

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

Inteli New Technology Modular Gen-set Controller

*Single Parallel Island application for Asynchronous
Generators*

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

Software version IGS-NT-Async-1.2, February 2011



USER GUIDE



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General guidelines

What is described in this manual?

This manual describes IGS-NT-Async-SPI software application for Asynchronous generators with enhanced functions for gas engines and heat control. The software configuration is designed for single set, parallel with mains operation.

Note:

- No MCB control is provided by the controller.
- The MCB feedback must be detected for proper functionality of application.

What is the purpose of this manual?

This manual provides general information on how to configure and operate the controller.

This manual is intended for use by:

Operators of gen-sets

Gen-set control panel builders

For everybody who is concerned with installation, operation and maintenance of the gen-set

!! Warnings !!

Remote control

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

To be sure:

Disconnect remote control via RS232 line

Disconnect input REMOTE START/STOP

or

Disconnect output STARTER and outputs GCB CLOSE/OPEN

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

Conformity declaration



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

Note:

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

WARNING – VERY IMPORTANT !!!

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

Every time you want disconnect following IntelliGen^{NT} controller terminals:

- Mains voltage measuring

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

!!! CAUTION !!!***Dangerous voltage***

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

Adjust set points

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

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

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

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 allow 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 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.

Available related documentation

<i>PDF files</i>	<i>Description</i>
IGS-NT-2.4-Application guide.pdf	Application guide for IG/IS-NT
IGS-NT-2.5-Installation guide.pdf	Installation guide for IG/IS-NT
IGS-NT-2.0-Operator guide.pdf	Operator guide for IG/IS-NT
IGS-NT-BB Communication Guide 01-2011	Communications guide for IG/IS-NT(C)-BB controllers
IG/IS-NT Communication Guide 12-2009	Communication guide for IG/IS-NT controllers

Functions

OFF-MAN-SEM-AUT mode

OFF mode

Outputs STARTER, GCB CLOSE/OPEN and FUEL SOLENOID are not energized.

Genset cannot be started. If **START**, **STOP**, **GCB ON/OFF** buttons are pressed the controller will not respond.

When the gen-set is running it is not possible to switch directly to OFF mode. First you have to stop the engine.

MAN mode

- 1) **START** button - starts the gen-set.
- 2) **GCB ON/OFF** button
 - a) controller does not close GCB to the dead bus.
 - b) When Mains is within limits and MCB feedback is closed the controller starts RPM matching and closes GCB when all matching conditions are met.
 - c) The controller closes GCB (during RPM matching procedure) when
 - (a) engine RPM = Requested RPM \pm **RPM/Load ctrl: RPM matching**,
 - (b) where Requested RPM = $f_{mains} * \text{Nominal RPM} / \text{Nominal freq}$
 - d) Electric generator protections are activated 2s after GCB is closed.
 - e) GCB automatically opens after mains fail
 - f) Opens the GCB if it is closed.
- 3) **STOP** button stops the gen-set.

Hint:

The gen-set is permitted to run unloaded for an unlimited time.

The controller does not automatically stop the unloaded running gen-set in MAN mode.

The controller does not respond to binary input REM START/STOP.

Load control in parallel depends on **ProcessControl**: *Load control* = BASELOAD or IMP/EXP setpoints.

SEM

- 1) **START** button - starts the gen-set.
 - a) The controller does not close GCB to the dead bus.
 - b) When Mains is within limits and MCB feedback is closed controller starts RPM matching and closes GCB when all matching conditions are met (see in MAN mode). Gen-set remains running in parallel.
 - c) When Mains failure is recognized during parallel operation - controller opens GCB and if this state continues for 1 minute, it will stop the engine.
 - d) After mains recovers and MCB feedback is closed again (MCB is controlled externally), the controller starts RPM matching and closes GCB when all matching conditions are met. Gen-set remains running in parallel.
- 2) **STOP** button softly unloads the gen-set, opens GCB, provides cooldown and stops the engine..

Hint:

Controller does not respond to **GCB ON/OFF** button and binary input REM START/STOP.

AUT mode

No AMF function in SPI application.

Remote start/stop

Gen-set starts automatically, when binary input REM START/STOP is closed and stops when the input is opened. If there is no mains present or the MCB feedback is not closed, the gen-set won't start.

- When Mains is within limits and MCB feedback is closed the controller starts RPM matching and closes GCB when all matching conditions are met (see in MAN mode). Gen-set remains running in parallel.
- When Mains failure is recognized during parallel operation - controller opens GCB and if this state continues for 1 minute, it will stop the engine.
- After mains recovers and MCB feedback is closed again (MCB is controlled externally), the controller starts RPM matching and closes GCB when all matching conditions are met. Gen-set remains running in parallel.

Peak shaving

Gen-set can start and stop automatically according to consumption from the mains (object). *IE measurement* must not be set to NONE and **ProcessControl:PeakAutS/S del** must be greater than 0.

If Mains import value exceeds for more than **ProcessControl:PeakAutS/S del**

ProcessControl:PeakLevel/Start, engine starts automatically.

If Load consumption (Mains import + Gen-set power) drops for more than **ProcessControl:PeakAutS/S del** below **ProcessControl:PeakLevel/Stop**, engine stops.

Hint:

Engine does not stop, if some other condition for automatic start is active.

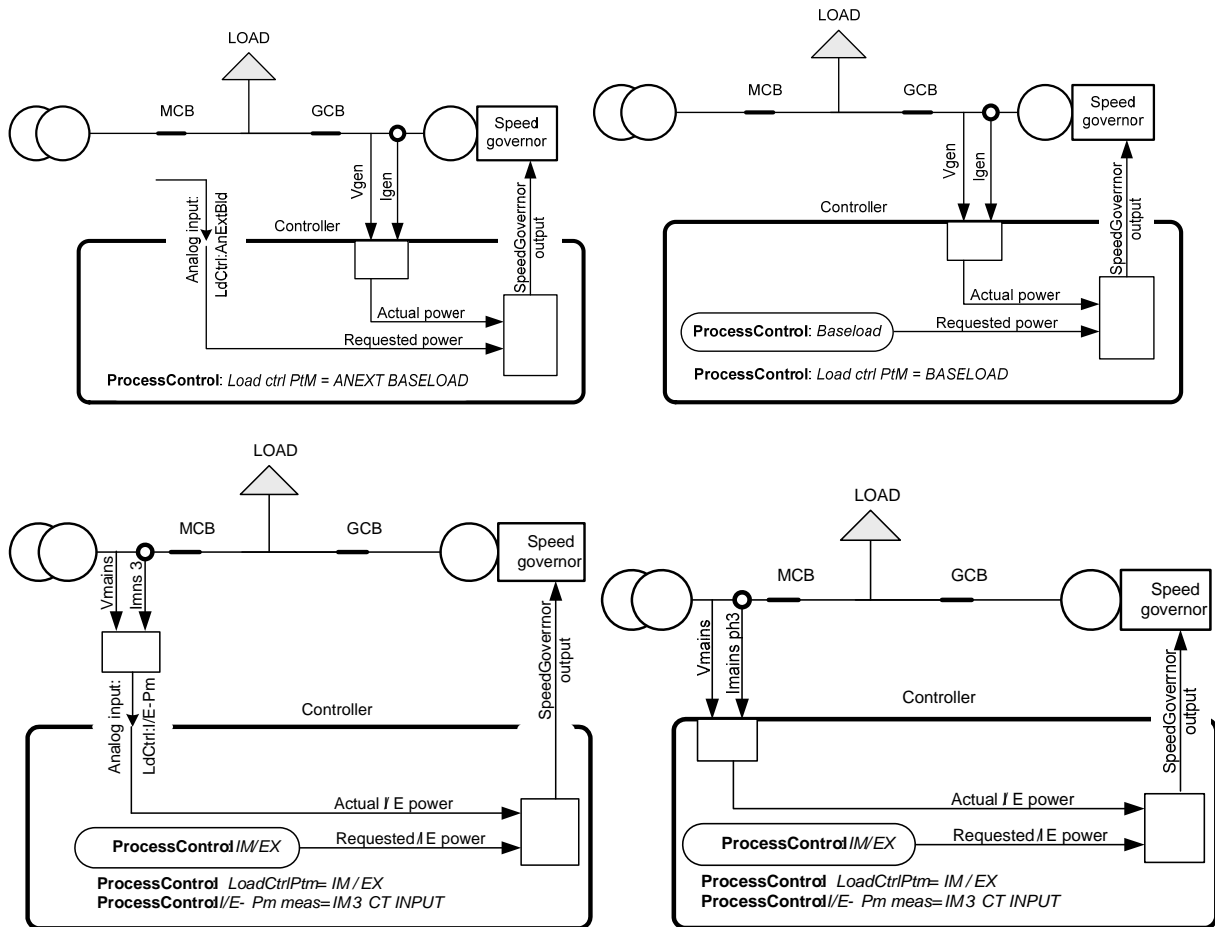
Example: If peak stop condition occurs, but REMOTE START/STOP is active, engine stays running.

The controller does not respond to **GCB ON/OFF**, **STOP**, **START** buttons and corresponding remote commands of IntelliMonitor or Modbus communication.

Set **Basic setting: FltRes GoToMAN** = ENABLED to avoid automatic engine start when pressing **FAULT** **RESET** after any 2nd level alarm (Shutdown, Slow stop, Breaker Open&Cooldown).

Active Power control modes in SPI

Mode	Function	Setpoints
Baseload	Gen-set power is constant - set by Baseload setpoint.	ProcessControl: Load ctrl PtM=BASELOAD; Base load
ANEXT Baseload	Gen-set power is set via Analog input.	ProcessControl: Load ctrl ANEXT Baseload; Analog input: LdCtrlAnextBld
Import / Export	Import/Export value is constant – I/E power is measured by controller.	ProcessControl: Load ctrl PtM=IM/EX; Import load; I/E Pm-meas = IM3 CT INPUT
ANEXT Import / Export	Import/Export value is constant – I/E power is measured via Analog input.	ProcessControl: Load ctrl PtM=IM/EX; Import load; I/E Pm-meas = ANALOG INPUT Analog input: LdCtrl:I/E-Pm
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.	Engine params: Warming load; Warming temp; Max warm time
Peak shaving	Automatic gen-set start/stop based on object (load) consumption.	ProcessControl: PeakLevel/Start; PeakLevel/Stop; PeakAutS/S del
Export limit	Limits export to the mains in the Baseload mode.	ProcessControl: Export limit = ENABLE



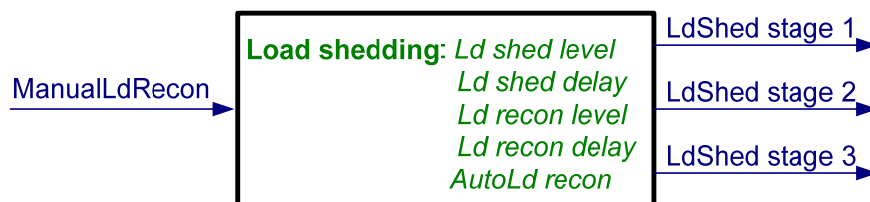
Load shedding

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

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

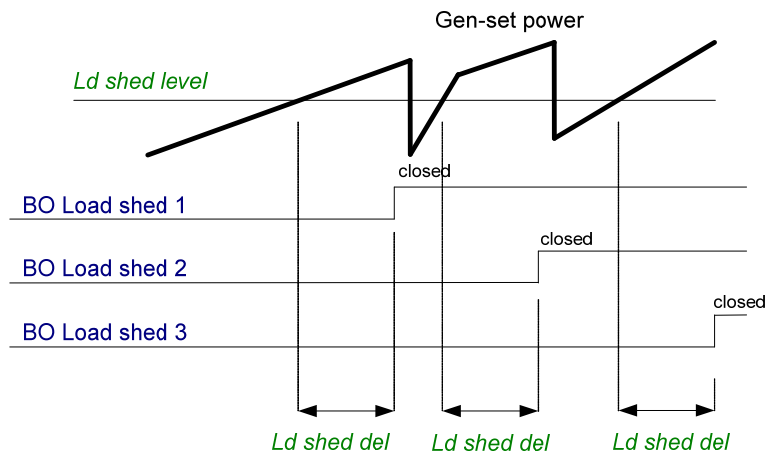
The load shedding function is active in all controller modes except OFF.

Load shedding has three steps and each step is linked with its own Load shed x binary output. There is only one load shed level and delay for all three steps as well as recon level and delay. Load shed can only move from one step to the next, e.g. No LoadShed to LdShed S1 to LdShed S2 to LdShed S3 and vice versa. If manual reconnection of the load is desired, the AutoLd recon setpoint needs to be disabled (*AutoLd recon* = DISABLED) and the MAN load recon binary input needs to be configured. Rising edge on this input resets the controller to a lower stage, but only if the load is under the *Ld recon level* at that moment.

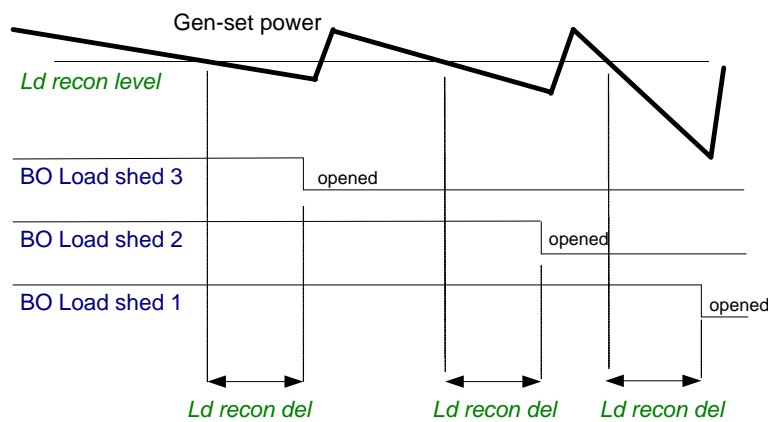


Hint:

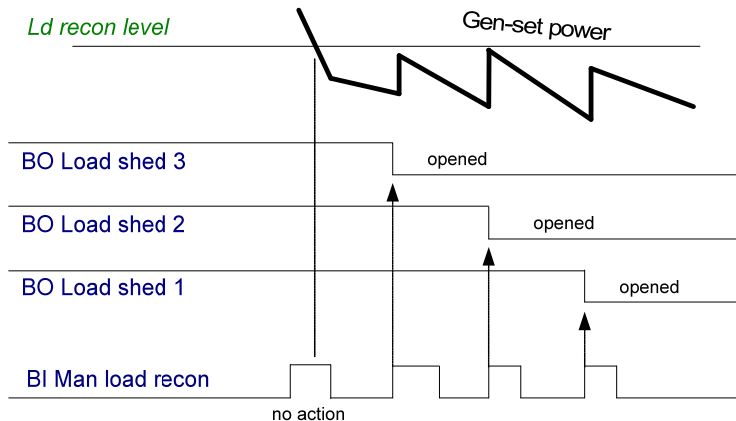
If no Load Shedding outputs are configured, there is no record to history and no screen timer indication of the activity of this function.



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



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



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 Power deratingX exceeds *DeratingX strt* value.

Gen-set power is at *DeratedX pwr* value when temperature measured by Analog input PowerDeratingX is equal or higher than *DeratingX end* value.

Hint:

To use Power derating function configure at first Analog input PowerDeratingX to any IS-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! !

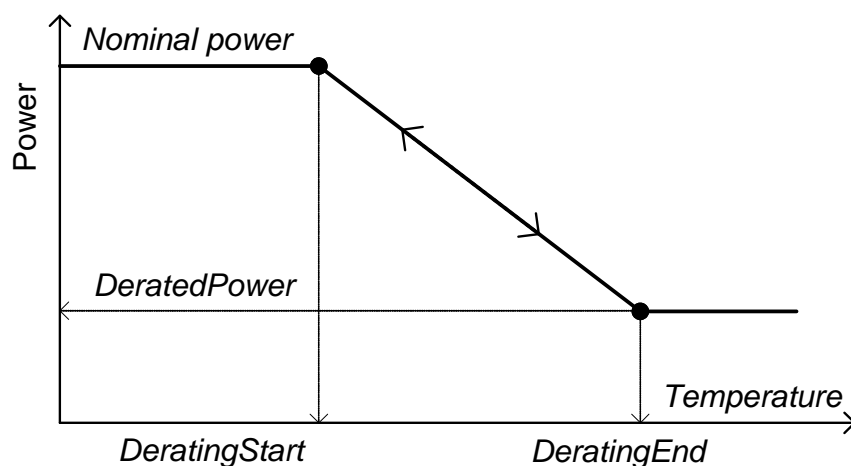
Derated power value **Pg derated** is visible in the controller measure screen.

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*.

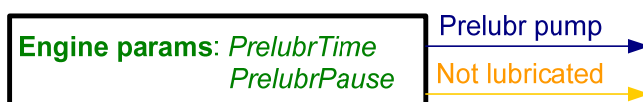
Temperature derating starts at *DeratingX strt* temperature.

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

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

Engine states

Engine prelubrication



Hint:

To use Prelubrication, configure Binary output PRELUBR PUMP first.

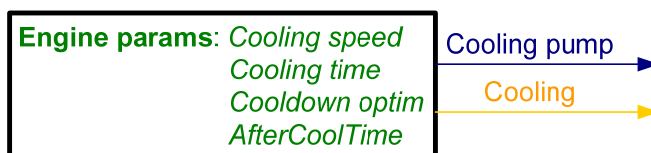
Prelubrication is disabled in controller OFF mode or if *Prelubr time* is set to zero.

Binary output PRELUBR PUMP is opened when engine is running.

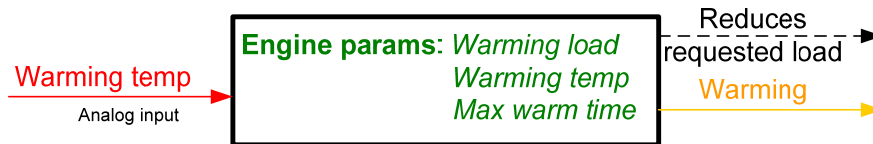
Prelubrication cycle starts with *PrelubrPause* after engine stop.

Prelubrication cycle starts immediately when controller power supply is switched on or when mode changes from OFF to MAN or AUT or after Emergency stop was reset. An Alarmlist message "Not lubricated" is active until this first lubrication cycle has been completed.

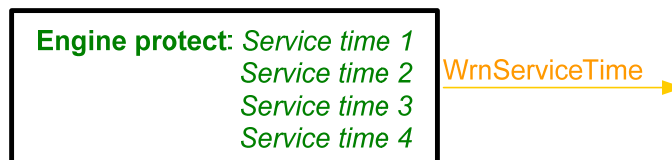
Engine cooling



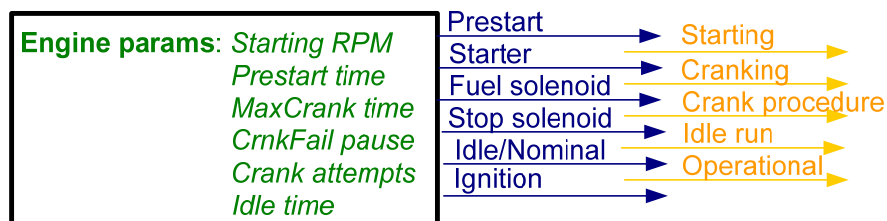
Engine warming



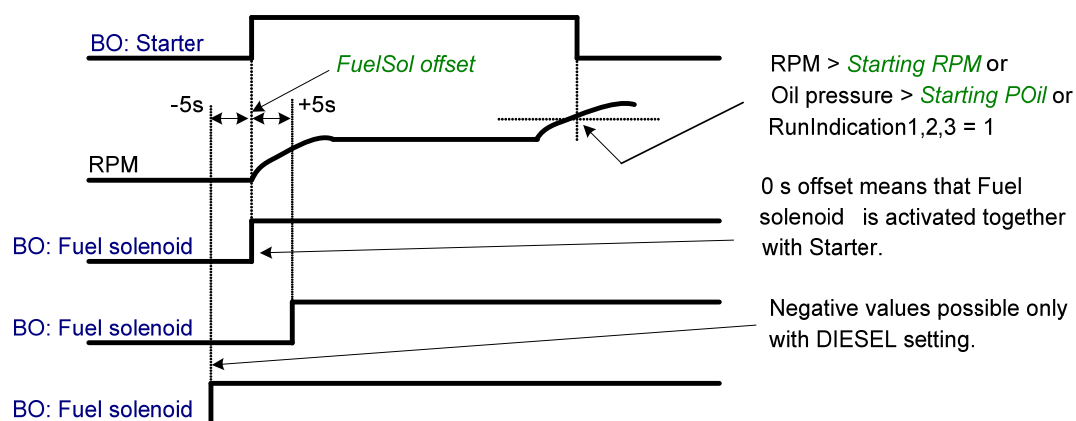
Service time alarm



Engine starting procedures



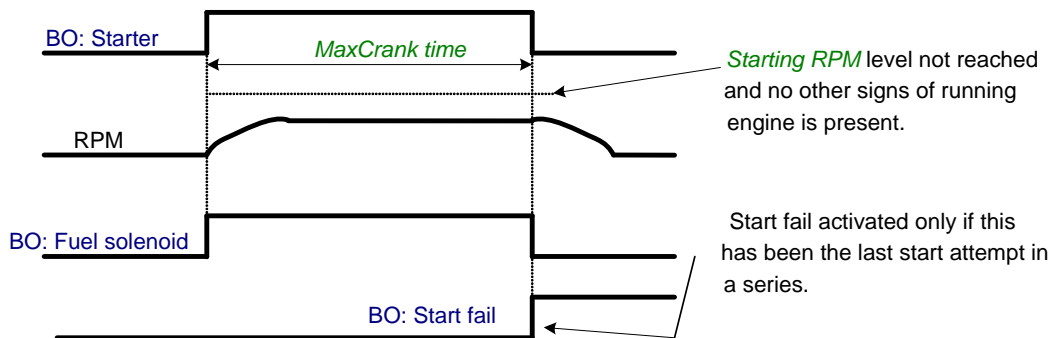
Engine starting procedure if **Engine params: Fuel solenoid** = DIESEL ENGINE with different setting of *FuelSol offset*.



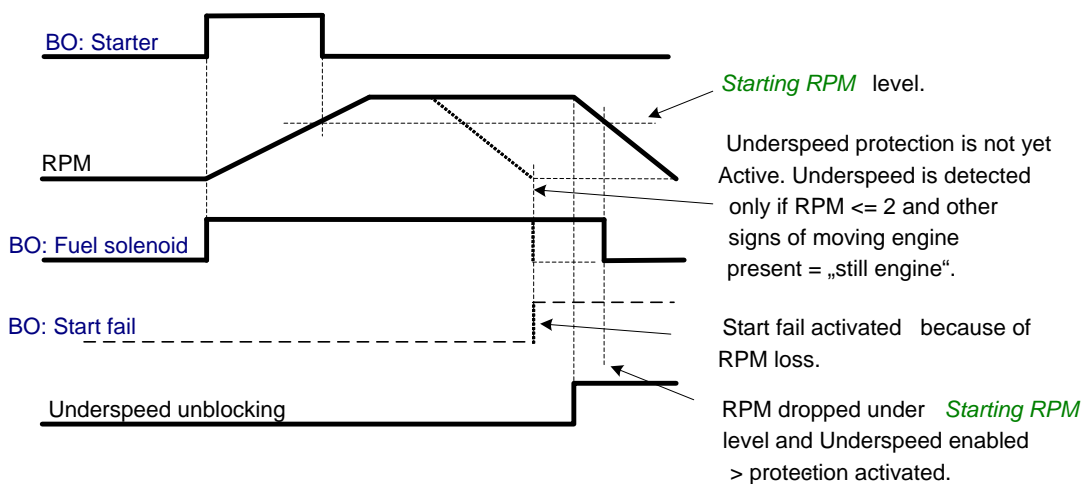
Engine starting procedure if **Engine params: Fuel solenoid = GAS ENGINE**



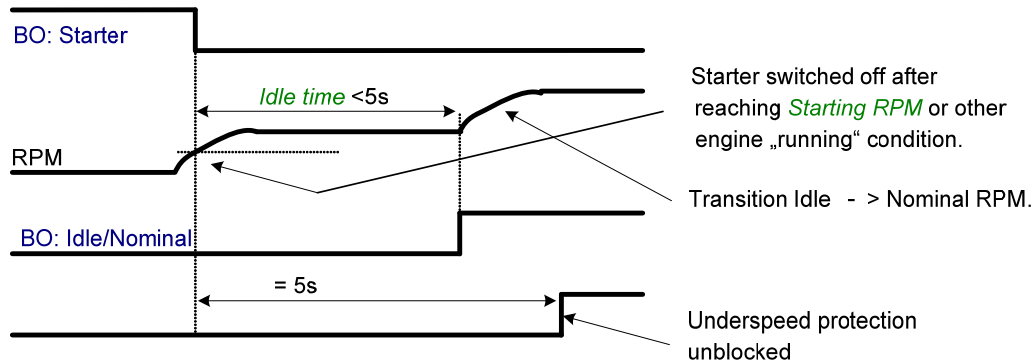
Unsuccessful start – no **Engine params: Starting RPM** reached



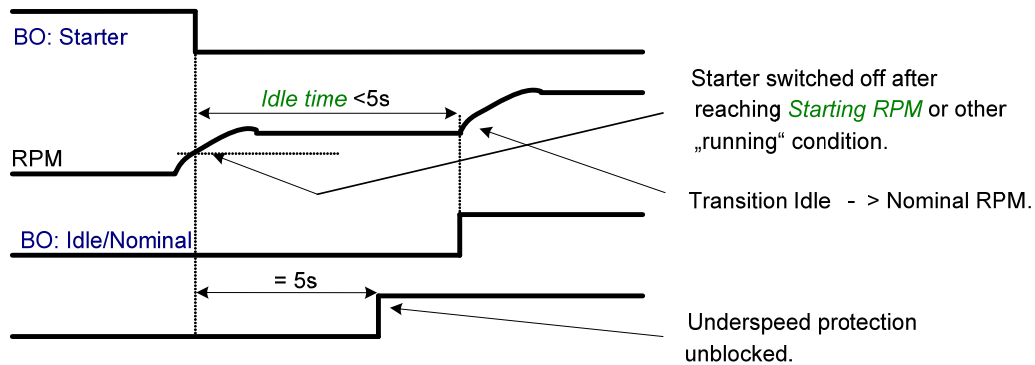
Unsuccessful start – RPM disappeared before/after Underspeed protection got active:



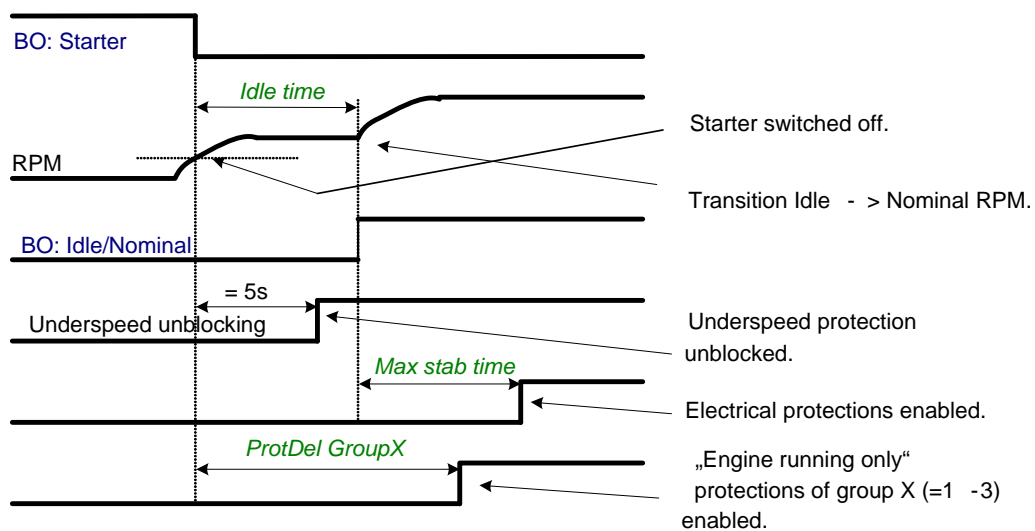
Underspeed protection unblocking if *Idle time* < 5s:



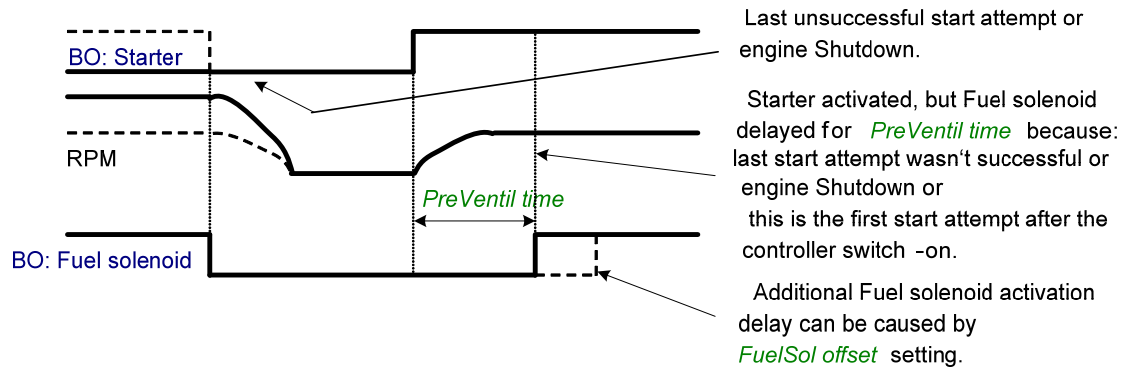
Underspeed protection unblocking if *Idle time* > 5s:



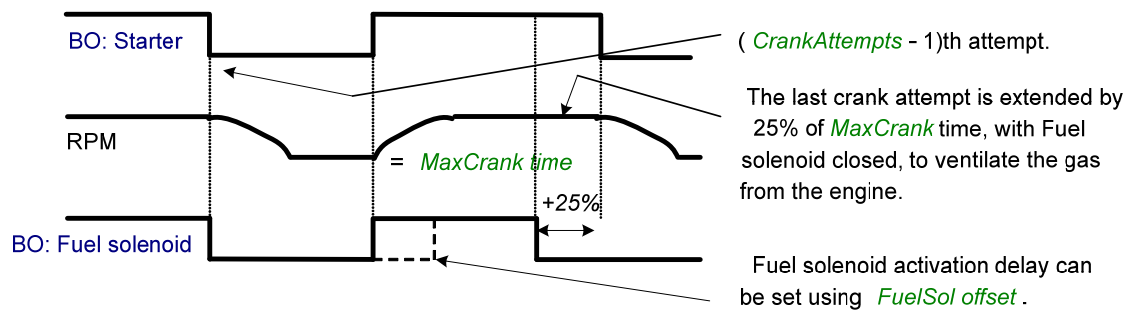
Transition Idle -> Nominal RPM, protections unblocking:



Preventilation (if *Fuel solenoid* = GAS ENGINE):

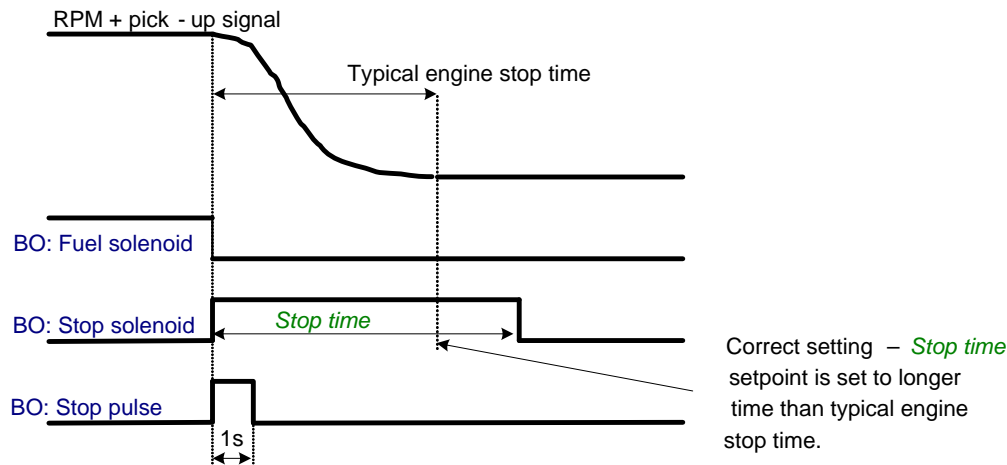


Ventilation (if *Fuel solenoid* = GAS ENGINE):

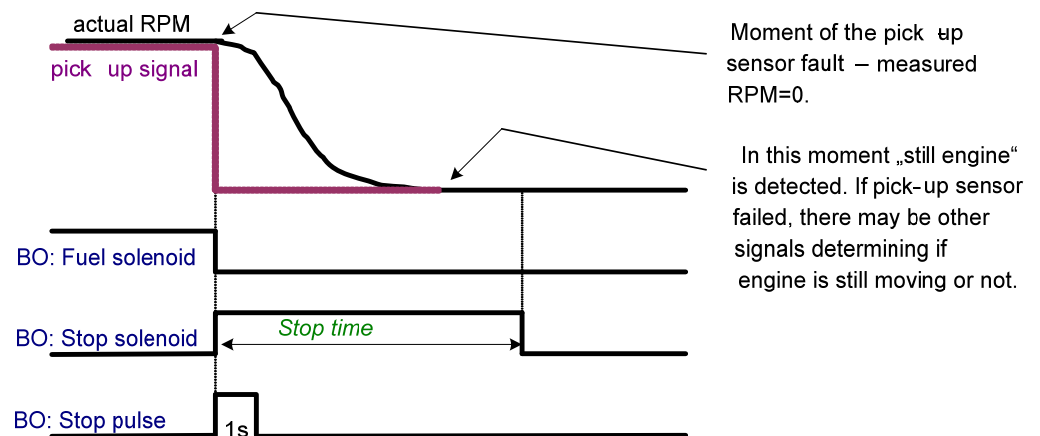


Engine stopping procedures

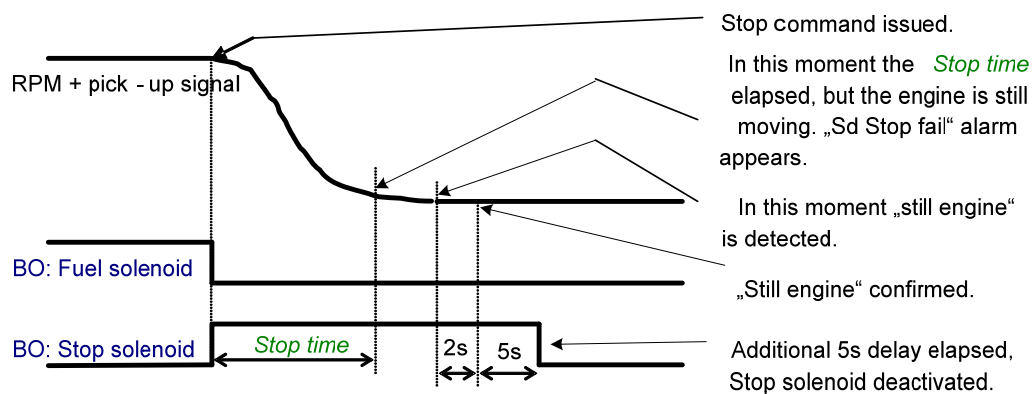
Normal engine stop:



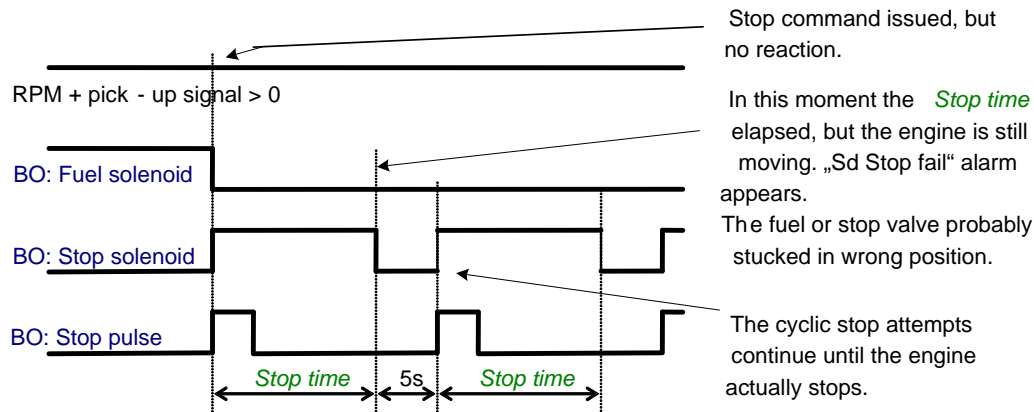
Pick-up sensor fault – forced engine stop:



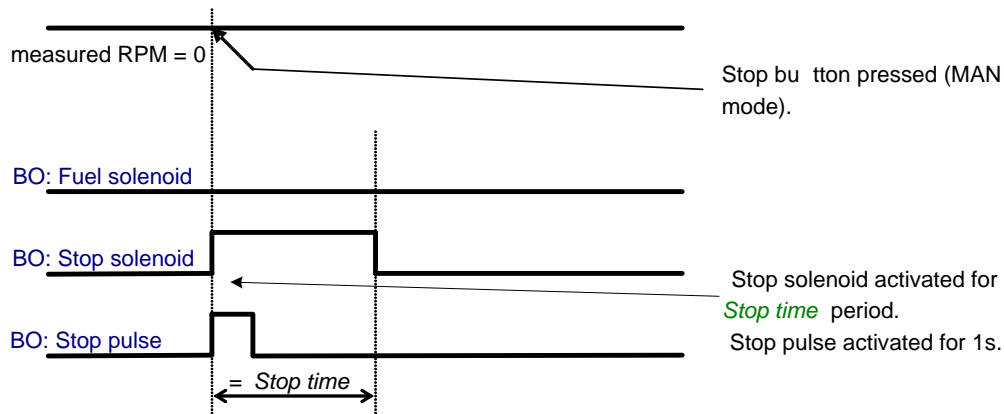
Normal engine stop, but Stop time is set too short:



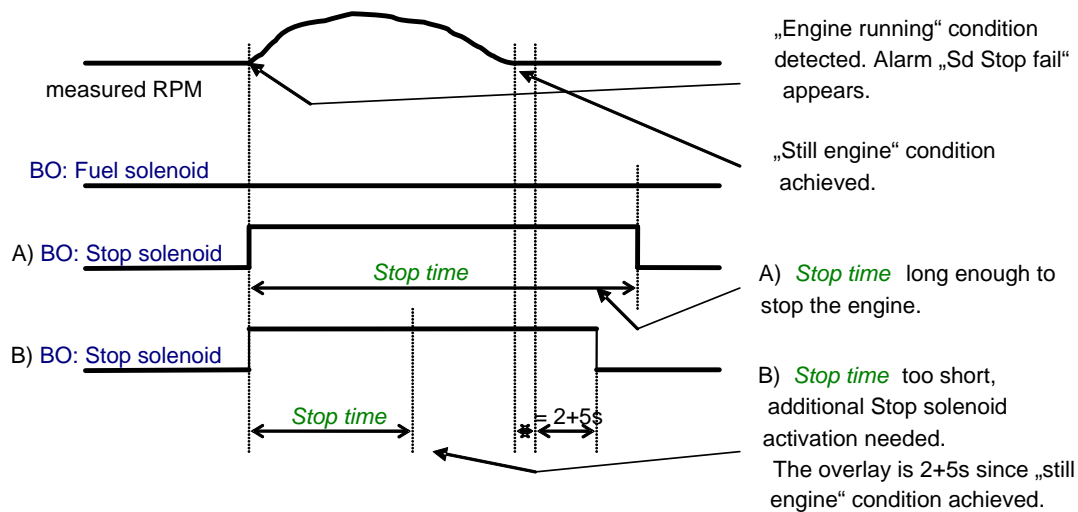
Unsuccessful engine stop:



“Forced” stop in still state:



Spontaneous engine start-up:



“Engine started” conditions

- Engine speed (RPM) > *Starting RPM* or
- AI: Oil press > *Starting POil* or
- D+ terminal active for minimum 1s or
- BI: RunIndication 1 or 2 or 3 = active or
- Generator voltage > 25% of *GenNomV* (any phase)

“Engine running” conditions

- Engine speed (RPM) <> 0 or
- AI: Oil press > *Starting POil* or
- D+ terminal active or
- BI: RunIndication 1 or 2 or 3 = active or
- Generator voltage > 15V (any phase) or
- Generator frequency <> 0 Hz


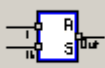
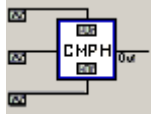
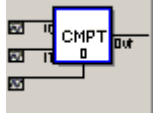
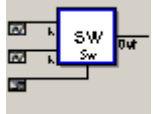
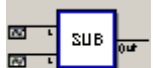
“Still engine” conditions


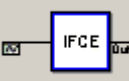
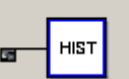

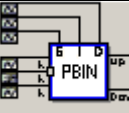
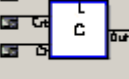
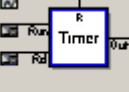
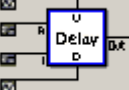
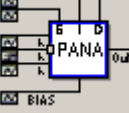
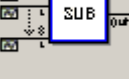
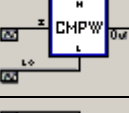


- Engine speed (RPM) = 0 and
- AI: Oil press < *Starting POil* and
- D+ terminal not active and
- BI: RunIndication 1 and 2 and 3 = not active and
- Generator voltage < 15V (all phases) and
- Generator frequency = 0 Hz and
- if all above conditions are fulfilled, additional 2s delay is necessary to confirm “still engine”

Note:

If any of the functions not used (e.g. BI RunIndication3 not configured), it's state is omitted in the evaluation. This is not valid for RPM comparisons, this condition is always active.

PLC functions

Config item	Selection Available	IS-NT	Note*
	Log Func I.	64	AND, OR 2 to 8 inputs Binary output
	Log Func II.	16	XOR, RS (flip-flop) 2 inputs Binary output
	Comp Hyst	16	Analog input Two limits Binary output
	Comp Time	8	Analog input One limit + delay Binary output
	Ana Switch	16	Two analog inputs Analog output Binary input as selector
	Math Func	16	ADD, SUB, ABS, AVG, MAX, MIN Two analog inputs Analog output

	Mov Avg	2	Analog input, Analog output Performs averaging (filtering) of the input value with selectable weight and period
	InterpolFunc	2	Linear interpolation Analog input Analog output
	ForceHistory	4	Binary input causes history record when changes from 0 to 1
	ForceProtect	4	Adjustable protection levels, based on PLC evaluation
	PID Bin	4	PID control loop with binary output
	Counter	4	Edges counter One limit Binary output
	Timer	4	Periodic signal generator Binary output Analog input
	Delay	16	Adjustable rising and falling edge delay
	PID Ana B	4	PID - Analog output jumps to adjustable Bias value when Gate input is active (instead zero as before) and starts from Bias.
	Ext. Math.	8	Math functions with expandable number of inputs up to 8. Selectable: ADD, AVG, MAX, MIN 8 analog inputs, 1 analog output.
	Comp.Win.	16	Window comparator Analog input, two limits, analog output. Binary output is active when input is within limits.
	Ramp	4	Ramp - Analog input, analog output. Two setpoints for Ramp-up and down speed (in number of units per second). Enable-Up, Enable-Down: Ena/Disables the ramp.
	Up/Down	4	Analog output changing within 2 limits (by defined rate of change - ramp) when Up/Down input is active.

* Note: For detailed PLC functions description see IGS-NT-2.1-Application guide.pdf

Multi language support

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

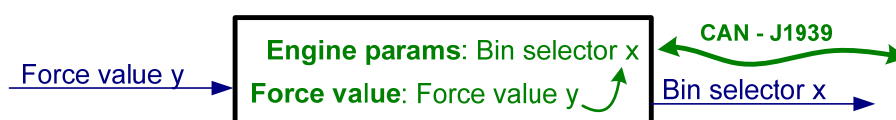
ECU interface customizing

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

Binary selector

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

J1939 value	ECU command
Governor mode	Isochronous - Droop
Idle Speed select	Idle – Nominal
Frequency select	1500 – 1800
Preheat request	Yes – No
Protection override	Yes – No



Protections and Alarm management

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	Configurable	Mains protect
Fix protections	Fix	Engine params, Gener protect, Mains protect, Analog protect

Protection types

Level	Protection types	Abbreviation	Gen-set action	Record
1	History record	Hst	None	History only
1	Alarm only	Al	None (Alarm disappears when becomes inactive and Fault Reset button is pressed.)	Alarmlist only
1	Warning	Wrn	None	Alarmlist and History
1	AL indication	ALI	None (Alarm disappears automatically, when becomes inactive.)	Alarmlist only
1	A+H indication	AHI	None	Alarmlist and History
2	Low power	LoP	Load is ramped-down to Gener protect: Min power PtM . After protection becomes inactive, the power limitation is automatically terminated (no fault reset necessary).	Alarmlist and History
2	Off load	OfL	SEM, AUT modes: Controller opens GCB without soft unloading, gen-set runs 1 minute at Nominal RPM. Gen-set state changes to Cooling and Stop 1 minute after Off load activation. Controller starts automatically GCB synchronizing (or closes GCB) when Off load is deactivated (no fault reset necessary). MAN mode: Controller opens GCB without soft unloading and the gen-set runs without load until operator intervention. All generator protections are active during Off load duty.	Alarmlist and History
2	Breaker Open & Cool-down	BOC	Controller opens GCB without soft unloading, gen-set state changes to Cooling and Stop. Fault reset must be activated for next start.	Alarmlist and History
1	Mains protection	MP	Controller opens GCB, gen-set stays running.	History only
2	Slow stop	Stp	Soft unloading then the GCB opens, the gen-set state changes to Cooling and Stop.	Alarmlist and History
2	Shutdown	Sd	Controller opens GCB without soft	Alarmlist and History

			unloading and stops the gen-set without Cooling state.	
X	Sensor fail	Fls	Can be indicated when Analog input value is $\pm 6\%$ out of sensor characteristic range. Fls can optionally activate corresponding (e.g. Sd) Analog input protection as well.	Alarmlist and History

Default protections in SPI

Fix – firmware based		
Engine:	Protection	Corresponding setpoints
Overspeed	Sd	Engine protections: <i>Overspeed</i>
Underspeed	Sd	Engine params: <i>Starting RPM</i>
Generator:		
		Corresponding setpoints
IDMT overcurrent	BOC	Basic settings: Nomin current; Gener protect: <i>2Inom del</i>
IDMT Active power	BOC	Gener protect: <i>OverldStrtEval; 2POvrlldStrtEvDel</i>
Shortcurrent	BOC	Gener protect: <i>Ishort; Ishort del</i>
Generator voltage: Ug1>, Ug1<, Ug2>, Ug2<, Ug3>, Ug3<	BOC	Gener protect: <i>Gen >V BOC; Gen <V BOC; Gen V del.</i>
Generator voltage: Ug1>>, Ug2>>, Ug3>>	Sd	Gener protect: <i>Gen >V Sd; Gen V del.</i>
Generator frequency: fg<, fg>	BOC	Gener protect: <i>Gen >f; Gen <f; Gen V del</i>
Reverse power	BOC	Gener protect: <i>Reverse power; ReversePwr del</i>
Mains:		
Vector shift	MP	Mains protect: <i>VectorS prot; Vector S limit</i>
Mains voltage	MP	Mains protect: <i>Mains >V MP; Mains <V MP; Mains V del</i>
Mains frequency	MP	Mains protect: <i>Mains >f; Mains <f; Mains f del</i>
Default - configurable		
Batt <V, Batt >V (UnivState 2)	Wrn	Analog protect: <i>Batt >V; Batt <V; Batt V del</i>
EarthFaultCurr (UnivState 3)	BOC	Gener protect: <i>EarthFaultCurr; EthCurr del</i>
Generator voltage asymetry (UnivState 4)	BOC	Gener protect: <i>Gen V unbal; Gen V unb del</i>
Generator current asymetry (UnivState 5)	BOC	Gener protect: <i>Gen I unbal; Gen I unb del</i>
Mains voltage asymetry (UnivState 6)	MP	Mains protect: <i>Mains V unbal; Mains Vunb del</i>

Mains voltage and frequency protections - limits and indications

Basic settings:

VoltProtselect = PHASE-NEUTRAL

Mains protect: <i>Mains >V MP</i>	MP L1 under	Mains V L1-N
<i>Mains <V MP</i>	MP L2 under	Mains V L2-N
<i>Mains V del</i>	MP L3 under	Mains V L3-N
<i>Mains >f</i>	MP L1 over	MP fms under
<i>Mains <f</i>	MP L2 over	MP fms over
<i>Mains f del</i>	MP L3 over	Mains freq

Basic settings:

VoltProtselect = PHASE-PHASE

Mains protect: *Mains >V MP*
Mains <V MP
Mains V del
Mains >f
Mains <f
Mains f del

MP L12 under → *Mains V L1-L2*
MP L23 under → *Mains V L2-L3*
MP L31 under → *Mains V L3-L1*
MP L12 over → *MP fms under*
MP L23 over → *MP fms over*
MP L31 over → *Mains freq*

Vector shift protection - limits and indications

Mains protect: *VectorS prot*
VectorS limit

VectorShiftTrp →
VectorShiftAct →

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

Gener protect: *Gen >V BOC*
Gen <V BOC
Gen V Sd
Gen V del
Gen >f
Gen <f
Gen f del

BOC L1 under → *Gen V L1-N*
BOC L2 under → *Gen V L2-N*
BOC L3 under → *Gen V L3-N*
BOC L1 over → *BOC fms under*
BOC L2 over → *BOC fms over*
BOC L3 over → *Gen freq*

Basic settings:

VoltProtSelect = PHASE-PHASE

Gener protect: *Gen >V BOC*
Gen <V BOC
Gen V Sd
Gen V del
Gen >f
Gen <f
Gen f del

BOC L12 under → *Gen V L1-L2*
BOC L23 under → *Gen V L2-L3*
BOC L31 under → *Gen V L3-L1*
BOC L12 over → *BOC fms under*
BOC L23 over → *BOC fms over*
BOC L31 over → *Gen freq*

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.

Hint:

All 2nd level protections are locked out, except of these:

- Emergency stop
- Overspeed
- Underspeed (only if *Fuel solenoid* = GAS ENGINE)

Gen-set operation states

Gen-set can operate in following states

Not ready	Gen-set is not ready to start
Init	After controller power supply switch on
Ready	Gen-set is ready to run
Prestart	Prestart sequence in process. From closing of <i>Prestart</i> output to closing of <i>Starter</i> output.
Cranking	Engine is cranking; <i>Starter</i> output is closed
Pause	Pause between start attempts
Starting	Engine params: <i>Starting RPM</i> is reached
Running	Waiting for GCB connection
Warming	After GCB is closed to parallel operation, gen-set load is reduced Engine params: <i>Warming load</i>
Soft load	Gen-set power is ramping up
Loaded	Gen-set is loaded
Soft unld	Gen-set power is ramping down
Cooling	Gen-set is cooling before stop
Stop	Stop
Shutdown	Shutdown alarm activated
Ventil	Gas engine – ventilation of unburned fuel when stop command comes during cranking with gas
SDVentil	Gas engine – ventilation of unburned fuel after unsuccessful start attempt
Off load	GCB is opened, gen-set keeps running on nominal RPM
Emerg man	Emergency manual state – see <u>Emerg. manual</u> BI description

External gen-set conditions :

MainsOper	Mains is present (MCB is closed, GCB is opened)
Brks Off	GCB, MCB opened
RPM match	RPM matching is active (MCB is closed, GCB is opened)
ParalOper	Gen-set is in parallel with mains (MCB is closed, GCB is closed)
MainsOper/Brks Off	Engine is running idle

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	BOU	AIN	AOU	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-BIN16/8	16	8	-	-	Standard I/O extension module.
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	-	-	4	-	Shared (virtual) Analog Input module
SHAOUT	-	-	-	4	Shared (virtual) Analog OUTput module
PLC	x	x	x	x	Programmable (internal) logic module.

Hint:

For more details about Virtual peripherals (Shared and Internal virtual I/O periphery and PLC) see IGS-NT-Application guide-2.1.pdf.

Binary inputs – Control

Rem start/stop

If the input closes, the controller starts the engine (in AUT mode only). This input forces the gen-set parallel run with mains, as an AMF start usually is managed in different way.

In SPI / SPtM application (AUT mode) activates the start or stop sequence – start, synchronizing, loading ramp, parallel run / unloading ramp, GCB opening, cool-down, stop.

Emergency stop

If the input is activated, engine shutdown is immediately issued. It has a character of a “Shutdown” - protection type, however some special behaviour follows in the case of its activation:

- Outputs Ignition, Ventilation, Cooling pump, Prelubr pump are switched off, regardless of the engine state.
- This input cannot be overridden with the input Sd override.

Hint:

Alarm type is set to “No protection”, as this input itself creates the shutdown protection.

Input is inverted (= normally closed) in default configuration to achieve maximum security (broken wire).

Nominal speed

If the input is closed, the controller forces the engine immediately to the Running state, bypassing the *Idle time* setting and shortening the start-up procedure.

Hint:

Use this input if you want to shorten the start-up procedure in an AMF situation.

PrestartBypass

If the input is closed, the controller bypasses the *Prestart time* and activates the Starter output immediately.

Hint:

Use this input to bypass the pre-glow / prelubrication time in the case that the engine has run a short time before.

Oil press

Behavior for Inverted = Open to activate configuration:

Binary input must be closed when engine is not running and opened when it is running. "Sd Oil press B" is activated when input is opened on not running engine ("still engine" condition) or when stays closed for

Engine protect: *RunOnlyBlkDel1* after engine start. "Sd Oil press B" protection is not active when input is not configured.

Sd override

If the input is closed, all 2nd level protections are disabled to allow engine run in an emergency situation, e.g. sprinkler devices power supply.

All protections are shown in Alarmlist and recorded into History, but the controller doesn't stop the engine because of them. If the input is deactivated and some protections are still active or not yet reset, the controller starts to take these protections into account and consequently stops the engine.

Hint:

All 2nd level protections are locked out, except of these:

- Emergency stop
- Overspeed
- Underspeed (only if *Fuel solenoid* = GAS ENGINE)

Emerg. manual

The controller behaves like when switched to OFF mode if input is closed. Opens all binary outputs Fuel solenoid, Cooling pump signals, etc... except:

Stop solenoid output does not close.

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 "Emerg Man" state and the engine can not be started. Generator current and power (energy) measurement is active in this mode, regardless of the actual state of the engine.

After the binary input "Emerg. manual" 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.

Hint:

The function is intended especially for Marine gen-sets which are supposed to be started manually while the controller has no power supply. To recover successfully from this state, only the signals Stop solenoid, GCB ON/OFF coil should be used for engine and breaker control, as the other outputs are continuous active during engine run (e.g. Fuel solenoid) and it is not possible to switch them between more control sources.

RunIndication1

RunIndication 2

RunIndication 3

T Any of three binary inputs can be used for engine running indication e.g. via Oil pressure contact. Active Running indication blocks engine start (to avoid starter damage).

AccessLock int

If the input is closed, no setpoints can be adjusted from the controller front panel.

Hint:

For IS-NT, this input is controlling the display #1, which is supposed to be attached to or close to the main module.

As the controller mode (OFF-MAN-AUT) is one of the setpoints, not even that can be changed.

The START, STOP, FAULT RESET and other control buttons are disabled as well.

AccessLock D#2

If the input is closed, no setpoints can be adjusted and no commands can be issued from IG/IS-Display #2.

AccessLock D#3

If the input is closed, no setpoints can be adjusted and no commands can be issued from IS-Display #3.

AccessLock ext

If the input is closed, no setpoints can be adjusted and no commands can be issued from any external terminal = via direct/modem/internet connection to the controller.

Hint:

Use these inputs to lock out the selected terminals for setpoint changes and commands. Such a terminal can only be used for monitoring.

Remote OFF

Active binary input forces the controller mode to OFF. When opened the controller is switched to previous mode.

If the engine is running, the active input has no effect. The controller switches to OFF mode only after the engine has been stopped.

Hint:

Use this input to block the engine start during service.

Remote MAN

Active binary input forces the controller mode to MAN.

Remote SEM

Active binary input forces the controller mode to SEM.

Remote AUT

Active binary input forces the controller mode to AUT.

Hint:

Use this input to switch the controller to automatic operation, e.g. using the external key switch.

Force block 1

Force block 2

Force block 3

Three binary inputs for user-specific blocking of programmable protections. If the particular input is active, all the protections with the corresponding "Force block X" block type are blocked.

StartButton

Binary input has the same function as **Start** button on the controller front panel. It is only active in MAN mode and when setpoint **Basic settings** -> *Local Button* is set to EXTBUTTONS or BOTH.

StopButton

Binary input has the same function as **Stop** button on the controller front panel. It is only active in MAN mode and when setpoint **Basic settings** -> *Local Button* is set to EXTBUTTONS or BOTH.

FaultResButton

Binary input has the same function as **Fault reset** button on the controller front panel.

To enable this function, set the setpoint **Basic settings** -> *Local Button* to EXTBUTTONS or BOTH.

HornResButton

Binary input has the same function as **Horn reset** button on the controller front panel.

GCBButton

Binary input has the same function as **GCB** button on the controller front panel. It is active in MAN mode only.

Hint:

All Binary inputs, which simulate controller front panel buttons, are edge (no level) sensitive, and they react on the rising edge only. Minimal input pulse duration is 0,2 seconds.

ManualLdRecon

The rising edge on this input switches the controller to the lower Load Shedding stage when *AutoLd recon* = DISABLED and the load is under *Ld recon level*.

GCB disable

The input blocks the GCB closing, even if all other conditions for its closing are fulfilled. Valid in all modes.

Hint:

If you want to lock out the GCB closing during RPM matching loop test, set **RPM/Load ctrl: RPM matching** = 0. This allows the control loop to be tested while actual GCB closing is blocked.
Condition for closing: voltage on the mains/bus side and all RPM matching conditions fulfilled.

IssueActCallC1

IssueActCallC2

IssueActCallC3

Rising edge on these binary inputs forces an active call to be issued via the corresponding channel.

Hint:

Can be used to send e.g. SMS in the case of a mains failure to report that the engine has successfully started (linked from the output Gen params OK) and later on to report that the engine has stopped again (linked from the inverted output Fuel solenoid).

Startblocking

The input blocks the engine start. If active, NotReady state is shown on the controller screen and a message appears in the Alarmlist. As soon as input is deactivated, engine start is enabled again.

Hint:

Use this input for cooperation with external supervisory device, such as PLC. It can prevent the engine to be started because of some reasons not known to the controller.

ECU StoppedEng

Engine stop was activated in ECU, not from controller. The controller reflects this situation and also goes to Stop to avoid an Underspeed alarm (and record in the Alarm list).

CtrlHBeat sens

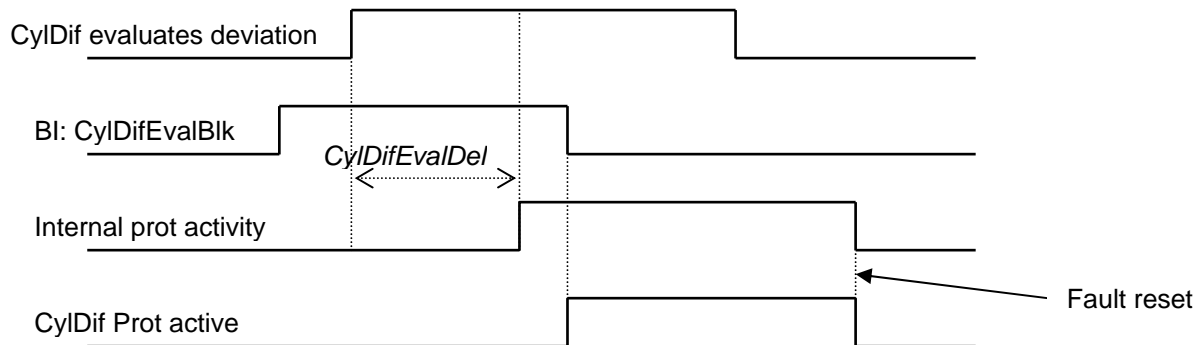
BI "CtrlHBeat sens" should be assigned to the output "CtrlHeartBeat" from the other controller. If input signal does not correspond to right form (log 1 / log 0 - 500 ms / 500 ms; +/- 100 ms), BO: "CtrlHBeat FD" (Fail Detect) is activated. This BO can be used for primary controller blocking (switching to Emerg. manual, disconnecting BO, ...) and mainly for disconnecting of BI "Emerg. manual" of this controller. What means that the backup controller assumes engine control.

Force value 1 ...16

If any of the particular 16 input s is active, the Force value function on that corresponding channel gets active, forcing an alternative value to the selected setpoint.

CylDifEvalBlk

If the signal is active, the protection based on the difference amongst cylinder temperatures is blocked. After signal deactivation, the protection is unblocked immediately.



ExtValue1 up

ExtValue2 up

ExtValue3 up

ExtValue4 up

Active binary input causes increasing of the corresponding *ExtValueX* value. The rate of change is given by the setpoint *ExtValueX rate*. If the *ExtValueX* reaches the *ExtValueXHiLim*, the further input request is ignored.

ExtValue1 down

ExtValue2 down

ExtValue3 down

ExtValue4 down

Active binary input causes decreasing of the corresponding *ExtValueX* value. The rate of change is given by the setpoint *ExtValueX rate*. If the *ExtValueX* reaches the *ExtValueXLoLim*, the further input request is ignored.

Hint:

If at least one of the inputs (*ExtValueX up* / *ExtValueX down*) is configured for the particular *ExtValueX*, the external set commands to the same value are ignored.

ExtValue1reset

ExtValue2reset

ExtValue3reset

ExtValue4reset

Active binary input causes *ExtValueX* to be reset and held at its default value, given by the setpoint *ExtValueXdeflt*.

Hint:

These inputs, if configured, do not block the external set commands (in contrast to *ExtValueX up* / *ExtValueX down* inputs). However, if the reset input is activated, the corresponding *ExtValueX* is reset to its default (*ExtValueXdeflt*) value. This default value is kept in *ExtValueX* until the reset input is deactivated, and the external set commands received meanwhile are ignored.

PulseCounter 1

PulseCounter 2

PulseCounter 3

PulseCounter 4

The inputs are linked with corresponding counters, which integrate the pulses sensed at these inputs. Each rising edge of the signal at input increases the internal counter value.

Hint:

Pulse width (both high/low levels) must be at least 100 ms in order to be correctly sensed!

Conversion ratio can be selected using the setpoints *ConvCoefPulseX*. The converted values are visible in statistics – values *PulseCounter X*. These values can be reset using Statistics window in IntelliMonitor.

Timer block 1

Timer block 2

Timer block 3

Timer block 4

Timer block 5

Timer block 6

Timer block 7

Timer block 8

Timer block 9

Timer block 10

Timer block 11

Timer block 12

Timer block 13

Timer block 14

Timer block 15

Timer block 16

Blocking inputs for particular timer module channels. The input can lock out its assigned channel – if this input is active, the channel won't activate its output (Timer active X) to e.g. start the engine.

Lang sel int A

Lang sel int B

Lang sel int C

Set of binary inputs for forcing alternative languages. This set of inputs is switching the controller's internal terminal – for IG-based controllers the front panel, for IS-based controllers the IS-Display with address #1.

Encoding of binary inputs' combinations:

Language index ->	given by display setting	1	2	3	4	5	6	7
Lang sel int A	0	1	0	1	0	1	0	1
Lang sel int B	0	0	1	1	0	0	1	1
Lang sel int C	0	0	0	0	1	1	1	1

Hint:

Warning – each language change causes the restart of the respective display (not the whole controller), so the display's control panel won't react until the restart has finished (~ 5s).

Value 0 in the table denotes that the corresponding input is not active or not configured.

If more than 7 languages are present in the controller, it is not possible to force languages with index higher than 7 using these binary inputs.

The reaction on BI combination change is 1s delayed not to react on transient combinations if a rotary selector switch is used.

Lang sel D#2 A

Lang sel D#2 B

Lang sel D#2 C

Set of binary inputs for forcing alternative languages. This set of inputs is switching the controller's external terminal with address #2 – for IG-based controllers the IG-Display, for IS-based controllers the IS-Display with address #2.

Encoding of binary inputs' combinations:

Language index ->	given by display setting	1	2	3	4	5	6	7
Lang sel D#2 A	0	1	0	1	0	1	0	1
Lang sel D#2 B	0	0	1	1	0	0	1	1
Lang sel D#2 C	0	0	0	0	1	1	1	1

Hint:

Warning – each language change causes the restart of the respective display (not the whole controller), so the display's control panel won't react until the restart has finished (~ 5s).

Value 0 in the table denotes that the corresponding input is not active or not configured.

If more than 7 languages are present in the controller, it is not possible to force languages with index higher than 7 using these binary inputs.

The reaction on BI combination change is 1s delayed not to react on transient combinations if a rotary selector switch is used.

Lang sel D#3 A

Lang sel D#3 B

Lang sel D#3 C

Set of binary inputs for forcing alternative languages. This set of inputs is switching the IS-Display with address #3.

Encoding of binary inputs' combinations:

Language index ->	given by display setting	1	2	3	4	5	6	7
Lang sel D#3 A	0	1	0	1	0	1	0	1
Lang sel D#3 B	0	0	1	1	0	0	1	1
Lang sel D#3 C	0	0	0	0	1	1	1	1

Hint:

Warning – each language change causes the restart of the respective display (not the whole controller), so the display's control panel won't react until the restart has finished (~ 5s).

Value 0 in the table denotes that the corresponding input is not active or not configured.

If more than 7 languages are present in the controller, it is not possible to force languages with index higher than 7 using these binary inputs.
The reaction on BI combination change is 1s delayed not to react on transient combinations if a rotary selector switch is used.

Binary inputs – Status information

GCB feedback

Generator Circuit Breaker positive feedback input (closed if GCB is closed). This is a primary source for the controller about the status of the GCB.

GCB fdb neg

Generator Circuit Breaker negative feedback input (closed if GCB is open). Additional signal, can be used if both positive and negative feedback signals are available from the breaker.

Hint:

If both feedbacks are used and there is a mismatch between these signals, longer than 500 ms, a GCB fail alarm is activated.

MCB feedback

Mains Circuit Breaker positive feedback input (closed if MCB is closed). This is a primary source for the controller about the status of the MCB.

Hint:

The controller can only enable parallel in mains operation when MCB feedback input is closed.

MCB fdb neg

Mains Circuit Breaker negative feedback input (closed if MCB is open). Additional signal, can be used if both positive and negative feedback signals are available from the breaker.

Hint:

If both feedbacks are used and there is a mismatch between these signals, longer than 500 ms, a MCB fail alarm is activated.

NeutralCB fdb

Use this input to detect, whether the Neutral circuit breaker is open or closed. See also setpoint *Neutral cont* and binary output Neutral CB C/O.

Binary outputs

Starter

The output is intended to energize the starter motor during start sequence. The output opens if the *Starting RPM* level is reached or maximum time of cranking is exceeded.

Hint:

If setpoint *Fuel solenoid* = GAS ENGINE, the Starter output is active during Pre-ventilation and Ventilation states as well to clean the engine off the unburned gas.

Fuel solenoid

The output is intended to control the engine fuel valve. The setpoint **Engine params: Fuel solenoid** selects the output behaviour – DIESEL or GAS ENGINE.

Stop solenoid

The output closes to activate the stop valve which interrupts the fuel input to the engine. The output is always closed until the engine reaches 0 RPM and other “engine running” conditions disappear as well + additional 5s.

The minimum time of activation is given by the *Stop time* setpoint, so even if all “engine running” conditions would disappear before, the Stop solenoid stays closed for that time.

Hint:

The output also closes if the engine begins to rotate spontaneously. It stays closed until “still engine” condition is achieved + additional 5s.
Intended only for diesel engines, especially marine ones.

Stop pulse

1s pulse for engine stop command, intended for ECU connection.

Prestart

The output closes prior to the engine start (time defined by *Prestart* setpoint) and opens when Starter output opens the last time during starting sequence. During repeated crank attempts the output is constantly closed. The output can be used for pre-glow, pre-heat or prelubrication.

Ignition

Intended to activate the ignition unit of gas engines. The output closes immediately as “engine running” condition is detected and opens after the engine stop (“still engine” condition). The function is independent on other conditions, i.e. always if “engine running” is detected, the output activates. The output opens immediately when BI Emergency stop gets active.

Hint:

In case of repeated start:

- a) the output is switched on when RPM = 30 (it is fixed value)
- b) the output is switched off during Crank pause, but not until RPM fell down to 0
- c) the output is switched off by STOP command when RPM=0

Ventilation

Intended for the engine ventilator control. The output closes together with Prestart output and opens after the engine stop (“still engine” condition).

The output opens immediately when BI Emergency stop gets active or in OFF mode.

Idle/Nominal

The output closes with transition from Starting (Idle) to Running state. It opens either with transition to Cooling state (if *Cooling speed* = IDLE), or after the command to stop the engine (if *Cooling speed* = NOMINAL).

The closed output means that Nominal RPM are requested.

Hint:

Connect this output to the speed governor to switch the requested speed: opened = IDLE RPM, closed=Nominal RPM.

Cooling pump

The output closes when gen-set starts (“engine started” condition) and opens *AfterCoolTime* delayed after the engine stop (“still engine” condition).

The output opens immediately when BI Emergency stop gets active or in OFF mode.

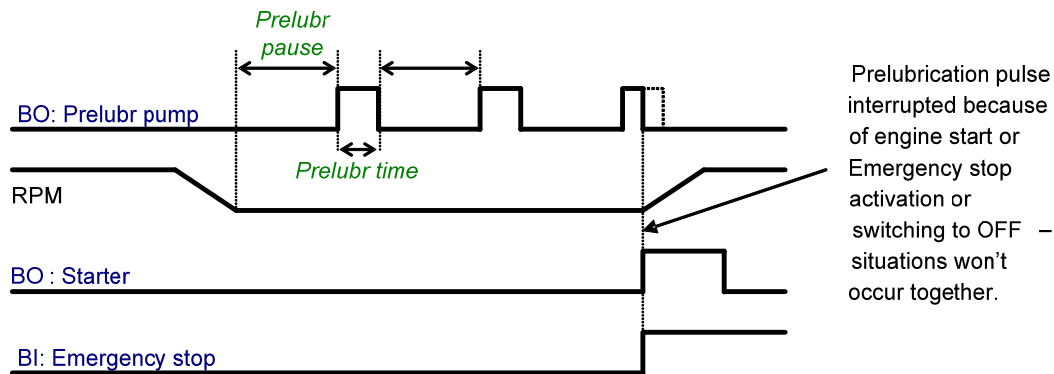
Prelubr pump

If engine is not running, the output closes with period *Prelubr pause* for *Prelubr time*.

The output opens immediately when BI Emergency stop gets active or in OFF mode.

Not lubricated

Output indicates the lubrication cycle (*PrelubrTime*) is not finished after controller Switch-on or return from OFF mode or deactivation of Emergency stop signal.



Binary outputs – Breaker control

GCB close/open

The output controls the generator circuit breaker. It is intended for contactors – provides a continual active signal if GCB should be closed.

GCB ON coil

The pulse output for GCB closing. If GCB synchronizing is enabled, the pulse length is 2s, if not, pulse length is 5s.

Hint:

ON coil can only be closed if UV coil is already active for at least 1s and *MinStab time* has elapsed.

GCB OFF coil

The pulse output for GCB opening. If GCB synchronizing is enabled, the pulse length is 2s, if not, pulse length is 5s.

GCB UV coil

GCB undervoltage coil. Output is closed if generator values are within limits and GCB is ready to be closed. It is opened if GCB should be open, and then closed again if generator electric values are in limits. If GCB synchronizing is enabled, the opening pulse length is 2s, if not, pulse length is 5s.

Hint:

UV coil automatically opens and OFF coil closes if GCB is closed spontaneously, not from controller's activity. This state lasts until the GCB status has been deactivated.

The only exception is during synchronization state, as an external device is allowed to close the GCB.

GCB status

Indicates breaker state expected by controller (based on gen-set state, controller commands and breaker feedback). Can be used for external indication of breaker status according to controller's information.

MCB status

Indicates breaker state expected by controller (based on breaker feedback). Can be used for external indication of breaker status according to controller's information.

Neutral CB C/O

Neutral circuit breaker close /open output controls the generator Neutral circuit breaker. It is intended for contactors – provides a continual active signal if NCB should be closed. See also setpoint Neutral cont.

LdShed stage 1

LdShed stage 2

LdShed stage 3

Load shedding outputs for partial load switching.

Derating 1 act

Indicates activity of derating function 1.

Derating 2 act

Indicates activity of derating function 2.

Binary outputs – Control loops

Speed up

Speed dn

Binary outputs for Synchronizing and Load control. Outputs can be used instead of analog Speed governor output for older engine types. Minimum pulse duration is 0,15 sec. Maximum pulse duration is 10,0 sec.

Hint:

When Speed governor output stays near to the limit value ($SpeedGovLowLim+0,2$ V or $SpeedGovHiLim-0,2$ V) for more than 2 sec, the “Wrn SpdRegLim” message is displayed in the Alarm list and recorded to History. When AVRi output stays on <2% or >98% for more than 2 sec, the “Wrn VoltRegLim” is displayed in the Alarm list and recorded to History.

Corresponding warning is blocked when Binary outputs Speed Up, Speed Dn or AVR up, AVR dn are configured to a physical BO or VPIO.

It is not recommended to process these signals via the internal PLC, as the precise signal timing would be distorted.

RemoteControl1

RemoteControl2

RemoteControl3

RemoteControl4

RemoteControl5

RemoteControl6

RemoteControl7

RemoteControl8

These outputs are controlled remotely from IntelliMonitor or other tool. The user selects the requested state of these outputs via the buttons in this program.

Hint:

Outputs can be used to switch on/off some auxiliary devices in the control panel.

Binary outputs – Status information

Ready for load

The output closes when the engine is running, no 2nd level protection is active and the GCB is already closed or is able to be closed (i.e. all generator parameters are within limits).

Stand-by ready

The output closes when the engine is ready for stand-by: SEM / AUT mode, no 2nd level protection active.

Gen-set active

The output closes together with Prestart output and opens together with achieving “still engine” condition after the stop command. If the start sequence finishes with Start fail, the output opens after the last unsuccessful start attempt.

Hint:

The output also closes if the engine begins to rotate spontaneously. It stays closed until “still engine” condition is achieved.

Operational

The output is closed when no protection is active and the gen-set is ready for operation or is currently in operation.

Ready

The output is closed, if following conditions are fulfilled:

- Gen-set is not running and
- No 2nd level protection is active (or not yet reset)
- The controller has no “engine running” indication from any source
- The controller is not in OFF mode

Not ready

The output is closed, if following conditions are fulfilled:

- The controller in OFF mode or
- Any 2nd level alarm is active or not yet reset

CrankProcedure

The output closes together with the first Starter activation and opens with the last Starter deactivation (either “engine running” state achieved, or Start fail). During crank pauses, the output stays closed.

Cranking

Indication of cranking procedure.

Starting

The output closes together with Prestart output and opens with transition from Idle to Running state or with Start fail output activation. During crank pauses, the output stays closed.

Idle run

The output closes if “engine started” condition is detected after start and opens with Starting to Running transition.

Running

The output closes with transition from Starting to Running state. It opens with transition to Cooling state or if any 2nd level protection gets active. It stays closed if the engine is loaded.

ForwardSynchro

The output is closed during forward synchronizing and opens when GCB status gets active (= GCB was closed). The output can be used for external synchronizing module control.

Warming

The output is closed during warming procedure – the gen-set power is kept at *Warming load* level in this period.

Soft load

The output is closed during gen-set soft loading state – the gen-set power is ramping up, i.e. since GCB was closed until the end of the ramp.

Loaded

The output is closed when gen-set is loaded – GCB is closed and no load ramp is active.

Soft unload

The output is closed during gen-set soft unloading state – gen-set power is ramping down.

Cooling

The output closes during engine Cooling state, i.e. from GCB opening to stop command.

Stopping

The output closes after the command to stop has been issued. It opens if “still engine” conditions are fulfilled. The output also closes if the engine begins to rotate spontaneously. It stays closed until “still engine” condition is achieved.

Off mode

The output is closed, if OFF mode is selected.

Man mode

The output is closed, if MAN mode is selected.

Sem mode

The output is closed, if SEM mode is selected.

Aut mode

The output is closed, if MAN mode is selected.

GenParams OK

The output is copy of generator status LED on controller front panel. The output is closed if gen-set is running and all generator electric values are in limits and no 2nd level alarm is active (when only 1st level alarm is active, the output is closed).

Hint:

Use this output for switching on of auxiliary device (e.g. cooling pump) driven from generator voltage independently on the GCB status.

MainsParams OK

The output is copy of mains status LED on controller front panel. The output is closed if mains electric values are in limits.

In synchronism

The output closes during synchronizing if all matching conditions are fulfilled. It opens if corresponding breaker is closed (xCB status output get active).

Hint:

Synchronizing matching conditions:

- Slip frequency < 0,25 Hz
- Gen to Mains/Bus voltage phase shift within **Sync/Load ctrl:Phase window**
- Gen and Mains/Bus voltages within **Sync/Load ctrl:Voltage window**
- **Sync/Load ctrl:Dwell time** elapsed

StartButnEcho

StopButnEcho

FltResButnEcho

HrnResButnEcho

GCBButnEcho

These outputs are active for 1s if the corresponding button is pressed or binary input gets active or remote command is issued (from PC software, SMS, ...).

CtrlHeartBeat

The output signalizes watchdog reset. In a healthy state it flashes at 500ms : 500ms rate. It stops flashing when the unit reset occurs and the new controller start-up fails.

Bin selector 1-4

Any of the four outputs is active according to the corresponding setpoints *Bin selector X*. These are used for particular ECU settings.

Logical 0

Constant value that can be configured to any output.

Logical 1

Constant value that can be configured to any output.

TimerAct 1-4

TimerAct 5-8

TimerAct 9-12

TimerAct 13-16

These outputs are active if at least one of their assigned timer module channels gets active. Timer module channels are organized into groups of four.

TimerActiveCom

This output is a logical OR (Com = Common) of the outputs TimerAct 1-4, 5-8, 9-12, 13-16. It gets active if any timer module channel is active.

kWh pulse

The output generates 1 sec pulse in case that the kWh value increases.

Binary outputs – Fixed protection outputs

Alarm

The output closes if any alarm comes up. It opens if **FAULT RESET** is pressed. The output closes again if a new fault comes up.

Alarm flashing

If any alarm comes up, the output starts periodic closing/opening with period 1s/1s. It opens and stays open if **FAULT RESET** is pressed.

Horn

The output closes if any alarm comes up. It opens if **FAULT RESET** or **HORN RESET** is pressed or if *Horn timeout* has elapsed. The output closes again if a new fault comes up.

Horn flashing

If any alarm comes up, the output starts periodic closing/opening with period 1s/1s. It opens and stays open if **FAULT RESET** or **HORN RESET** is pressed or if *Horn timeout* has elapsed.

Common Hst

The output closes if any “History record”-type alarm appears. The output opens after 1s.

Common MP

The output closes if any “Mains protection”-type alarm appears. The output opens, if no “Mains protection”-type alarm is active. No **FAULT RESET** needed.

Common LoP

The output closes if any “Low power”-type alarm appears. The output opens, if no “Low power”-type alarm is active. No **FAULT RESET** needed.

Common AI

The output closes if any “Alarm only”-type alarm appears. The output opens, if no “Alarm only”-type alarm is active and **FAULT RESET** has been pressed.

Common Wrn

The output closes if any “Warning”-type alarm appears. The output opens, if no “Warning”-type alarm is active and **FAULT RESET** has been pressed.

CommonActLev 1

The output is a logical OR of Common AI and Common Wrn outputs.

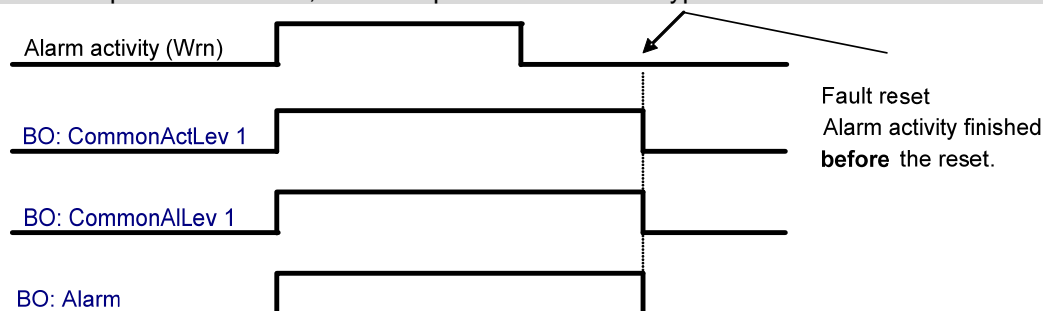
CommonAILev 1

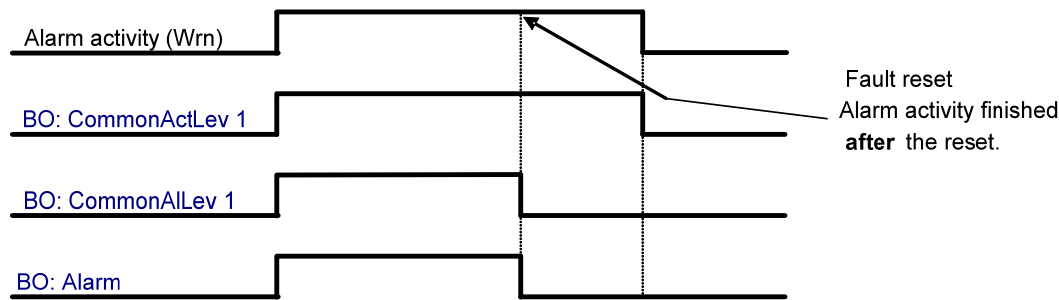
The output is active if at least one of the 1st level alarms (AI, Wrn) is active or not yet confirmed.

Hint:

See picture below with signal behaviour description. The same behaviour like for “Warning”-type alarm would be for “Alarm only”.

The same behaviour, but with signals CommonActLev 2 and CommonAILev 2 would be for “BreakerOpen&Cool-down”, “Slow stop” and “Shutdown”-type alarms.





Common OfL

The output closes if any “Off load”-type alarm appears. The output opens, if no “Off load”-type alarm is active. No **FAULT RESET** needed.

Common BOC

The output closes if any “Breaker Open & Cool-down”-type alarm appears. The output opens, if no “Breaker Open & Cool-down”-type alarm is active and **FAULT RESET** has been pressed.

Common Stp

The output closes if any “Slow stop”-type alarm appears. The output opens, if no “Slow stop”-type alarm is active and **FAULT RESET** has been pressed.

Common Sd

The output closes if any “Shutdown”-type alarm appears. The output opens, if no “Shutdown”-type alarm is active and **FAULT RESET** has been pressed.

CommonActLev 2

The output is a logical OR of Common BOC, Common Stp and Common Sd outputs.

CommonAlLev 2

The output is active if at least one of the 2nd level alarms (BOC, Stp, Sd) is active or not yet confirmed.

Common Fls

The output closes if any “Fail sensor”-type alarm appears. The output opens, if no “Fail sensor”-type alarm is active and **FAULT RESET** has been pressed.

T cyl differ

Output closes when engine cylinder temperature difference warning is active.

Vgen <>

The output closes if the generator over/under voltage alarm activates.

Vmains <>

The output closes if the mains over/under voltage alarm activates.

VectorShiftTrp

The output closes if the Vector shift protection gets active and the controller actually trips the selected breaker. The output stays closed for 3s, then opens again.

VectorShiftAct

The output closes if the Vector shift protection gets active. It stays closed for 3s, then opens again. This output is activated regardless of the activity of the input Sd Override.

Overcurrent

The output closes if the generator IDMT Overcurrent or Shortcurrent alarm activates. The output opens, if none of these alarms is active and **FAULT RESET** has been pressed.

ECU comm error

Output closes if there is an error in the communication with ECU. It doesn't matter how the ECU is connected – J1939 link or RS232 line.

PeriphCommErr

Output closes if there is an error in the communication with any peripheral unit (e.g. IS-AIN8, IGS-PTM, ...).

CtrlHBeat FD

BI "CtrlHBeat sens" should be assigned to the output "CtrlHeartBeat" from the other controller. If input signal does not correspond to right form (log 1 / log 0 - 500 ms / 500 ms; +/- 100 ms), BO: "CtrlHBeat FD" (Fail Detect) is activated. This BO can be used for primary controller blocking (switching to Emerg. manual, disconnecting BO, ...) and mainly for disconnecting of BI "Emerg. manual" of this controller. What means that the backup controller assumes engine control.

CAN2 bus empty

The output closes if the controller doesn't "see" any other controllers on the CAN2 bus. The output activation can be blocked by setpoint **Basic settings:CAN2emptDetect** (So it should be DISABLED for single applications.)

Binary outputs – Configurable prog. states

ECU

Indication of J1939 communication fail (configurable between Nop protection, Warning or Shutdown).

SHBinCfGErr

Shared Binary module configuration error – i.e. more than one source was configured (is on the CAN2 bus).

SHAINCfGErr

Shared Analog module configuration error – i.e. more than one source was configured (is on the CAN2 bus).

PLC State 1 .. 4

PLC state indication.

ECUDiagBlocked

Output is active when **Basic setting: ECU diag** = DISABLED..

WrongConfig

Wrong configuration indication.

Batt volt

Indication of battery voltage protection based on **Analog protection: Batt >V, Batt <V, Batt V del.**

EarthFaultCurr

Indication of Earth fault current protection based on **Gener protect: EarthFaultCurr** and *EthFltCurr del.*

Dongle incomp

Incompatible dongle indication.

Emergency stop

Activity of Emergency stop (from Binary input Emergency stop) indication.

Hint:

Any Binary output alarm indication that follows the corresponding internal state is activated with alarm and stays active until alarm reason disappears and the Fault reset (panel button or remote) is activated.

WrnService time

The output closes when at least one of gen-set Service count down timers *Service time X* has reached zero. To reset the output (and the related Wrn alarm), it is necessary to set again a non-zero value to the corresponding setpoint.

Overspeed

The output closes if the gen-set over speed alarm activates. The output opens, if alarm is no more active and **FAULT RESET** has been pressed.

Underspeed

The output closes if the gen-set under speed alarm activates. Under speed limit is given by *Starting RPM* if the engine has already started (see Starting procedure description). The output opens, if alarm is no more active and **FAULT RESET** has been pressed.

Start fail

The output closes if the gen-set start-up fails (= Cranking issued *Crank attempts* times and engine did not start). The output opens, if alarm is not active and **FAULT RESET** has been pressed.

Sd Stop fail

Engine stop fail indication. Stop fail: engine does not reach “still engine” condition within **Engine params: Stop time**.

ChrgAlternFail

Charger fail detection. D+ output current is limited to cca 300 mA.
Guaranteed level for signal Charging OK = 90% of supply voltage.

Pickup fail

Pickup fail indication. Pickup fail: lost of RPM signal in running state (“engine running” condition is active).

Sd Battery flat

Output closes if the controller “wakes up” after a start attempt which caused the battery voltage to drop down and consequently the controller switch-off.

Stp GCB fail

Output closes when GCB fail is detected.

Wrn MCB fail

Output closes when MCB fail is detected.

Stp Sync fail

The output is closed when the alarm Sync timeout is active.

WrnSpdRegLim

Output indicates the controller Speed governor output is on limit.

Hint:

When Speed governor output stays near to the limit value (*SpeedGovLowLim*+0,2 V or *SpeedGovHiLim*-0,2 V) for more than 2 sec, the “Wrn SpdRegLim” message is displayed in the Alarm list and recorded to History.

RPM

Indication of RPM state.

Sd Oil press B

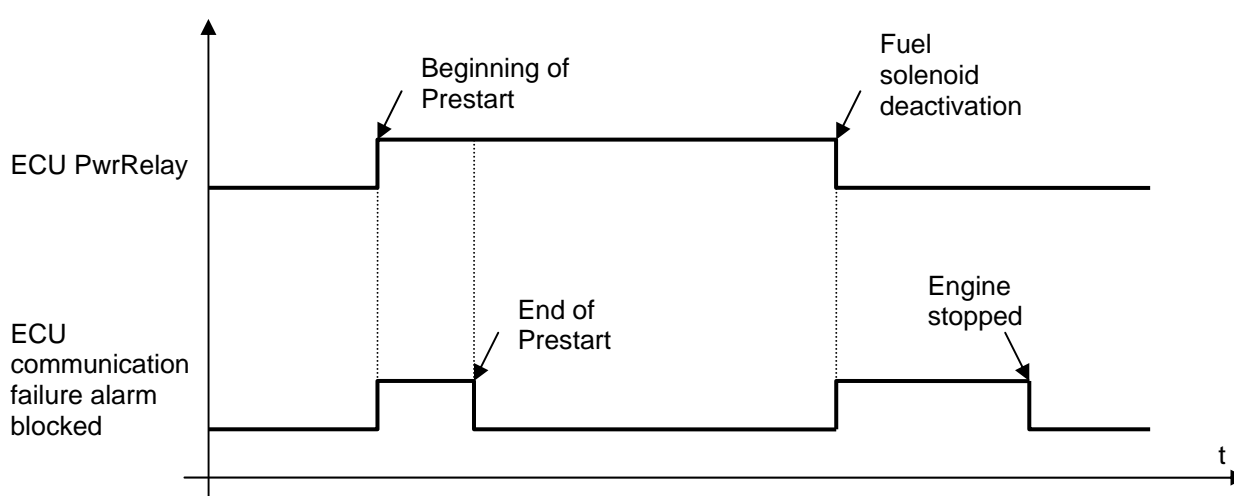
Engine Shut-down is activated by Binary input "Oil press".

ECU PwrRelay

The output closes at the beginning of prestart and opens if the engine shall be stopped.

This output can be used to indicate when the ECU should be powered up i.e. only while the engine is running.

This output also influences evaluation of communication failure with ECU and related FLS alarms from analog inputs read from the ECU. If the output is configured (which means configured on physical binary output or VPIO output), the issuing of communication error is blocked during Prestart and Stopping procedure as shown in the picture.



Hint:

The input must be configured on physical binary output or VPIO output. It is not enough to configure it as a PLC input for example.

Generator Voltage and Frequency alarms indication

Basic settings: *FixVoltProtSel* = PHASE-NEUTRAL

Binary output name	Protection type	Based on setpoint
BOC L1 under	BreakerOpen & Cool-down	Gener protect: <i>Gen < V BOC</i> , <i>Gen V del</i>
BOC L2 under		
BOC L3 under		
BOC L1 over	BreakerOpen & Cool-down	Gener protect: <i>Gen > V BOC</i> , <i>Gen V del</i>
BOC L2 over		
BOC L3 over		
Sd L1 over	Shut-down	Gener protect: <i>Gen > V SD</i>
Sd L2 over		Gener protect: <i>Gen V del</i>
Sd L3 over		
Gen V L1-N	BreakerOpen & Cool-down Shut-down	Gener protect: <i>Gen < V BOC</i>
Gen V L2-N		Gener protect: <i>Gen > V BOC</i>
Gen V L3-N		Gener protect: <i>Gen > V SD</i> Gener protect: <i>Gen V del</i>

Basic settings: *FixVoltProtSel* = PHASE-PHASE

Binary output name	Protection type	Based on setpoint
BOC L12 under	BreakerOpen & Cool-down	Gener protect: <i>Gen <V BOC</i> Gener protect: <i>Gen V del</i>
BOC L23 under		
BOC L31 under		
BOC L12 over	BreakerOpen & Cool-down	Gener protect: <i>Gen >V BOC</i> Gener protect: <i>Gen V del</i>
BOC L23 over		
BOC L31 over		
Sd L12 over	Shut-down	Gener protect: <i>Gen >V SD</i> Gener protect: <i>Gen V del</i>
Sd L23 over		
Sd L31 over		
Gen V L1-L2	BreakerOpen & Cool-down Shut-down	Gener protect: <i>Gen <V BOC</i> Gener protect: <i>Gen >V BOC</i> Gener protect: <i>Gen >V SD</i> Gener protect: <i>Gen V del</i>
Gen V L2-L3		
Gen V L3-L1		
BOC fgen under	BreakerOpen & Cool-down	Generator protect: <i>Gen <f</i> and <i>Gen f del.</i>
BOC fgen over		Generator protect: <i>Gen >f</i> and <i>Gen f del.</i>
Gen freq		Generator protect: <i>Gen >f</i> , <i>Gen <f</i> and <i>Gen f del.</i>

Mains Voltage and Frequency alarms indication

Binary output name	Protection type	Based on setpoint
MP L1 under	BreakerOpen & Cool-down	Gener protect: <i>Gen <V BOC</i> , <i>Gen V del</i>
MP L2 under		
MP L3 under		
MP L1 over	BreakerOpen & Cool-down	Gener protect: <i>Gen >V BOC</i> , <i>Gen V del</i>
MP L2 over		
MP L3 over		
Mains V L1-N	Shut-down	Gener protect: <i>Gen >V SD</i> Gener protect: <i>Gen V del</i>
Mains V L2-N		
Mains V L3-N		

Binary output name	Protection type	Based on setpoint
MP L12 under	Mains Protection	Mains protect: <i>Mains <V MP</i> and <i>Mains V del.</i>
MP L23 under		
MP L31 under		
MP L12 over	Mains Protection	Mains protect: <i>Mains >V MP</i> and <i>Mains V del.</i>
MP L23 over		
MP L31 over		
Mains V L1-L2	Mains Protection	Mains protect: <i>Mains <V MP</i> , Mains protect: <i>Mains >V MP</i> and <i>Mains V del</i>
Mains V L2-L3		
Mains V L3-L1		
MP fmns under	Mains Protection	Mains protect: <i>Mains >f</i> , Mains protect: <i>Mains <f</i> , Mains protect: <i>Mains f del.</i>
MP fmns over		
Mains freq		

Hint:

L1-N, L2-N, L3-N alarm indications are active when **Basic settings:** *FixVoltProtSel* = PHASE-NEUTRAL.
L1-L2, L2-L3, L3-L1 alarm indications are active when **Basic settings:** *FixVoltProtSel* = PHASE-PHASE.

OfL StartBlick

Output indicates wrong setpoints setting that disables the engine start or taking the load.

Binary output name	Protection type	Based on setpoint
BOC IDMT	BreakerOpen & Cool-down	Generator protect: <i>2Inom del.</i>
BOC ShortCurr	BreakerOpen & Cool-down	Generator protect: <i>Ishort</i> and <i>Ishort del.</i>
BOC Overload	BreakerOpen & Cool-down	Generator protect: <i>OverldStrtEval</i> Generator protect: <i>2POverldStEvDel</i>
BOC NCB fail	BreakerOpen & Cool-down	x

Analog inputs

LdCtrl:AnExBld

External requested gen-set power value.

- Configure LdCtrl:AnExBld to selected analog input
- Configure Analog input range
- Adjust **ProcessControl**: *Load ctrl PTM* = ANEXT BASELOAD

LdCtrl:AnExI/E

External requested mains import/export power value.

- Configure input LdCtrl:AnExI/E to selected analog input
- Configure Analog input range
- Adjust **ProcessControl**: *Load ctrl PtM* to ANEXT IM/EX.

LdCtrl:I/E-Pm

Mains import/export active power measured from an external transducer.

- Configure LdCtrl:I/E-Pm to selected analog input
- Configure Analog input range
- Adjust **ProcessControl**: *I/E-Pm meas* = ANALOG INPUT

PowerDerating1

Analog input for Power derating function, channel 1.

PowerDerating2

Analog input for Power derating function, channel 2.

LdCtrl:TByPwr

Input to measure water temperature for temperature by generator power control.

Warming temp

Input to measure engine temperature during warm-up procedure. See setpoints **Engine params**: *Warming load, Warming temp, Max warm time*.

Cyl temp 1 - 32

32 inputs to measure Cylinder Temperatures. Configured cylinder temperatures are displayed on controller measurement screens as well as average cylinder temperature. Cylinder temperature protection is based on the difference against average temperature.

RPM pick-up

Logical Analog input for RPM receiving from various types of Engine Control Units (and optionally via I-CB).

Oil press

Logical input for Oil pressure protection.

Oil pressure is calculated into "running engine" condition when configured. Engine start is blocked if Oil pressure is higher than *Starting POil* setpoint setting.

LCD brightness

Analog input for external LCD brightness setting (e.g. via potentiometer). Keyboard LCD brightness setting and binary input Alt brightness do not work when input is configured. Expected value is in the range 0 to 100%.

Hint:

Input available in IG-NT/EE and modifications only and valid only for the built-in display. For attached IG-Display module, this input has no meaning. Input is not present in IS-NT.

Analog outputs

The IS-NT has one analog output available. Default setting of this output is the value of actual generator power in the range 0 to 20 mA.

Hint:

It is possible to configure any other value available in the configuration using GenConfig.

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.

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 IntelliMonitor (direct or Modem) until this level is set in IMON. Setpoints opened from front panel are automatically closed 15 minutes after the last key has been depressed 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

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.

Base load

[kW – MW*]

Required gen-set power when *Load ctrl PtM* = BASELOAD.

Step: 0,1 kW / 1 kW / 0,01 MW*

Range: OFF, 0,1 kW - *Nomin power**

*Note:

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

Hint:

If the setpoint *Base load* is set to lower value than the one given by setpoint **Generator protect: Min power PtM**, the gen-set power is limited to **Generator protect: Min power PtM**.

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).

<u>IM3 CT INPUT</u>	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.
<u>ANALOG INPUT</u>	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.

<u>NONE</u>	No source for I/E reactive power measurement available. If selected, power factor control defaults to BasePF.
<u>IM3 CT INPUT</u>	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.
<u>ANALOG INPUT</u>	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.

Import load [kW – MW*]

Requested power from / to mains when *LoadCtrl PtM* = IMP/EXP or when Export protection function is active i.e. *Export limit* = ENABLED.

Step: 0,1 kW / 1 kW / 0,01 MW*

Range: -320,0 MW to +320,0 MW*

*Note:

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

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 *PeakLevelStart* limit.

Step: 0,1 kW / 1 kW / 0,01 MW*

Range: *PeakLevelStop* to 320,0 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 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 to zero to disable Peak aut start function.

Step: 1s

Range: OFF, 0 – 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

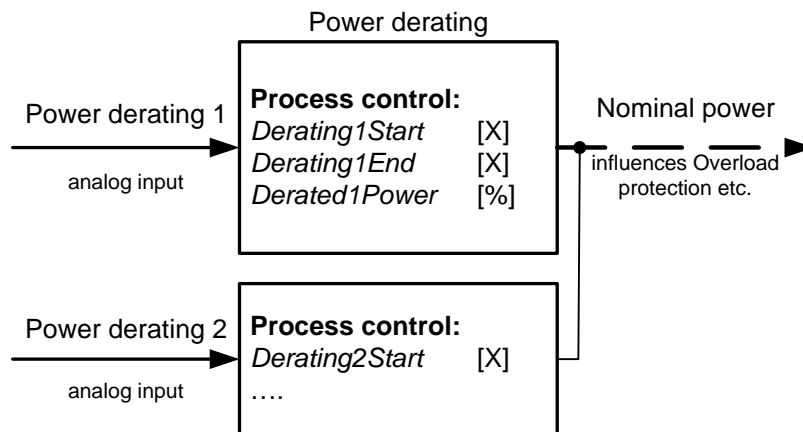
Hints:

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

#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-sets are running in parallel to the mains (MCB is closed).

COMMON: Three pole GCB's are supposed for the gen-set. 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 are closed MCB and Neutral contactor for more than 400 ms.

Basic 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. IntelliMonitor). Gen-set name isn't affected by GenConfig SW.

Nomin power [kW – MW*] (FV)

Nominal power of the generator.

Step: 0,1 kW / 1 kW / 0,01 MW*

Range: 0,1 kW – 320,0 MW*

Force value possibility: Yes

*Note:

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

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 possibility: 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

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.

Hint:

Do not switch to 1A range unless you have IG-NTC/EEC or IS-NT hardware.

Im3/ErFICurCTp [A]

Mains current phase 3 or Earth Fault protection Current Transformer ratio – primary side.
Mains CT ratio for single phase Import / Export power and PF measuring. Single phase power value is internally multiplied by three.

Step: 1 A

Range: 1 – 10000 A

Hint:

Im3 controller terminals have to be connected to mains L3 phase for Import/Export measuring!!!
Balanced mains power is expected.

Im3/ErFICurCTs [/5A / /1A]

Mains current phase 3 or 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.

Hint:

Do not switch to 1A range unless you have IG-NTC/EEC or IS-NT hardware.

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.
Do not switch to 120V range unless you have IG-NTC/EEC or IS-NT hardware.

Vm VT ratio [/1]

Mains 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.

Vm InpRangeSel [277 V / 120 V]

Mains voltage sensing inputs range selection. Available in IG-xxC and IS-NT versions. In standard IG-EE/NT units only 277 V range available – the setpoint setting is not important.

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.
Do not switch to 120V range unless you have IG-NTC/EEC or IS-NT hardware.

GenNomV [V – kV*] (FV)

Nominal generator voltage (phase to neutral).

Step: 1 V / 0,01 kV*

Range: 80 V – 300,0 kV*

Force value possibility: Yes

*Note:

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

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 *ForceValueInXX* source setpoints. It is prohibited to use another controller values as a source for Force value in this case!!! Both Gen and Mains nominal voltages must be set to the same value when no PT is used.

GenNomVph-ph [V – kV*]

Nominal generator voltage (phase to phase).

Step: 1 V / 0,01 kV*

Range: 130 V – 600,0 kV

*Note:

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

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 $220 \times 1,73 = 381$ V. Both Gen and Mains nominal voltages must be set to the same value when no PT is used.

MainsNomV [V – kV*] (FV)

Nominal mains voltage (phase to neutral).

Step: 1 V / 0,01 kV*

Range: 80 V – 300,0 kV*

Force value possibility: Yes

*Note:

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

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 *ForceValueInXX* source setpoints. It is prohibited to use another controller values as a source for Force value in this case!!! Both Gen and Mains nominal voltages must be set to the same value when no PT is used.

MainsNomVph-ph [V – kV*]

Nominal mains voltage (phase to phase).

Step: 1 V / 0,01 kV*

Range: 130 V – 300,0 kV*

*Note:

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

Hint:

Both Gen and Mains nominal voltages must be set to the same value when no PT is used.

FixVoltProtSel [PHASE-NEUTRAL / PHASE-PHASE]

PHASE-NEUTRAL: The generator and mains/bus fixed voltage protections are based on phase-to-neutral voltages.

PHASE-PHASE: The generator and mains/bus fixed voltage protections are based on phase-to-phase voltages.

Hint:

Values in user configurable voltage protection have to be changed manually (e.g. V L1-N for V L1-L2 or vice versa)

Nominal freq [Hz] (FV)

Nominal generator frequency (usually 50 or 60 Hz).

Step: 1Hz

Range: 45 – 65 Hz

Force value possibility: Yes

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 *ForceValueInXX* source setpoints. It is prohibited to use another controller values as a source for Force value in this case!!!

Gear teeth []

Number of teeth on the engine's flywheel for the pick-up sensor.

Set to Fgen->RPM, if no pick-up sensor is used. In that case, engine speed is calculated from the generator frequency.

Step: 1

Range: Fgen->RPM, 1 – 500

Hint:

Generator frequency can be used (for RPM measuring) only when generator voltage (min 10V) is present during cranking. This is in general not suitable option for gas engines!

Gear teeth should not be set to zero when **Engine params: Fuel solenoid** = GAS ENGINE (it is likely that RPM would not reach 30, the gen-set wouldn't start and gas valve would not open – see **Fuel solenoid**).

Some electronic engines provide their own cranking and preheat cycle (e.g. CAT EMCP3). In such case, set Gear teeth = 0, otherwise it may not be possible to start the engine.

Nominal RPM [RPM] (FV)

Nominal speed of the engine.

Step: 1RPM

Range: 100 – 4000 RPM

Force value possibility: Yes

The following table shows the relationship between frequency and nominal RPM due to generator poles:

Generator poles	50 Hz	60 Hz
2	3000	3600
4	1500	1800
6	1000	1200

Hint:

Generator frequency can be used (for RPM measuring) only when generator voltage (min 10V) is present during cranking.

When pick-up cut (fail) comes, IntelliSys detects under speed and stops the engine.

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

Equivalent to Controller mode changes by **MODE→** or **←MODE** buttons.

Force value possibility: Yes

Hint:

Mode change can be separately password protected.

FltRes GoToMAN [DISABLED / ENABLED] (FV)

DISABLED: Controller stays in AUT mode after **Fault reset**.

ENABLED: Automatic switch from SEM / AUT to MAN mode after **Fault reset** to avoid automatic engine start. This function is active for all 2nd-level protections (Shut down, Slow stop, EIProt, Off-load).

Force value possibility: Yes

Hint:

It is not possible to reset a Fault when Binary input Remote AUT is closed or another mode forcing function is active.

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, FaultResButton, HornResButton, StartButton, StopButton.

DispBaklightTO [min] (FV)

Timeout after which the display backlight is switched off.

OFF = the backlight is off all the time, NO TIMEOUT = the backlight is on all the time.

Step: 1 min

Range: OFF (=0), 1 – 240 min, NO TIMEOUT (=241)

Force value possibility: Yes

DispBklStrtOff [DISABLED / ENABLED] (FV)

This setpoint determines if display backlight is switched on/off during the gen-set start. This parameter is effective for all the displays not only for the internal one.

Force value possibility: Yes

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)]

Communication protocol selection for RS232(1) line.

DIRECT: Connection to a local PC running IntelliMonitor. 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*.

Hint:

Detail description of Modbus protocol see in Communication guide.

ECU LINK mode can be selected only at one of the RS232 ports at the same time. If selected on both, the RS232(2) line won't work.

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

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)Mdmlni []

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)Mdmlni []

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 and ECU LINK 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 and ECU LINK 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 possibility: Yes

ECU Diag [DISABLED / ENABLED] (FV)

When set to disabled, the ECU advanced diagnostics is disabled to allow the cooperation with external diagnostics tool.

Alarm list indication “ECU Diag disabled” is indicated when ECU diagnostics is disabled.

Force value possibility: Yes

SHxOcol detect [DISABLED / ENABLED]

This setpoint is dedicated for virtual peripherals; it can enable / disable error messages when more then one master (source) is configured.

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. IntelliMonitor). Gen-set name isn't affected by GenConfig SW.

Contr. address []

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 IntelliMonitor. 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.

~~ECU LINK mode can be selected only at RS232(1) port.~~

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.

Hint:

Detail description of Modbus protocol see in Communication guide.

~~ECU LINK mode can be selected only at RS232(1) port.~~

ECU LINK mode available only starting from FW versions IGS-NT-2.2 or higher together with IGS-NT-E-COM-1.1 or higher.

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.

RS485(1) conv. [DISABLED / ENABLED]

If set to ENABLED, the communication RS232(1) port is redirected to the built-in RS485 converter (IG-Display connector).

Hint:

Applicable only for DIRECT, MODBUS-DIRECT and ECU LINK modes.

This converter is not isolated!

For ports position and description see Installation guide.

RS485(1) has to be switched to Disabled when IG-Display (Remote Display) is used.

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.

RS232(1)Mdmlni []

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)Mdmlni []

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.

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 possibility: Yes

LB/UART Log [DISABLED / ENABLED] (FV)

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. IntelliSupervisor.

CANAddrSwitch1 [MODEM / OTHER]

This setpoint defines whether CAN address 122 is used for modem communication over ComAp I-LB module or direct communication of another device:

MODEM: Default setting for modem communication

OTHER: Address 122 can be used by other devices to read data via CAN bus the same way as if using addresses 123 and 124

CANAddrSwitch2 [MODEM / OTHER]

This setpoint defines whether CAN address 122 is used for modem communication over ComAp I-LB module or direct communication of another device:

MODEM: Default setting for modem communication

OTHER: Address 125 can be used by other devices to read data via CAN bus the same way as if using addresses 123 and 124

IP addr mode [FIXED / AUTOMATIC]

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. 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.

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.

Net mask [-]

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.

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.

A gateway is a device which connects the respective segment with the other segments and/or Internet.

ComApProtoPort [1 to 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. IntelliMonitor, GenConfig). This setpoint should be adjusted to 23, which is the default port used by all ComAp PC programs. A different value should be used only in special situations as e.g. sharing one public IP address among many controllers or to overcome a firewall restrictions.

AirGate server [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 [-]

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 [DISABLED / ENABLED]

Switch this setpoint to ENABLED if your SMTP server requires authenticated access. You have also adjust SMTP user name and SMTP password. Ask your internet provider or IT manager for this information.

Hint:

Most of public free SMTP servers require authentication. You will get instructions when you register to the freemail service.

SMTP user name [-]

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

SMTP password [-]

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

SMTP address [-]

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.

Hint:

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.

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.
Proper setting of SMTP-related setpoints as well as controller mailbox are essential for sending alerts via e-mails

Contr mailbox [-]

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.

Hint:

Most of SMTP server will reject sending e-mails that contain nonexisting address in the sender address field.

Time zone [-]

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.

Hint:

If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.

DNS IP [-]

In fixed settings mode this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in e-mail addresses and server names into correct IP addresses.

In Automatic settings mode this setpoint is used to display DNS server, which has been assigned by the DHCP server.

ECU Diag [DISABLED / ENABLED] (FV)

When set to disabled, the ECU advanced diagnostics is disabled to allow the cooperation with external diagnostics tool.

Alarm list indication "ECU Diag disabled" is indicated when ECU diagnostics is disabled.

Force value possibility: Yes

SHxOcol detect [DISABLED / ENABLED]

This setpoint is dedicated for virtual peripherals; it can enable / disable error messages when more then one master (source) is configured.

Engine params

Starting RPM [RPM] (FV)

"Firing" speed when controller stops cranking.

Step: 1 RPM

Range: 0 – 1000 RPM

Force value possibility: Yes

Hint:

Under speed limit is given by *Starting RPM* value once the Under speed protection has been enabled. The Under speed protection becomes active 5s after reaching *Starting RPM* or other engine running condition regardless of the setting of *Idle time* (transition Idle -> Nominal RPM).

Starting POil [bar] (FV)

Oil pressure limit for controller cranking termination = one of the engine running indications.

To activate this function an Analog input must be configured to Analog logical input **Oil press**.

Step: 0,1 bar

Range: 0 – 10,0 bar

Force value possibility: Yes

Hint:

Step, Range and dimension depend on corresponding Analog input sensor characteristic.

Prestart time [s] (FV)

The binary output PRESTART is active prior to engine start for this time.

Set to zero if you want to disable this function.

Step: 1s

Range: 0 – 3600 s

Force value possibility: Yes

Prelubr time [s] (FV)

This is the time the binary output PRELUBR PUMP is active. The controller will activate the binary output PRELUBR PUMP for this time, then pause for *Prelubr pause*, then activate it again. This will continue the entire time the engine is not running and the controller is not in OFF mode and EMERGENCY STOP is not active.

Step: 1s

Range: 0 – 3600 s

Force value possibility: Yes

Prelubr pause [min] (FV)

Pause between prelubrication cycles.

Step: 1 min

Range: 1 – 3000 min

Force value possibility: Yes

Hint:

To use Prelubrication, configure Binary output PRELUBR PUMP first.

Prelubrication is disabled in controller OFF mode or if *Prelubr time* is set to zero.

Binary output PRELUBR PUMP is opened when engine is running.

Prelubrication cycle starts *PrelubrPause* after engine stop.

Prelubrication cycle starts immediately when controller power supply is switched on or when mode changes from OFF to MAN or AUT or after Emergency stop was reset. An Alarmlist message “Not lubricated” is active until this first lubrication cycle has been completed.

MaxCrank time [s] (FV)

The maximum time the starter motor is energized.

Step: 1s

Range: 1 – 240 s

Force value possibility: Yes

Hint:

If *Fuel solenoid* = GAS ENGINE, the engine will crank 25% longer with closed fuel valve after the last unsuccessful attempt in order to ventilate the remaining gas.

If magnetic pickup is used and the controller does not receive non-zero RPM within 2s after energizing the starter motor, then cranking pause follows immediately.

If *Fuel solenoid* = DIESEL, magnetic pickup is used and the controller does not receive non-zero RPM within 5s after energizing the starter motor, then cranking pause follows immediately.

CrankFail time [s] (FV)

Time which enables to engine gain any min. RPM.

Step: 0,1s

Range: 5 – 60 s

Force value possibility: No CrnkFail pause [s] (FV)

Pause between crank attempts.

Step: 1s

Range: 5 – 60 s
Force value possibility: Yes

Crank attempts [] (FV)

Max number of crank attempts.
Step: 1
Range: 1 – 10
Force value possibility: Yes

Hint:

A pickup fail shutdown is activated if digital output starter is closed and the controller measures zero RPM (from the pickup) and non-zero frequency.

Idle time [s] (FV)

Idle time delay starts when RPM exceeds *Start RPM*. A start fail is detected if the RPM drops below 2 RPM during *Idle time*.

Binary output IDLE/NOMINAL is opened before and during engine start (during *Idle time*) and after engine start is activated - in Cooling state, only if **Engine params: Cooling Speed** = NOMINAL.

Step: 1 s
Range: 1 – 3600 s
Force value possibility: Yes

Hint:

The Under speed protection becomes active 5s after reaching *Starting RPM* or other engine running condition regardless of the setting of *Idle time* (transition Idle -> Nominal RPM).

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 possibility: Yes

Warming load [%] (FV)

The requested load during warm-up period after GCB is closed. In parallel to mains operation only.

Step: 1 % of Nominal power
Range: 0 – 100 % of Nominal power
Force value possibility: Yes

Hint

Warming temp Analog input has to be configured. Otherwise the warm-up procedure does not work.

Warming temp [°C] (FV)

The requested engine water temperature to finish the warming period. If this limit reached, the actual Warming time is shorter than *Max warm time* setpoint.

Step: 1 °C
Range: ± 32000 °C
Force value possibility: Yes

Max warm time [s] (FV)

If the required *Warming temp* is not achieved within this time, the warming period is completed anyway.

Step: 1 s
Range: 0 – 3600 s
Force value possibility: Yes

Cooling speed [NOMINAL / IDLE] (FV)

Determines function of *Idle/Nominal* binary output during cooling.

NOMINAL Gen-set cools down on nominal speed, generator voltage and frequency protections are active.

IDLE Gen-set cools down on idle speed, generator protections are deactivated (except of Gen >V Sd).
Force value possibility: Yes

Cooling time [s] (FV)

Runtime of the unloaded gen-set to cool down the engine before stop.

Step: 1s

Range: 0 – 3600 s

Force value possibility: Yes

CoolDnAfterBOC [STOP / INFIN COOLING] (FV)

STOP = opens breaker, starts cooling, after set time stops engine

INFIN COOLING = opens breaker, starts cooling; engine stays in that state for infinite time; after acknowledging all the BOC protections (and all the others which can block engine running) it is possible to switch back from cooling; in AUT mode automatically, in MAN mode after pushing Start button

Force value possibility: Yes

Cooldown optim [DISABLED / ENABLED]

DISABLED Gen-set cooling period is given strictly by the setpoint *Cooling time*.

ENABLED Gen-set cooling period depends on the load that was present in the moment of Stop command.

I.e. the higher the produced power has been, the longer cooling period will be. It is a linear

equation: - Act power = 100% of the *Nomin power* => cooling period = *Cooling time*

- Act power = 50% of the *Nomin power* => cooling period = *Cooling time* / 2

- ...

AfterCool time [s] (FV)

Runtime of the cooling pump after engine stop. Binary output COOLING PUMP is closed when the engine starts and opens *AfterCoolTime* delayed after gen-set stops.

Step: 1s

Range: 0 – 3600 s

Force value possibility: Yes

Hint:

For After cooling function configure the binary output COOLING PUMP.

Stop time [s] (FV)

Stop time value means the minimum time for which Stop solenoid will be closed. If the engine stopping procedure will take longer time, the Stop solenoid stays closed until all signs of moving engine have disappeared (RPM, Vg, fg, Oil press, RunIndicationX) + 5 seconds more to have some safety overlap. After *Stop time* has elapsed and the engine is still moving, the alarm "Sd Stop fail" is produced. Conditions for stopped engine: RPM=0, Ug < 10 V, fg = 0 Hz, Oil press < Ain Sd level, all RunIndicationX inputs deactivated. However, this is not a normal situation and should be solved by increasing the *Stop time* setpoint.

Step: 1s

Range: 0 – 240 s

Force value possibility: Yes

SDVentil time [s]

If *Fuel solenoid* setpoint is set to GAS ENGINE, this setpoint adjusts the time of starter motor to be switched on for engine prevention in case of a first start attempt after a shutdown or controller switch-on.

Step: 1s

Range: 0 – 60 s

Fuel solenoid [DIESEL ENGINE / GAS ENGINE]

Selection of Fuel solenoid output function:

DIESEL ENGINE: In this mode of operation the output closes to energize the fuel solenoid and enable the engine to start. The delay or advance of activation in relation to Starter output is defined by *FuelSol offset*.

GAS ENGINE: In this mode of operation the output closes to open the gas valve and enable the engine to start. The output closes only if RPM > 30 (i.e. the starter motor is engaged) with *FuelSol offset*.

The output opens if there is any reason to stop the engine or in pause between repeated starts.

Hint:

In the case of gas engine, the underspeed protection cannot be blocked by the Sprinkler function. For gas engines, it is strongly recommended to use the pick-up sensor, as non-zero RPM detection is required during the start procedure.

FuelSol offset [s]

This setpoint adjusts the Fuel solenoid output activation in relation to Starter output. Positive values mean that fuel valve is opened after the Starter, negative values mean that it is open before. Negative values are suppressed if *Fuel solenoid* = GAS ENGINE.

Step: 0,1 s

Range: -5,0 – 5,0 s

D+ function [DISABLED / CHRGFAIL / ENABLED]

DISABLED: The D+ terminal is not used.

CHRGFAIL: The D+ terminal is used for charge fail detection only.

ENABLED: The D+ terminal is used for both functions - "running engine" detection and charge fail detection.

Hint:

The magnetization current is provided independently on this setpoint value.

Bin selector 1-4 [OFF / ON] (FV)

These setpoints are linked with binary outputs Bin selector X. Activity of these outputs depends on setpoint state:

OFF: The corresponding binary output is not active.

ON: The corresponding binary output is active.

The setpoints are intended for ECU control, e.g. nominal speed switching. The binary output values can be transmitted to ECU and control particular functions.

Force value possibility: Yes

Engine protect

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 possibility: 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.

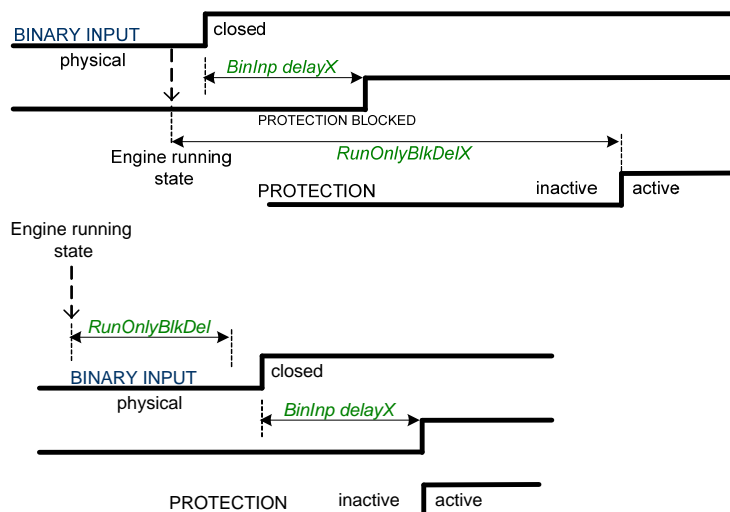
Step: 0,1s

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 possibility: Yes



Hint:

Engine running state = RPM > **Engine params: Starting RPM** or
Analog input Oil pressure > **Engine params: Starting POil** or
Active Binary input Run indication1 or
Active Binary input Run indication2 or
Active Binary input Run indication3.

BinInp delay 1 [s]

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

BinInp delay 2 [s]

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

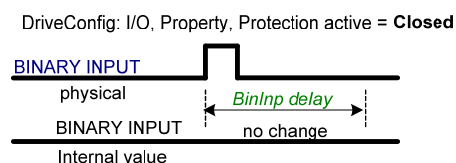
BinInp delay 3 [s] (FV)

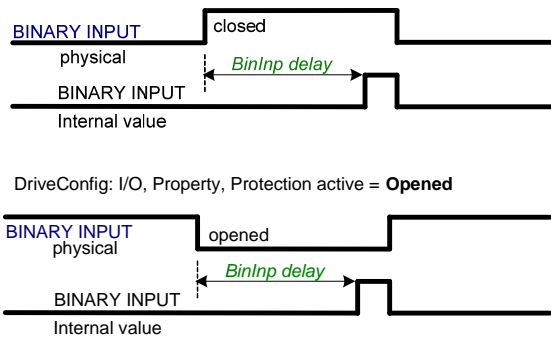
Binary input protection is activated when input is closed for longer time than *BinInp delay 3*. To use this delay Binary input must be configured in GenConfig for Property – Delay = BinInp delay 3.

Step: 0,1s
Range: 0,0 – 600,0 s
Force value possibility: 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.





ForceBlock1Del [s]

ForceBlock2Del [s]

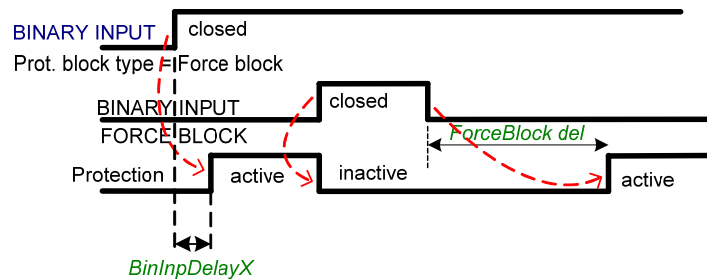
ForceBlock3Del [s] (FV)

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 possibility: Yes



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.

Overspeed [%]

Threshold for engine over speed protection.

Step: 1% of *Nominal RPM*

Range: 0 – 200%

Hint:

Engine params: *Starting RPM* value is checked as under-speed level when engine is running.

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).

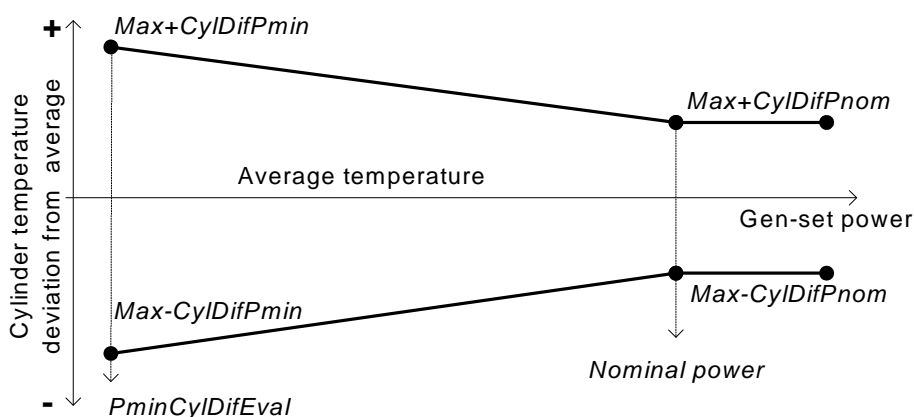
CylDifEvalDel [s]

Cylinder temperature Difference Evaluation Delay.

Step: 1s

Range: 0 – 600 s

Cylinder temperature deviation protection type: warning



Drawing text translation

Cylinder temperature deviation from average
Average temperature
Max+CylDifPmin
Max-CylDifPmin
PminCylDifEval
Max+CylDifPnom
Max-CylDifPnom
Nominal power
Gen-set power

Cylinder temperature deviation from average
Average temperature
Max+CylDifPmin
Max-CylDifPmin
PminCylDifEval
Max+CylDifPnom
Max-CylDifPnom
Nominal power
Gen-set power

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

Batt volt del [s]

Delay for battery voltage alarms.

Step: 1 s

Range: 0 – 600,0 s

Gener protect

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

OverldStrtEval [%] (FV)

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

Step: 1 % of *Nomin power*

Range: 100 – 200 %

Force value possibility: Yes

2POvrlldStEvDel [s]

IDMT curve shape selection. *2POvrlldStEvDel* is the Reaction time of IDMT protection for 200% overload $P_{gen} = 2 * OverldStrtEval$.

Step: 0,1 s

Range: 0,0 - 600,0 s

Protection: BreakerOpen & Cool-down.

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.

$$\text{Reaction time} = \frac{2POvrlldStEvDel * OverldStrtEval}{P_{gen} - OverldStrtEval}$$

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.

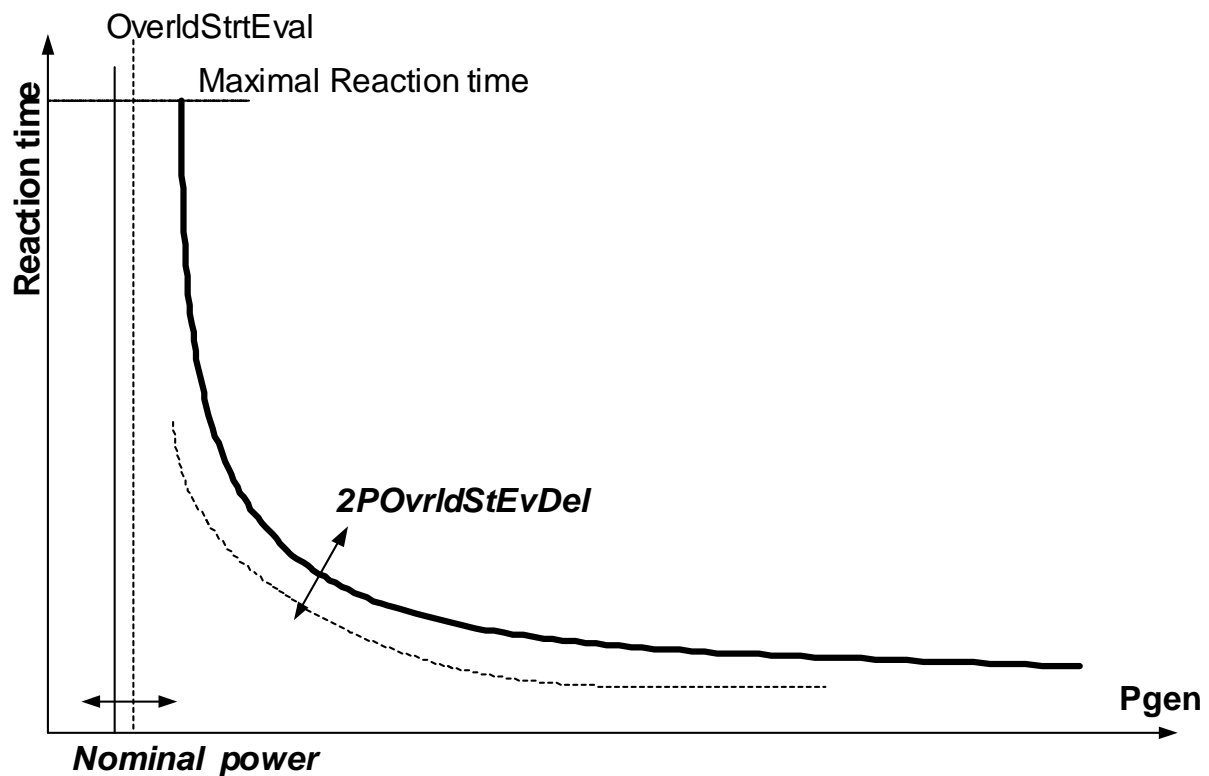
Following example shows reaction times for *OverldStrtEval* = 100% in dependence on generator power and setpoint *2POvrlldStEvDel* value:

	Pgen [%]	<=100	101	102	105	110	120	150
2POvrlldStEvDel [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 *2POvrlldStEvDel* value:

	Pgen [%]	<=110	111	112	115	120	150	200
2POvrlldStEvDel [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 possibility: 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 str1: Load ramp**, to *Min power PtM*. After protection becomes inactive, the power limitation is automatically terminated.

Ishort [%]

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: 100 - 500 % of *Nomin current*

Protection: BreakerOpen & Cool-down.

Ishort del [s]

Delay for generator shortcurrent protection.

Step: 0,02 s

Range: 0,00 – 10,00 s

Hint:

Ishort del can be set in GenConfig to 0,01 s, but this value is rounded to the proximate controller evaluation period, which is 0,02 s when the frequency is 50Hz.

2Inom del [s]

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

$I_{gen} = 2 * \text{Nominal current}$.

Step: 0,1 s

Range: 0,0 - 60,0 s

Protection: BreakerOpen & Cool-down.

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.

$$\text{Reaction time} = \frac{2Inom\ del * Nomin\ current}{I_{gen} - Nomin\ current}$$

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. I_{gen} is the maximum current of the three phases of generator current.

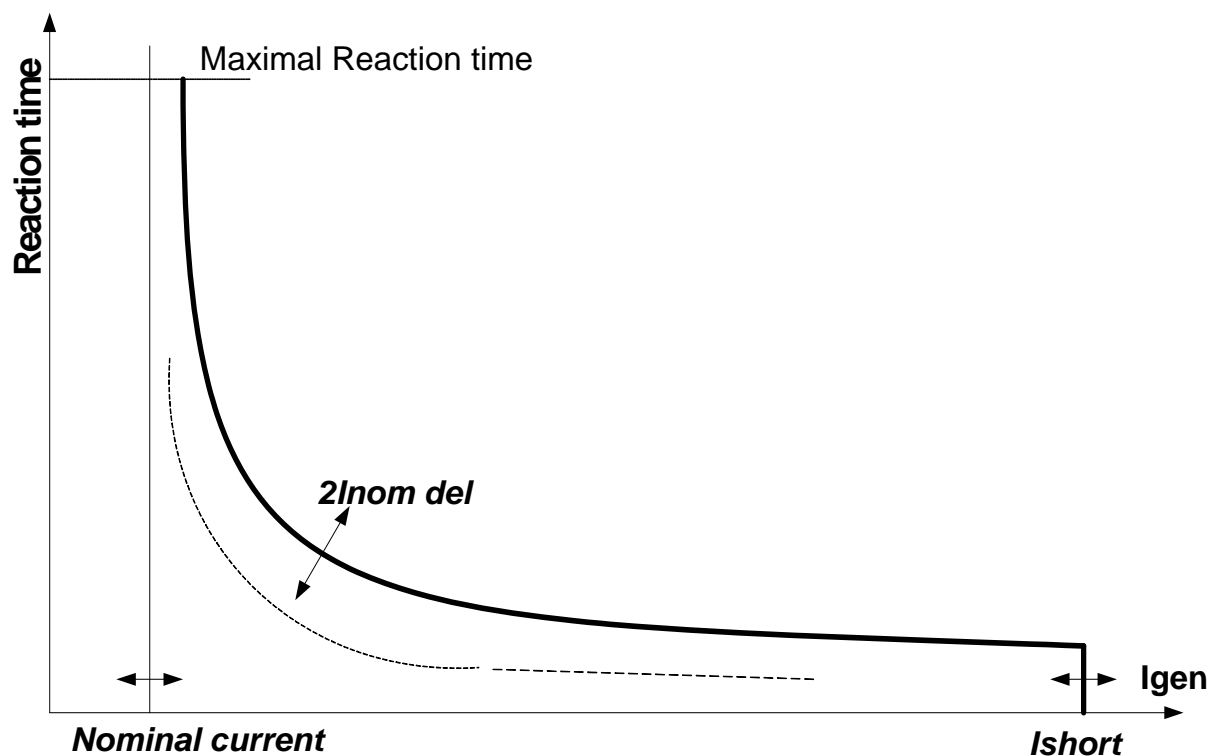
EXAMPLE of Reaction time for different over current levels.

	I_{gen} [%]	≤ 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.



Gen >V BOC [%] (FV)

Threshold for generator over voltage in % of nominal voltage.

Step: 1 %

Range: Gen <V BOC – 150 % of GenNomV or GenNomVph-ph respectively

Protection: BreakerOpen & Cool-down.

Gen <V BOC [%] (FV)

Threshold for generator under voltage in % of nominal voltage.

Step: 1 %

Range: 50 – Gen >V BOC % of GenNomV or GenNomVph-ph respectively

Protection: BreakerOpen & Cool-down.

Hint:

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

Gen >V Sd [%] (FV)

2nd threshold for generator over voltage in % of nominal voltage.

Step: 1 %

Range: 50 – 150 % of GenNomV or GenNomVph-ph respectively

Protection: Shutdown.

Gen V del [s]

Delay for generator under and over voltage protection.

Step: 0,02 s

Range: 0,00 – 600,00 s

Gen >f [%] (FV)

Threshold for generator over frequency in % of nominal frequency.

Step: 0,1 %

Range: $Gen < f - 150,0$ % of *Nominal freq*

Protection: BreakerOpen & Cool-down.

Gen <f [%] (FV)

Threshold for generator under frequency in % of nominal frequency.

Step: 0,1 %

Range: 50,0 – $Gen > f$ % of *Nominal freq*

Protection: BreakerOpen & Cool-down.

Hint:

The generator frequency is evaluated from the L3 phase.

Gen f del [s]

Delay for generator under frequency and over frequency protection.

Step: 0,02 s

Range: 0,00 – 600,00 s

Reverse power [%]

Threshold for generator reverse (back) power alarm in % of nominal power.

Step: 1%

Range: 0 – 50 % of *Nomin power*

Protection: BreakerOpen & Cool-down.

ReversePwr del [s]

Delay for generator back (reverse) power alarm.

Step: 0,1 s

Range: 0 – 600,0 s

EarthFaultCurr [A]

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 & Cool-down.

EthFltCurr del [s]

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 [%]

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]

Delay for generator voltage unbalance alarm.

Step: 0,1s

Range: 0 – 600,0 s

Protection: BreakerOpen & Cool-down.

Gen I unbal [%]

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]

Delay for generator current asymmetry (unbalance).

Step: 0,1 s

Range: 0 – 600,0 s

Protection: BreakerOpen & Cool-down.

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. The setting does not work in the case of SPI application since MCB can not be controlled.

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 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 V unb del [s]

Delay for mains voltage unbalance alarm.

Step: 0,1s

Range: 0 – 600,0 s

Protection: BreakerOpen & Cool-down.

AMF settings

Mains ret del [s] (FV)

Delay after the mains return to the start of synchronizing of GCB.

Step: 1 s

Range: 0 – 3600 s

Force value possibility: Yes

RPM/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.

Dwell time [s] (FV)

The period of time that the genset RPM must be within *RPM matching* limit before GCB is closed.

Step: 0,1 s

Range: 0,0 – 25,0 s

Force value possibility: Yes

RPM matching [°]

Maximum RPM \pm difference between gen-set and mains. RPM is compared according to this formula:

$$\text{RPMreq} = \text{fmains} * \text{Nominal RPM} / \text{Nominal freq}$$

Step: 0,01 %

Range: 0,00 – 2,50%

Force value possibility: Yes

Hint:

Before optimization of **RPM/Load ctrl** setpoint group adjusting disconnect GCB OPEN/CLOSE output or set RPM matching = 0 to avoid paralleling.

RPM gain [%]

Gain of speed control loop.

Step: 0.1 %

Range: 0 to +200.0 %

RPM int [%]

Relative integration factor of speed control loop.

Step: 1 %

Range: 0 % – 100 %

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 possibility: 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

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 possibility: Yes

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.

RampStartLevel [%]

Value of initial load, on which starts the load ramping according to *Load ramp* setting in % of nominal load.

Step: 1 %

Range: 0 – 100 %

Hint:

In case of higher value of this setpoint and closing the GCB with no load on the mains/bus, an overswing may occur.

GCB open level [%]

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.

Step: % of *Nomin power*

Range: 0 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*.

Step: 1 s

Range: Load ramp – 1800 s

Force value possibility: Yes

GCB close TOut [s]

Maximum allowed time for RPM matching procedure.

Step: 1 s

Range: 1 – 1800 s, NO TIMEOUT

RPM matching /load control adjustment

Hint:

Use isochronous speed governor.

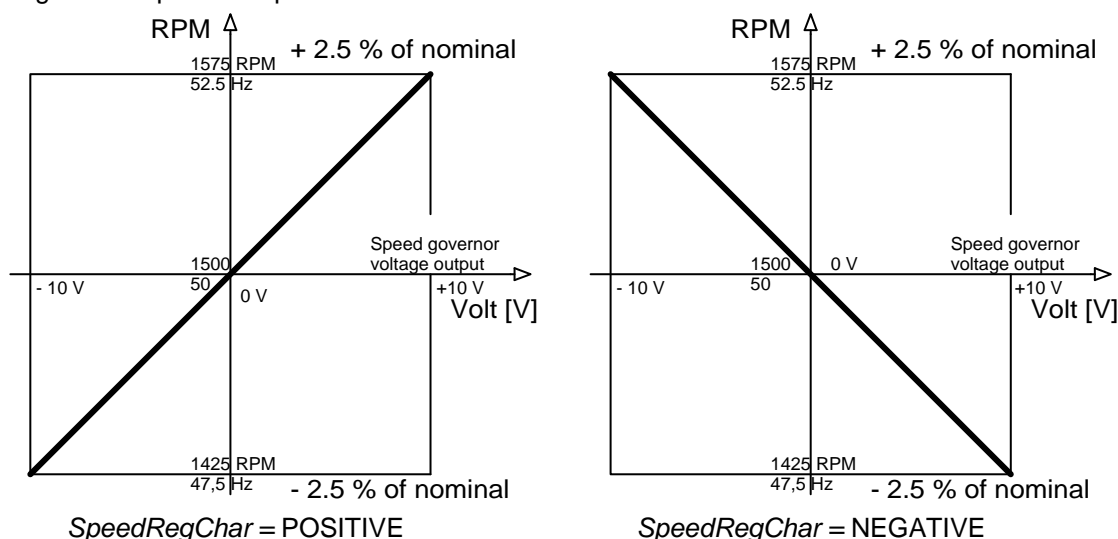
Two wire shielded connection from controller SPEED GOVERNOR output (SG OUT, SG COM) to Speed governor auxiliary input is recommended.

A full range change of the IS speed governor output (from –10V to 10V) should cause 5-10% change of the engine speed ($-10V \sim 95\% \text{ RPM}_{\text{nom}}$, $0V \sim 100\% \text{ RPM}_{\text{nom}}$, $+10V \sim 105\% \text{ RPM}_{\text{nom}}$)

IMPORTANT

Speed governor has to be adjusted for optimum performance before controller RPM match / load control adjusting.

Check generator phase sequence before the first GCB connection.



Before optimization of **RPM/Load ctrl** setpoint group adjusting disconnect GCB OPEN/CLOSE output or set RPM matching = 0 to avoid paralleling.

RPM matching adjustment

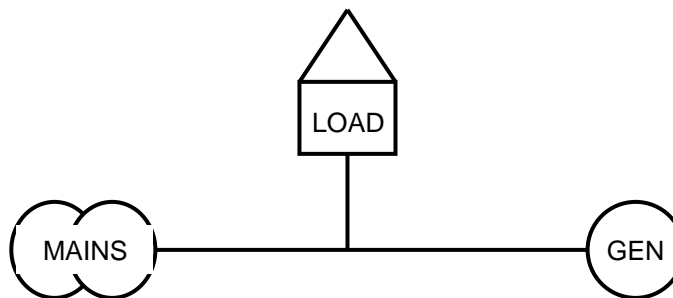
- 1) Start the engine in MAN Mode.
- 2) Set the engine RPM by speed trim on speed governor or by *Speed gov bias* and *SpeedGovLowLim* to Nominal frequency.

- 3) To start RPM matching press **GCB ON/OFF** button. GCB LED starts flash to indicate RPM matching. To stop synchronization press again **GCB ON/OFF**.
Slip control adjusting:
- 4) Adjust *RPM gain* to unstable speed control and decrease value by 30 % to RPM insure stable performance.
- 5) Adjust *RPM int* to stable (fast and smooth) slip control.

Load control adjustment

- 1) Set *Load control* = Baseload, set *Baseload* value to 30 % of nominal load.
- 2) Set *Load gain* to the same value and sign (polarity) as *RPM 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 is GCB 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.
- 7) When gen-set is running full load check if
 - a. The governor output voltage value is not limited (not near to $\pm 10V$)
 - 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

$\begin{array}{c} \uparrow Q \\ \text{Cos} < 0 \text{ L} \\ \text{Export P} \\ \text{Import Q} \end{array}$	$\begin{array}{c} \uparrow Q \\ \text{Cos} > 0 \text{ L} \\ \text{Import P} \\ \text{Import Q} \end{array}$	$\begin{array}{c} \uparrow Q \\ \text{Cos} > 0 \text{ L} \\ \text{Consumption P} \\ \text{Inductive LOAD} \end{array}$	$\begin{array}{c} \uparrow Q \\ \text{Cos} < 0 \text{ L} \\ \text{Consumption P} \\ \text{Generation Q} \end{array}$	$\begin{array}{c} \uparrow Q \\ \text{Cos} > 0 \text{ L} \\ \text{Generation P} \\ \text{Generation Q} \end{array}$
$\begin{array}{c} \text{Cos} < 0 \text{ C} \\ \text{Export P} \\ \text{Export Q} \end{array}$	$\begin{array}{c} \text{Cos} > 0 \text{ C} \\ \text{Import P} \\ \text{Export Q} \end{array}$	$\begin{array}{c} \text{Cos} > 0 \text{ C} \\ \text{Consumption P} \\ \text{Capacitive LOAD} \end{array}$	$\begin{array}{c} \text{Cos} < 0 \text{ C} \\ \text{Consumption P} \\ \text{Consumption Q} \end{array}$	$\begin{array}{c} \text{Cos} > 0 \text{ C} \\ \text{Generation P} \\ \text{Consumption Q} \end{array}$

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) controller displays L (inductive) character of the load. When reactive power is exported (<0) controller 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) controller displays L (inductive) character of the load.

When reactive power is negative (<0) controller displays C (capacitive) character of the load.

Gen-set

Generated active power is displayed in positive numbers e.g. 20kW.

When reactive power is positive (>0) controller displays L (inductive) character of the load.

When reactive power is negative (<0) controller displays C (capacitive) character of the load.

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 *ForceValueInXXth* function.

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 *ForceValueInXX* 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 *ExtValueX*reset 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 *ExtValueX*reset is active, the *ExtValueX* is held at this value regardless of other conditions.

Step: 1 X

Range: -32000 – 32000 X

Load shedding

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

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

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

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

If manual reconnection of the load is desired, the AutoLd recon setpoint needs to be disabled (*AutoLd recon* = DISABLED) and the MAN load recon binary input needs to be configured.

Rising edge on this input resets the controller to a lower stage, but only if the load is under the *Ld recon level* at that moment.

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

DISABLED - Load shedding is switched off at all

ISLAND ONLY - 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 back

ALL THE TIME - Load Shedding works only according to gen-set Power, it works without reference to

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IS-NT-Async-SPI-1.2.PDF

operation type (island, parallel or any transitions)
Force value possibility: Yes

Ld shed level [%] (FV)

When gen-set load exceeds this level for more than *Ld shed delay* time, controller proceeds to the next Load shedding stage - the next binary output Load shed x is closed.

Step: 1 % of *Nomin power*
Range: *Ld recon level* - 200 % of *Nomin power*
Force value possibility: Yes

Ld shed delay [s] (FV)

Time delay for *LD shed level* limit.

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

Ld recon level [%] (FV)

When gen-set load drops under this level for more than *Ld 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 power*
Range: 0 - *Ld shed level*
Force value possibility: Yes

Ld recon delay [s] (FV)

The amount of time that the load has to be under *Ld recon level* before the next part of the load is reconnected.

Step: 1 s
Range: 0 - 600 s
Force value possibility: Yes

AutoLd recon [DISABLED / ENABLED] (FV)

Switch between manual and automatic reconnection of shedded load.

DISABLED Rising edge on binary input *MAN load recon* 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.

Force value possibility: Yes

Hint:

To understand Load shedding better see diagrams in section Load shedding (page 9 and 10).

Timer settings

Timer channel 1-16

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. If blocking input is active then the timer is not activated even if it should be, according to it's other settings.

The channels are divided into groups of 4. Each group has independent binary output, which activates if any of the 4 channels within the group is active (1-4, 5-8,...). There is also one common output for all 16 channels.

Act. calls/SMS

HistRecOnly [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 possibility: 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).

AlarmlistOnly [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 possibility: 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 possibility: 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 possibility: 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&CoolDn [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/mails to selected phone, mobile or mail address when a BrkOpen&CoolDn type protection occurs.

Force value possibility: 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 possibility: 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 possibility: Yes

Shutdown [DISABLED / ENABLED] (FV)

Enables or disables active calls/SMS/emails to selected phone, mobile or mail address when a Shutdown type protection occurs.

Force value possibility: 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.

Force value possibility: Yes

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 IntelliMonitor – 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.

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 possibility: 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.

#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.

List of possible events

IGS-NT Alarm/history record	Alarm/History appearance
ProcessControl	A+H
BIN 1	A+H
BIN 2	A+H
BIN 3	A+H
BIN 4	A+H
BIN 5	A+H
BIN 6	A+H
BIN 7	A+H
BIN 8	A+H
BIN 9	A+H
BIN 10	A+H
BIN 11	A+H
BIN 12	A+H
ANA 1	A+H
ANA 2	A+H
ANA 3	A+H
ANA 4	A+H
ANA 5	A+H
ANA 6	A+H
ANA 7	A+H
ANA 8	A+H
ANA 9	A+H
ANA 10	A+H
BOUT 1	A+H
BOUT 2	A+H
BOUT 3	A+H
BOUT 4	A+H
BOUT 5	A+H
BOUT 6	A+H
BOUT 7	A+H
BOUT 8	A+H
BOUT 9	A+H
BOUT 10	A+H
BOUT 11	A+H
BOUT 12	A+H
AOUT 1	A+H
AOUT 2	A+H
AOUT 3	A+H
AOUT 4	A+H
ECU	A+H
SHBIN 1	A+H
SHBIN 2	A+H
SHBIN 3	A+H
SHBIN 4	A+H
SHAIN 1	A+H
SHBinCfgErr	A
SHAINCfgErr	A
PLC State 1	A
PLC State 2	A
PLC State 3	A
PLC State 4	A
ActCall Fail	A

ECUDiagBlocked	A
Wrong config	A+H
RTCbatteryFlat	A
UnivState 1	A+H
Batt volt	A+H
EarthFaultCurr	A+H
Gen V unbal	A+H
Gen I unbal	A+H
Mains V unbal	A+H
UnivState 7	A+H
UnivState 8	A+H
UnivState 9	A+H
UnivState 10	A+H
UnivState 11	A+H
UnivState 12	A+H
UnivState 13	A+H
UnivState 14	A+H
UnivState 15	A+H
UnivState 16	A+H
Dongle incomp	A+H
Emergency stop	A+H
CAN2 bus empty	A+H
ChrgAlternFail	A+H
Sd Stop fail	A+H
Overspeed	A+H
Underspeed	A+H
Pickup fail	A+H
Sd BatteryFlat	A+H
WrnServiceTime	A+H
Not lubricated	A
Start fail	A+H
Start blocking	A
Wrn CylTemp1	A+H
Wrn CylTemp2	A+H
Wrn CylTemp3	A+H
Wrn CylTemp4	A+H
Wrn CylTemp5	A+H
Wrn CylTemp6	A+H
Wrn CylTemp7	A+H
Wrn CylTemp8	A+H
Wrn CylTemp9	A+H
Wrn CylTemp10	A+H
Wrn CylTemp11	A+H
Wrn CylTemp12	A+H
Wrn CylTemp13	A+H
Wrn CylTemp14	A+H
Wrn CylTemp15	A+H
Wrn CylTemp16	A+H
Wrn CylTemp17	A+H
Wrn CylTemp18	A+H
Wrn CylTemp19	A+H
Wrn CylTemp20	A+H
Wrn CylTemp21	A+H
Wrn CylTemp22	A+H
Wrn CylTemp23	A+H
Wrn CylTemp24	A+H
Wrn CylTemp25	A+H
Wrn CylTemp26	A+H

Wrn CylTemp27	A+H
Wrn CylTemp28	A+H
Wrn CylTemp29	A+H
Wrn CylTemp30	A+H
Wrn CylTemp31	A+H
Wrn CylTemp32	A+H
Wrn MCB fail	A+H
Stp GCB fail	A+H
Sd Oil press B	A+H
Stp Sync fail	A+H
BOC L1 under	A+H
BOC L2 under	A+H
BOC L3 under	A+H
BOC L1 over	A+H
BOC L2 over	A+H
BOC L3 over	A+H
Sd L1 over	A+H
Sd L2 over	A+H
Sd L3 over	A+H
BOC L12 under	A+H
BOC L23 under	A+H
BOC L31 under	A+H
BOC L12 over	A+H
BOC L23 over	A+H
BOC L31 over	A+H
Sd L12 over	A+H
Sd L23 over	A+H
Sd L31 over	A+H
BOC fgen under	A+H
BOC fgen over	A+H
BOC ReversePwr	A+H
MP L1 under	A+H
MP L2 under	A+H
MP L3 under	A+H
MP L1 over	A+H
MP L2 over	A+H
MP L3 over	A+H
MP L12 under	A+H
MP L23 under	A+H
MP L31 under	A+H
MP L12 over	A+H
MP L23 over	A+H
MP L31 over	A+H
MP fmns under	A+H
MP fmns over	A+H
Bus meas error	A+H
OfL StartBck	A+H
BOC IDMT	A+H
BOC ShortCurr	A+H
BOC Overload	A+H
BOC NCB fail	A+H
Wrn BadPwrCfg	A+H
WrnTstOnLdFail	A+H
Wrn SpdRegLim	A+H
G L neg	A
G ph+L neg	A
G ph opposed	A
M L neg	A

M ph+L neg	A
M ph opposed	A
hist PLC 1	H
hist PLC 2	H
hist PLC 3	H
hist PLC 4	H
Fault reset	H
ActCallCH1-OK	H
ActCallCH2-OK	H
ActCallCH3-OK	H
ActCallCH1Fail	H
ActCallCH2Fail	H
ActCallCH3Fail	H
Switched On	H
Watchdog	H
System Error	H
System Log	H
SetpointChange	H
Password set	H
Password chng	H
AccessCodeSet	H
AccessCodeChng	H
Admin action	H
Terminal	H
Ext display	H
BinaryUnstable	H
ForceValue	H
TimeModeChange	H
GroupsLinked	H
GroupsUnlinked	H
Time stamp	H
Gen Peak start	H
Gen PMS start	H
Overload	H
Extern start	H
Gen Rem start	H
Gen MF start	H
Gen start	H
Engine stop	H
Gen stop	H
Gen MF stop	H
Gen Rem stop	H
Gen Peak stop	H
Gen PMS stop	H
Load Shed	H
Load Reconnect	H
VectorShift	H
Other CB trip	H
GCB opened	H
GCB closed	H
MCB opened	H
MCB opened ext	H
MCB closed	H
SyncStarted	H
RevSyncStarted	H
Ready	H
Idle run	H
Running	H

Warming	H
Soft load	H
Loaded	H
Soft unload	H
Cooling	H
Emerg man	H
Not ready	H

Controller configuration and monitoring

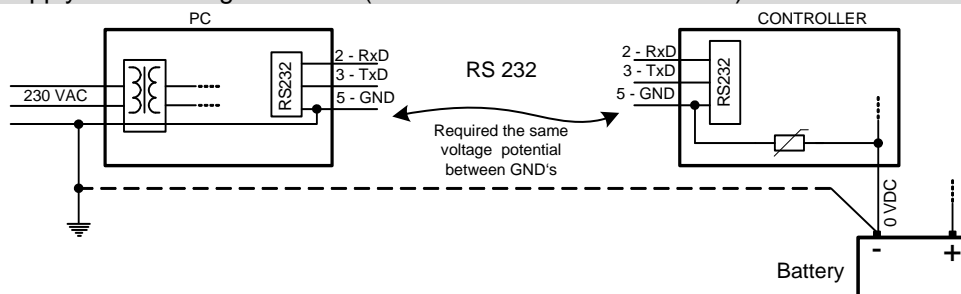
IGS-NT installation pack contains separate PC software tools: GenConfig (GC) and IntelliMonitor (IM). GC and IM is based on Windows 95/98/NT/ME/2000/XP or higher platform and requires approximately 5 Mbyte of hard disc free space.

Direct connection to the PC

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

Hint:

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



GenConfig functions

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

Configuration steps

Following configuration steps are available in GenConfig software:

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

InteliMonitor

Functions

- On-line direct, Modem or Internet single or multiple engine monitoring
- Active Modem or Internet call from 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 at <http://www.modicon.com/openmbus/>.

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-2.1.pdf.