5.0
Description	The output closes at the beginning of the prestart phase and opens after the gen-set has been fully stopped. If the gen-set fails to start the output opens after the last cranking attempt. **NOTE:** The output also closes if the engine begins to rotate spontaneously.

Binary output: Operational

Related FW	3.5.0
Description	The output is closed when the gen-set is ready for operation or is currently in operation.

Binary output: Not ready

Related FW	3.5.0
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 gen-set.

Binary output: Starting

Related FW	3.5.0
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 gen-set 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	3.5.0
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	3.5.0
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: ReverseSynchro

Related FW	3.5.0
Description	The output is closed during reverse synchronizing (synchronizing of loaded gen-set back to the mains) and opens when the output *MCB status* is activated (= MCB was closed). **NOTE:** The output can be used for external synchronizing module control.

Binary output: Soft load

Related FW	3.5.0
Description	The output is closed during gen-set soft loading period – i.e. it is closed when the gen-set has been synchronized to the mains/bus and GCB has been closed and opened again when the ramp of the gen-set power reached the required level. **NOTE:** The output is not closed during the warming period.

Binary output: Loaded

Related FW	3.5.0
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: Soft unld

Related FW	3.5.0
Description	The output is closed while the gen-set is beeing unloaded before opening GCB.

Binary output: Stopping

Related FW	3.5.0
Description	The output closes when the Stop pulse was sent to engine controller and LBI:RadyToLoad is still active

Binary output: Stopped

Related FW	3.5.0
Description	The output closes when the Stop pulse was sent to engine controller and LBI:RadyToLoad is not active

Binary output: Logical 0

Related FW	3.5.0
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	3.5.0
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: Remote S/S

Related FW	3.5.0
Description	This output is active

Binary output: WrongPhSeq

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0

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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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: CAN2 bus empty

Related FW	3.5.0
Description	The output is closed while there is the alarm *CAN2 bus empty* present in the alarm list, i.e. if the controller doesn't detect any other controller on the CAN2 bus. This alarm can be disabled by the setpoint *CAN2emptDetect*.

Alarm output: ECU

Related FW	3.5.0
Description	The output is closed while there is the *ECU* alarm present in the alarm list, i.e. if an ECU unit is configured and it does not communicate with the controller althought it is required to communicate.

Alarm output: SHBinCfgErr

Related FW	3.5.0
Description	The output is closed while there is the *SHBinCfgErr* alarm present in the alarm list, i.e. if there is **more than one controller** on the CAN2 bus, which has configured the SHBOUT peripherial module **with the same index**.

Alarm output: SHAinCfgErr

Related FW	3.5.0
Description	The output is closed while there is the *SHAinCfgErr* alarm present in the alarm list, i.e. if there is **more than one controller** on the CAN2 bus, which has configured the SHAIN peripherial module **with the same index**.

Alarm output: ECUDiagBlocked

Related FW	3.5.0
Description	The output is active when receiving of diagnostic messages from the ECU is disabled (*ECU diag* = DISABLED).

Alarm output: WrongConfig

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0

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: Stp GCB fail

Related FW	3.5.0
Description	This output is closed while the *Stp GCB fail* alarm is present in the alarm list. **NOTE:** The *Stp GCB fail* alarm is temporarily disabled, if controller is powered up when genset already runs, GCB is closed and LBI: ReadyToLoad is active. It enables to power up controller after genset was started and loaded.

Alarm output: BO NCB fail

Related FW	3.5.0
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	3.5.0
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	3.5.0
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	3.5.0
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: OfL StartBlck

Related FW	3.5.0
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	3.5.0
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: PLC State 1

Related FW	3.5.0
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	3.5.0
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.

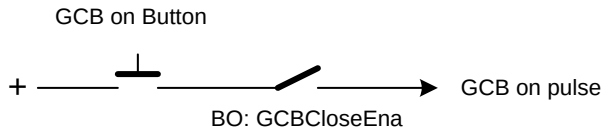
Alarm output: PLC State 3

Related FW	3.5.0
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	3.5.0
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.

Binary input: GCBCloseEna

Related FW	3.5.0
Description	The output can be used for safe “by hand” GCB closing. The output activity is based on condition “In synchronism” OR “Dead bus” (any bus phase voltage is below 15 VAC). Output is opened when GCB is closed. Signal is evaluated if Gen sync=1, if the voltages are in synchronism, then GCBCloseEna=1. For modes: MAN, SEM. In synchronism state means - when both sides of measurement (generator voltages and Bus voltages are In synchronism – according to condition based on setpoints: - Voltage window - Phase window - Dwell time *Hint:* In MAN mode, function Gen sync=1 does nothing, just causes possibility to evaluate GCBCloseEna signal. 

Binary input: New Alarm

Related FW	3.5.0
Description	This LBO generates one pulse (length 1s) when new alarm is added to alarm list.

Binary input: New ECU Alarm

Related FW	3.5.0
Description	This LBO generates one pulse (lenth 1s) when new alarm from ECU is added to alarm list.

Binary output: ModbusSw1-32

Related FW	3.5.0
Description	These LBO show state of Modbus switches (registers) 1-32. The modbus registers are shown in the controller in the form of two values and

	also as a set of logical binary outputs. These outputs may be used further in the configuration and connected to other functions in the controller.

Binary output: Initialized

Related FW	3.5.0
Description	This logical binary output function can be used for indication of fully initialized controller after power on. Furthermore it is useful to block Delay functions in the controller during the initialization phase of controller power up (outputs of Delays in the controller are activated immediately during the power on if Delay input is active prior and during the power up).

Controller configuration and monitoring

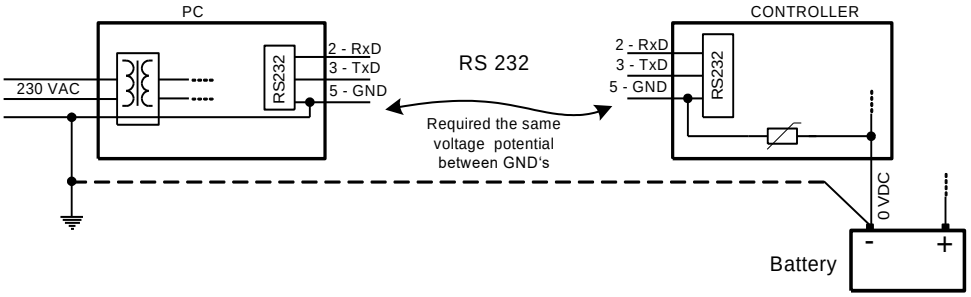
IGS-NT installation pack contains separate PC software tools: GenConfig (GC) and InteliMonitor (IMON). GC and IMON are based on Windows 95/98/NT/ME/2000/XP or higher platform and require approximately 15 Mbyte of hard disc free space.

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 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 engine 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 or 38400 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

Hint:
Detail Modbus command description see in ComAp Communication 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.

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