

InteliLite^{NT}

InteliLite NT[®] AMF26-P

Compact Controller for Stand-by Operating Gen-sets

(IL-NT AMF26-P unit)

SW version 2.4 January 2016



Reference Guide

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Written by Petr Novák
Customized by Michal Novak
Prague, Czech Republic

ComAp, a.s.
Kundratka 2359/17, 180 00 Praha 8, Czech Republic
Tel: +420 2 66316661, Fax: +420 2 66316647
E-mail: info@comap.cz, www.comap.cz



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General Guidelines

What describes this manual?

! IMPORTANT SAFETY INSTRUCTIONS !

SAVE THESE INSTRUCTION - This manual contains important instructions for IL-NTAMF26- P controller that shall be followed during installation and maintenance of the IntelliLite NT genset controllers. It is intended for use by gen-set control panel builders and for everybody who is concerned with installation, operation and maintenance of the gen-set.

This manual describes „AMF26-P“ software, which is designed for single set, stand-by applications.

What is the purpose of the manual?

Manual also provides general information how to install and operate IntelliLite NT AMF26-P controller.

This manual is dedicated for

Operators of gen-sets

Gen-set control panel builders

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

!! Warnings !!

Remote control

IL-NT controller can be remotely controlled. In case of the work on the gen-set check, that nobody can remotely start the engine.

To be sure:

Disconnect remote control via RS232 line

Disconnect input REM START/STOP

or

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

Because of large variety of IntelliLite^{NT} parameters settings, it is not possible to describe any combination. Some of IL-NT functions are subject of changes depend on SW version. The data in this manual only describes the product and are not warranty of performance or characteristic.

Symbols

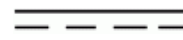
Symbols used in this manual:



Grounding
point symbol



AC voltage
symbol



DC voltage
symbol

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
IL-NT-EFCPM2 (Yellow background) new features and text changed from version 1.0

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.

Note:
SW and HW must be compatible otherwise the function will be disabled. If wrong software is downloaded, message **HARDWARE INCOMPATIBLE** appears on controller screen. In this case use Boot load (jumper) programming – close Boot jumper and follow instructions in LiteEdit or follow video guide **“Boot Jumper Programming”** at <http://www.comap.cz/support/training/training-videos/>.

WARNING – VERY IMPORTANT !!!

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

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

Switch IL-NT to MAN or OFF Mode or disconnect the Binary outputs Starter and Fuel to avoid unexpected automatic start of gen-set and GCB closing.

!!! CAUTION !!!

Dangerous voltage

In no case touch the terminals for voltage and current measurement!
Always connect grounding terminals!
In any case do not disconnect IntelliLite^{NT} CT terminals !

Adjust set points

All parameters 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)

InteliLite^{NT} AMF26-P is a comprehensive AMF-controller for single generating sets operating in stand-by mode. IL-NT AMF26-P features extended support of electronic engines and extension modules.

InteliLite^{NT} 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.

InteliLite^{NT} 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.

InteliLite^{NT} provides gas engine support without ventilation.

The key feature of InteliLite^{NT} is its easy-to-use operation and installation. Predefined configurations for typical applications are available as well as user-defined configurations for special applications.

What is in the package?

Accessories	Description	Optional / Obligatory
IL-NT-AMF26-P	InteliLite ^{NT} central unit	Obligatory
IL-NT-RS232	RS232 communication card	Optional for AMF26-P
IL-NT-RS232-485	RS232 and RS485 communication card	Optional for AMF26-P
IL-NT-S-USB	Service USB communication card	Optional for AMF26-P
**IB-Lite	Ethernet communication card	Optional for AMF26-P
***IL-NT-GPRS	GSM/GPRS modem card	Optional for AMF26-P
**IL-NT-AOUT8	Gauge driver plug-in card	Optional for AMF26-P
*IL-NT RD	Remote display software	Optional for AMF26-P
IL-NT-EFCPM	Earth Fault Current Protection Module	Optional for AMF26-P
**IL-NT-EFCPM2	Earth Fault Current Protection Module	Optional for AMF26-P
IGL-RA15	Remote annunciator	Optional for AMF26-P
IG-IOM/PTM	I/O extension module	Optional for AMF26-P
IG-IB	Internet communication bridge	Optional for AMF26-P
AT-LINK-CONV	Service programming RS232 interface	Optional for AMF26-P
AT-LINK-CABLE	Serial RS232 communication cable 1,8m	Optional for AMF26-P

*Remote display for IL-NT controllers uses standard IL-NT controller with Remote display software.

**Supported from version IL-NT-AMF26-P-2.0.

*** Supported from version IL-NT AMF 26-P- 2.2

Hint:

For detailed information about extension modules used with IL-NT controllers, please see the IL-NT-Accessory Modules manual.

IL-NT RS232 Communication module

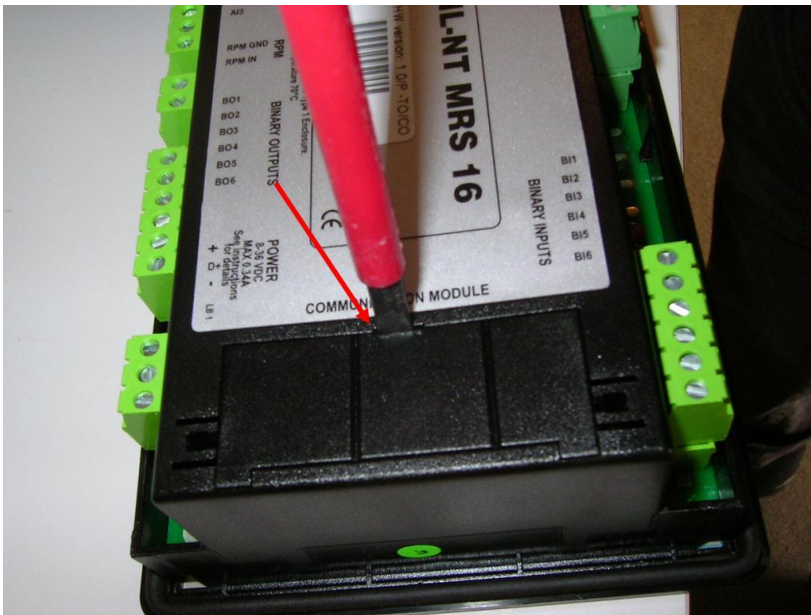
IL-NT RS232 is optional plug-in card to enable IntelliLite^{NT} for RS232 communication. This is required for computer or Modbus connecting. Card inserts into expansion slot back on the controller. To insert the module, you must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have insert it, the module will snap under plastic teeth. It is supposed to be installed permanently. Should you need to remove it, the safest way is to remove whole back cover and then remove module manually.

How to install RS 232 communication module:

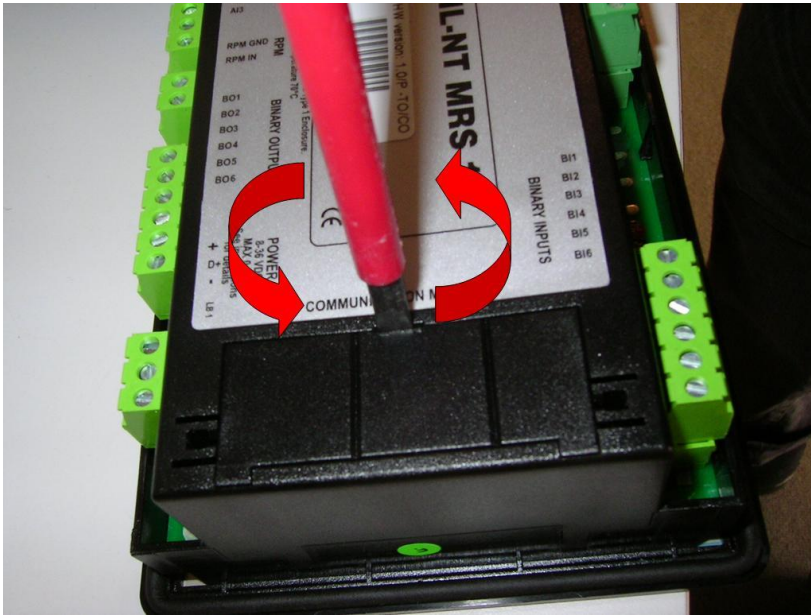
Hint:

The following procedure is analogic also for other communication modules.

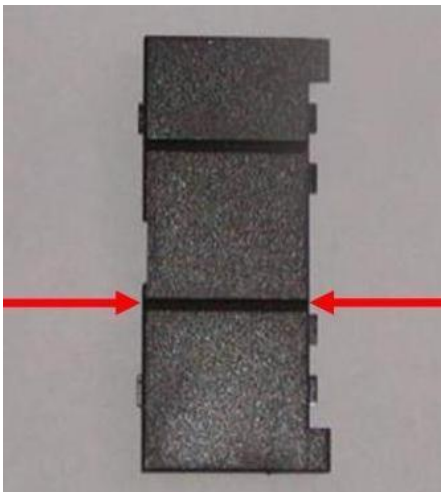
1. Insert a screwdriver into the slot of the cover.

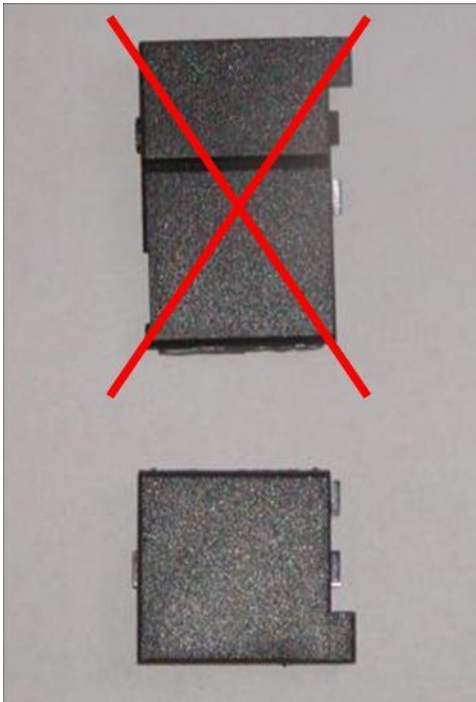


2. Move the screwdriver to set apart the small cover. **Be careful!**



3. Remove the small cover.
4. Break apart the small cover into two pieces. **Do not throw away the smaller part!**





5. Take RS 232 communication module.

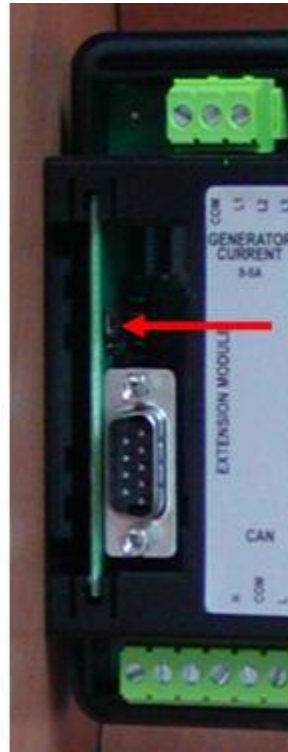
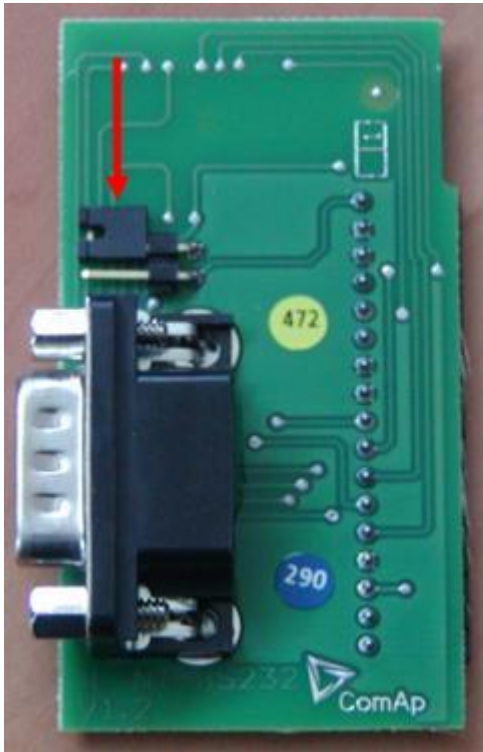


6. Plug RS 232 communication module into the slot of the controller.
7. Put back the small cover.



Hint:

When you insert RS 232 communication module, the boot jumper is hidden. For that reason we recommend to use RS 232 communication module with the boot jumper placed on it. See pictures below:

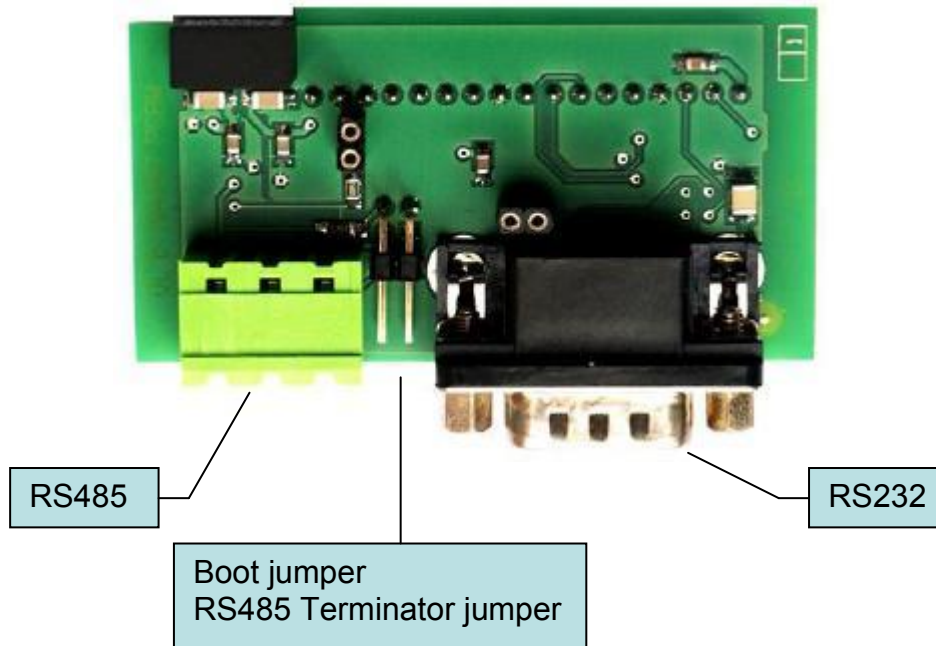


RS 232 communication module with the boot jumper.

IL-NT RS232-485 Communication module

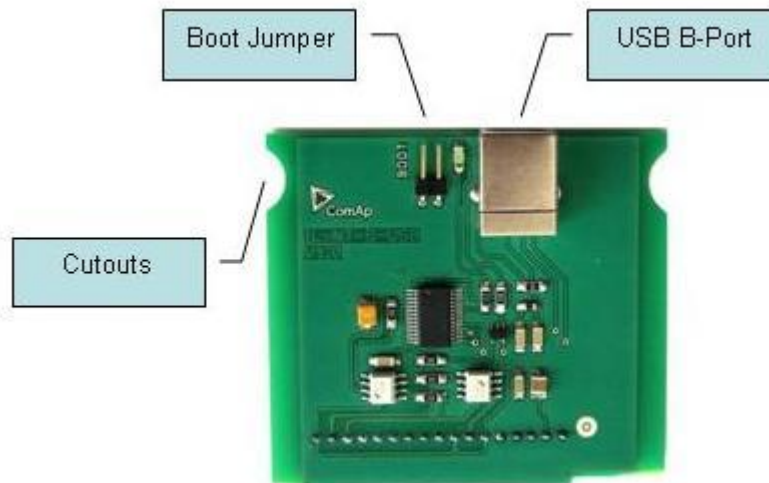
IL-NT RS232-485 is optional plug-in card to enable IntelliLite^{NT} the RS232 and RS485 communication. This is required for computer or Modbus connection. Card inserts into expansion slot back on the controller. The IL-NT RS232-485 is a dual port module with RS232 and RS485 interfaces at independent COM channels. The RS232 is connected to COM1 and RS485 to COM2.

To insert the module, please follow the instructions for IL-NT RS232 module, procedure is analogous. You must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have inserted it, the module will snap under plastic teeth. It is supposed to be installed permanently. Should you need to remove it, the safest way is to remove whole back cover and than remove module manually.



IL-NT S-USB Service USB communication module

IL-NT S-USB is optional plug-in card to enable IntelliLite^{NT} communication via USB port. This is required for computer or Modbus connecting. Card inserts into expansion slot back on the controller. To insert the module, please follow the instructions for IL-NT RS232 module, procedure is analogous. You must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have inserted it, part of the module will remain over plastic box. It is supposed to be used as a service tool. When you need to remove it, grab module in cutouts and pull it up manually.



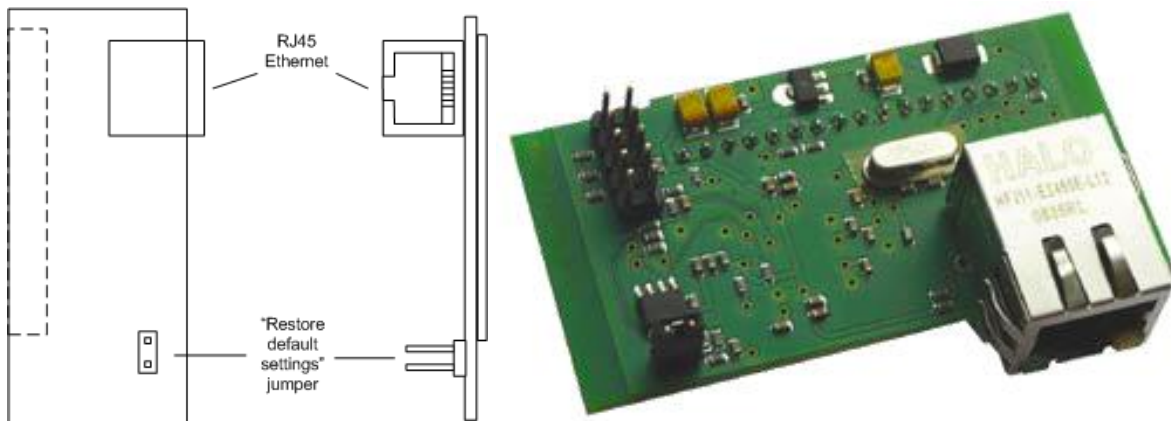
Hint:

Use the shielded USB A-B cable with this module! Recommended is ComAp cable – Order code: “USB-LINK CABLE 1.8M”.

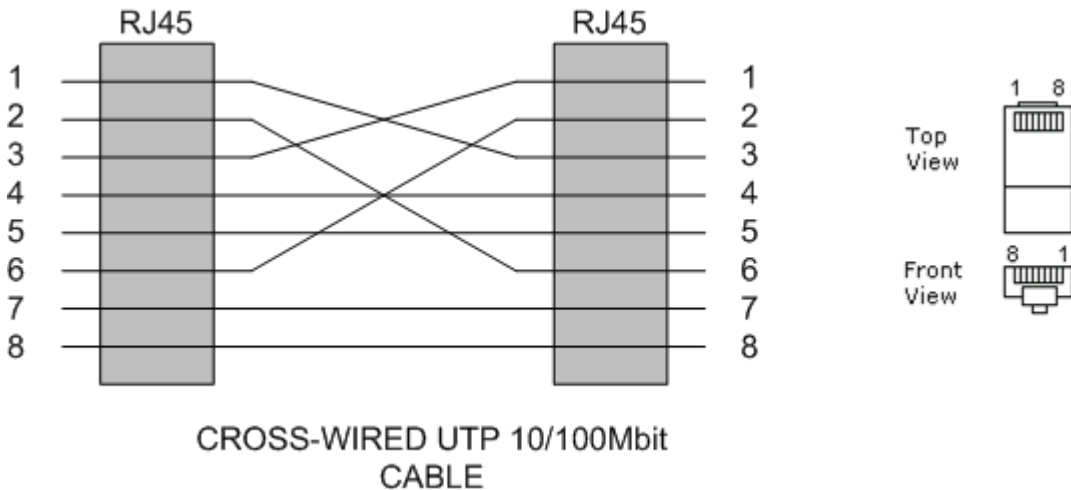
IB-Lite Ethernet communication plug-in card

IB-Lite is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. The card is internally connected to both COM1 and COM2 serial channels and provides an interface for connecting a PC with LiteEdit or IntelliMonitor through ethernet/internet network, for sending active e-mails and for integration of the controller into a building management (Modbus TCP protocol). This card also enables to monitor and control the genset over web browser from any location with internet access using appropriate security measures.

Card inserts into “extension module” slot back on the controller. To insert the module, please follow the instructions for IL-NT RS232 module, procedure is analogical.



Use Ethernet UTP cable with RJ45 connector for connection of the module into your ethernet network. The module can be also connected directly to a PC using cross-wired UTP cable.



Hint:

Modbus TCP protocol using IB-Lite communication module requires setting [COM1 Mode](#) = DIRECT and [COM2 Mode](#) = MODBUS.

Hint:

The module requires some settings before initial usage. See [IB-Lite-1.2-Reference Guide.pdf](#) for more details about IB-Lite communication plug-in card.

InternetBridge NT

InternetBridgeNT is a communication module that allows connection of a single controller as well as whole site to the Internet or Local area network. The connection to the Internet can be via built-in cellular modem supporting 2G and 3G networks or Ethernet cable.

Supported functions for IntelliLite AMF26P, AC-03

ComAp Direct or AirGate connection (ComAp PC tools, WebSupervisor)

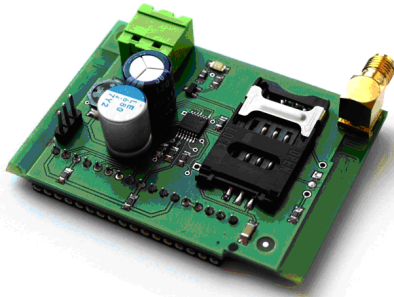
Active e-mails and Event e-mails only.

Supported connection modes: RS232 or RS485

IL-NT-GPRS GSM and GPRS plug-in modem

CAUTION!:

Any manipulation with plug-in module shall be done with disconnected power supply to both controller and module. Power supply shall be switched on also is same time to both module and controller. Fail to follow these instructions (power supply active only in controller or only in module) can lead to module or controller failure!



IL-NT-GPRS is a modem plug-in module which support GPRS internet connection and also dial up connection. This module incorporates support of AirGate technology for plug and play connection via GPRS. Module is usually used for connection to remote monitoring and controlling system.

WebSupervisor (<http://websupervisor.comap.cz>) or to LiteEdit PC software. Module is capable of sending alarm SMS based on settings in SMS/Email setpoint group.

Hint:

Quick guide how to start using this module is in chapter Remote Communication - Short guide how to start using IL-NT-GPRS module or on ComAp webpage <http://www.comap.cz/products/detail/IL-NT-GPRS>.

IL-NT-AOUT8 Gauge driver module

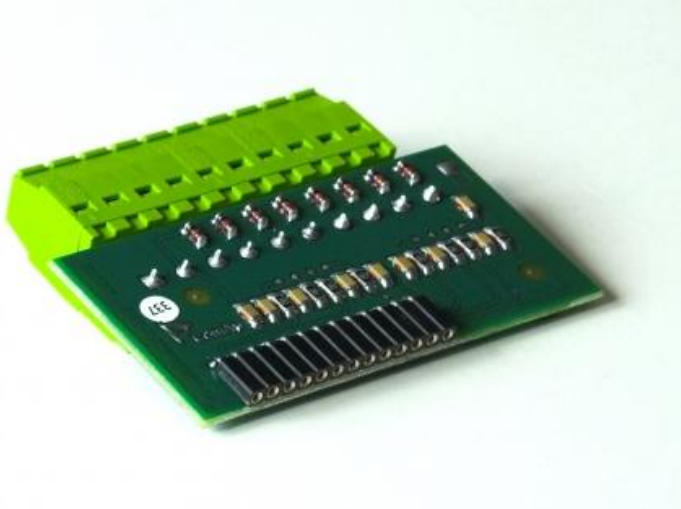
IL-NT-AOUT8 is optional plug-in card. Through this card controller can drive up to 8 VDO style industrial/automotive gauges. Noncompensated gauges like 0-10V or 0-20mA are not supported. Gauge type and value are configured in LiteEdit software. Any analog value from controller may be shown in that way.

To insert the module, you must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have insert it, the module will snap under plastic teeth. It is supposed to be installed permanently. Should you need to remove it, the safest way is to remove whole back cover and than remove module manually.

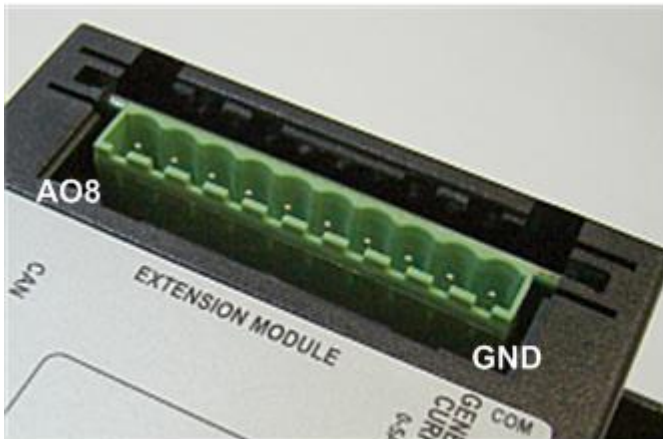
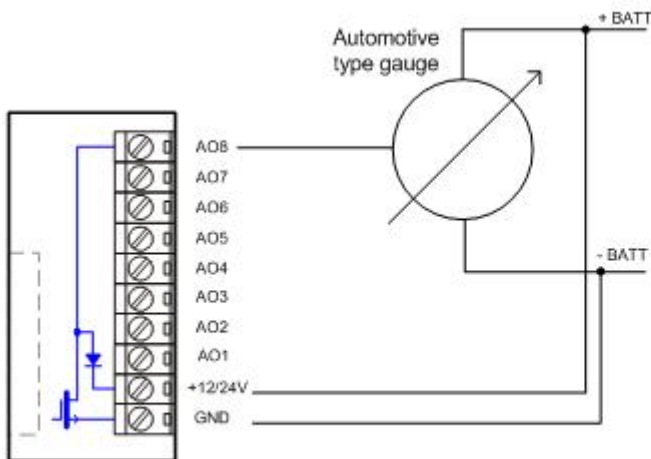
Installing IL-NT-AOUT8 module is similar to installing RS 232 module. The difference is that IL-NT-AOUT8 fits to “extension module” slot and after installing IL-NT-AOUT8 you do not put back the small cover.

PC Installation Suite consist a set of prepared converting curves for basic usage of PWM outputs with automotive gauges.

IL-NT-AOUT8 module:



Typical wiring:



Hint:

Please see chapter [IL-NT-AOUT8 interface \(optional card\)](#) for technical details.

IL-NT RD Remote display software

IL-NT RD is remote display software for a controller. Remote display provides the same control and monitoring functions as controller itself. Remote display for IL-NT controllers uses standard IL-NT controller with Remote display software. No further programming of the display is required – unit is self configurable from the main controller. It is connected with the controller via IL-NT-RS232 communication modules using RS232 line. Longer distances (up to 1200m) are possible using IL-NT-RS232-485 communication module or when RS232/RS485 converters are used.

The IL-NT RD hardware type should fit to the master IL-NT.

Hint:

Please see the “IL-NT-RD Remote display software” chapter for more details.

IL-NT-EFCPM

The IL-NT-EFCPM (Earth Fault Current Protection Module) is designed as extension unit for IL-NT controller, connected in EXTENSION MODULE slot. This unit checks any leakage of current towards earth (Earth Fault protection).

To insert the module, you must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have insert it, the module will snap under plastic teeth. It is supposed to be installed permanently. Should you need to remove it, the safest way is to remove whole back cover and than remove module manually.

Installing IL-NT-EFCPM module is similar to installing RS 232 module. The difference is that module fits to “extension module” slot and after installing IL-NT-EFCPM you do not put back the small cover.

Functionality for IL-NT-PRAMAC-1.0, 1.1 and 1.2 and for IL-NT-AMF26-P-1.0:

When IL-NT-AMF26-P is switched on presence of IL-NT-EFCPM is detected. When IL-NT-EFCPM is not detected (at the moment when controller is started) Earth Fault measurement function is not activated and EFCPM screen is not visible on controller display. When the module is detected Earth Fault measurement function is activated, EFCPM screen is visible and works according to Earth Fault measurement setting, then IL-NT-EFCPM card shouldn't be removed till the controller is switched off otherwise the Earth Fault Measurement will not work properly and Emergency Stop Sd (if configured as normally closed) will be activated.

The plug-in module also provides 1 binary input and 2 binary outputs, which are not configurable.

See more details in [Earth Fault measurement](#) chapter.

Functionality for IL-NT-AMF26-P-2.0 and higher:

IL-NT-EFCPM presence and binary input/binary output logical functions assignment can be configured within LiteEdit PC software. There is no more detection during controller start.

See more details in [Earth Fault measurement](#) chapter.

IL-NT-EFCPM2

IL-NT-EFCPM2 is optional plug-in card based originally on IL-NT-EFCPM (see more details in the chapter above [IL-NT-EFCPM](#)), but enhanced regarding its inputs and outputs options. Through this card controller can accommodate up to 7 binary inputs or outputs. It is possible to easily choose and configure if particular I/O will be binary input or output in LiteEdit PC software configuration.

To insert the module, you must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have insert it, the module will snap under plastic teeth. It is supposed to be installed permanently. Should you need to remove it, the safest way is to remove whole back cover and than remove module manually.

Installing IL-NT-EFCPM2 module is similar to installing RS 232 module. The difference is that module fits to “extension module” slot and after installing IL-NT-EFCPM2 you do not put back the small cover.

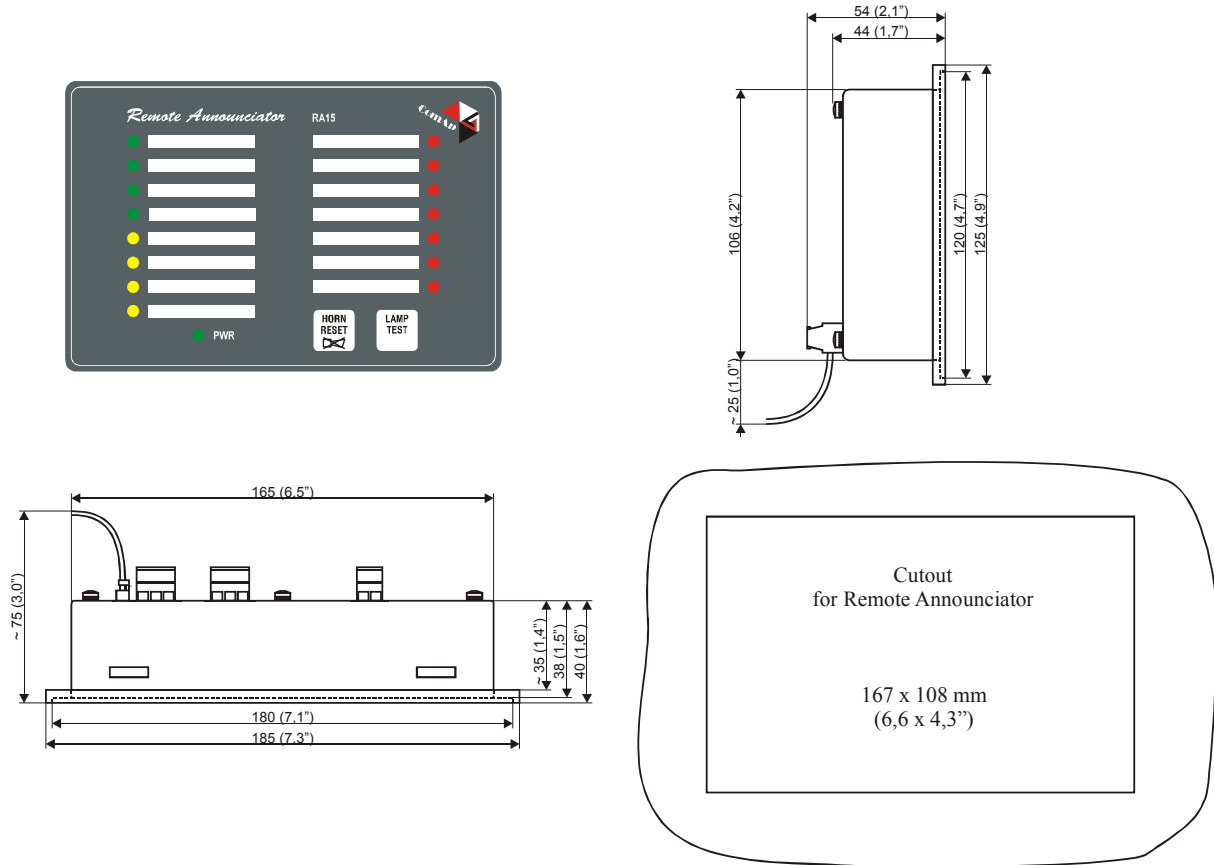
See more details in [Earth Fault measurement](#).

Remote annunciator IGL-RA15

The remote annunciator IGL-RA15 can be connected to the IL-NT unit via CAN bus. Any of the binary outputs can be configured (using LiteEdit software) to each LED diode on the RA15. The module can be also enabled or disabled using LiteEdit software.

If IGL-RA15 remote annunciator is not communicating with a controller via CAN bus, it activates a warning.

See the documentation of RA15 for the technical and function description.



IG-IOM/PTM module

IG-IOM and IGS-PTM modules are I/O extension modules equipped with 8 binary inputs, 8 binary outputs, 4 analog inputs and one analog output. The module can be used for AMF25, MRS15, 16, 19 only.

- Binary inputs and outputs are configurable the same way like inputs and outputs on iL.
- Analog inputs are configurable like iL with the limitation that the binary and tristate mode can not be used on PTM module.
- The protection of analog IOM/PTM inputs is activated by overcrossing the limits, active only when the engine is running.
- IG-IOM analog inputs are resistive (the same parameters like IL-NT) 0 Ω-2,4 kΩ. The module IOM is designed for especially VDO resistive sensors.
- IGS-PTM analog inputs are configurable by jumpers to ranges 0-250Ω, 0-100mV, 0-20mA. The module can be used especially for Pt100 sensors and current sensors. The module PTM is not suitable for VDO temperature sensor.

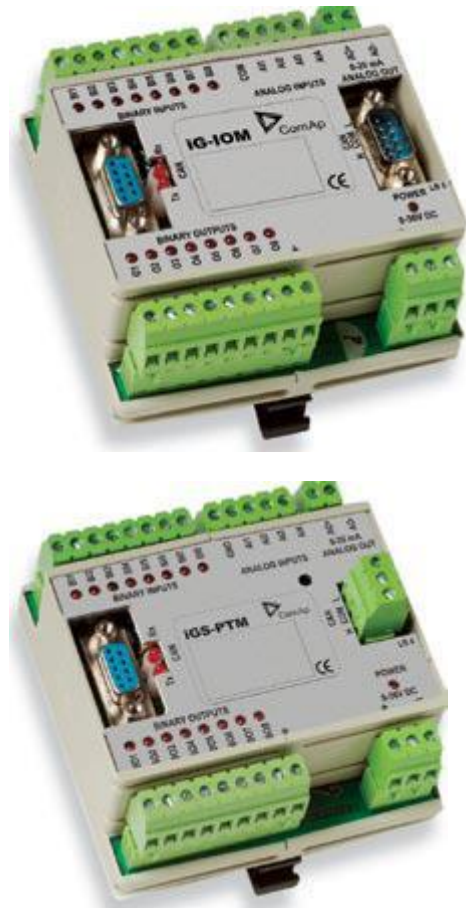
Hint:

- For a description of setting IGS-PTM module with current/voltage sensors please see the Extension modules manual.
- When module is not configured by LiteEdit SW, controller does not show related values and

setpoints

Hint:

If IGS-PTM is not communicating to a controller, ShutDown is activated.



See the documentation of IGS-PTM for the technical and function description.

IG-IB Internet bridge

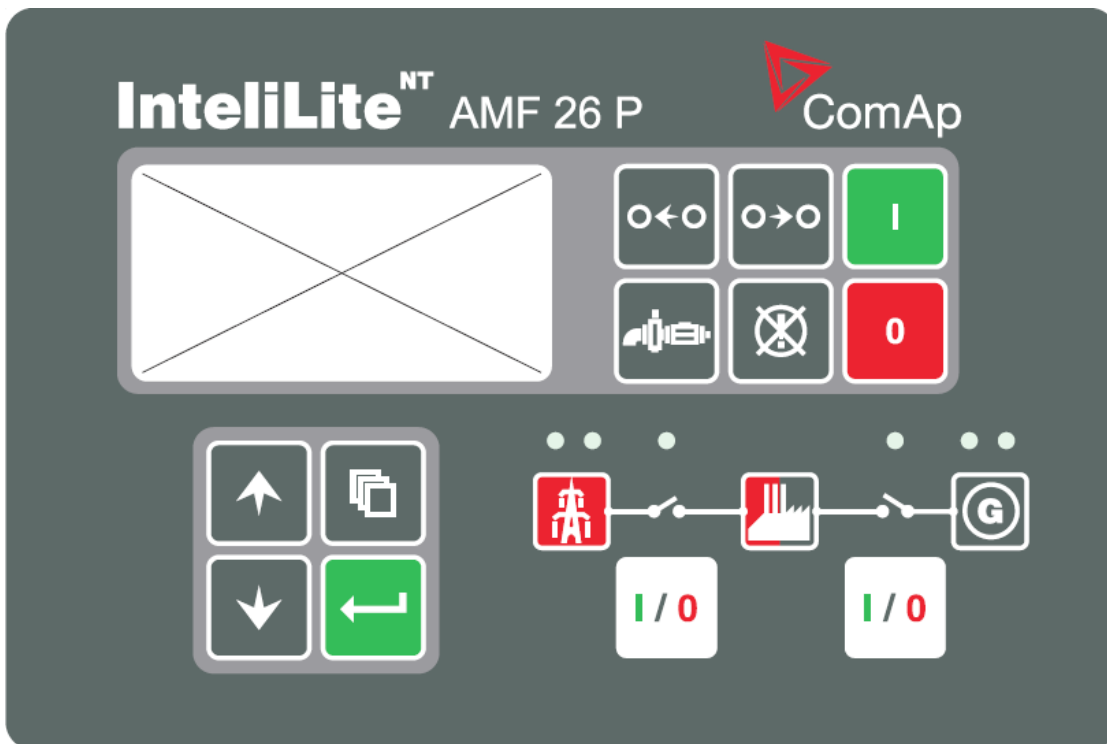
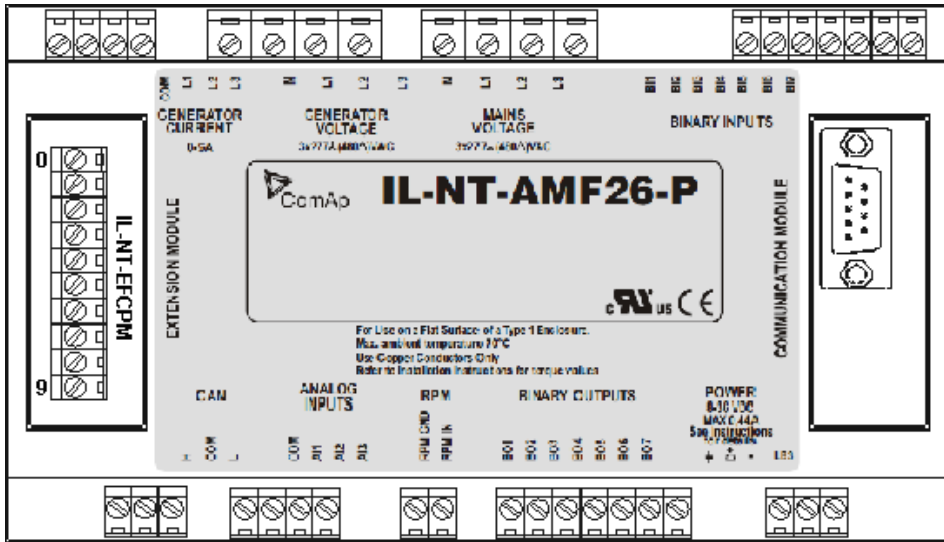
IG-IB Internet bridge enables IntelliLite^{NT} for Ethernet/Internet communications. It is connected to controller via RS232 line.

See IntelliCommunication Guide for further details.



IL-NT Terminals and front fascia

IL-NT terminals and front fascia



Installation

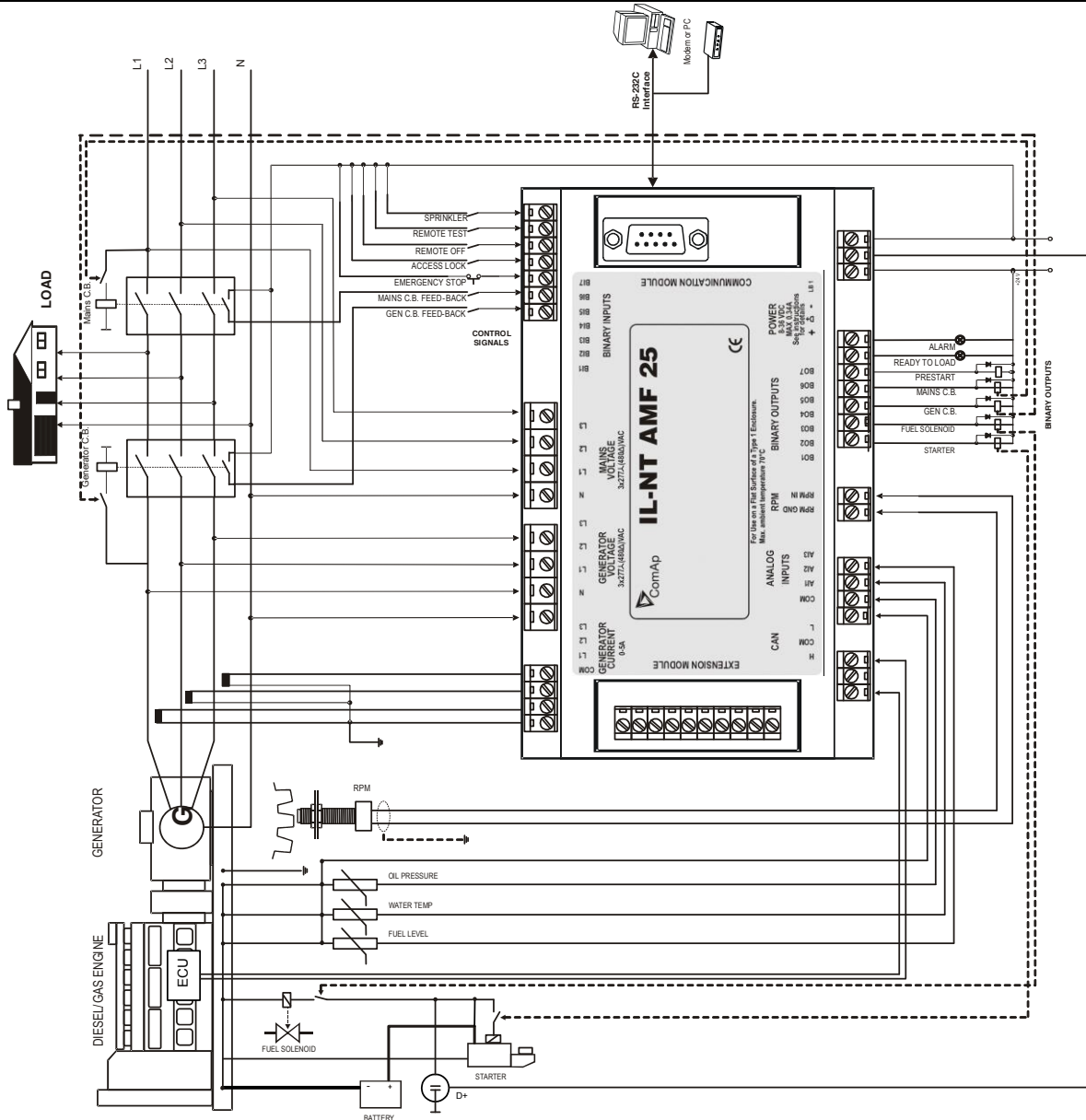
Mounting

The controller is to be mounted onto the switchboard door. Requested cut out size is 175x115mm. Use the screw holders delivered with the controller to fix the controller into the door as described on pictures below.



Recommended Wiring

AMF - Wiring Diagram



In case of the wiring above following setting should be used.

ConnectionType: 3Ph4Wire, CT location: Gen-Set and Number of CTs: 3CTs

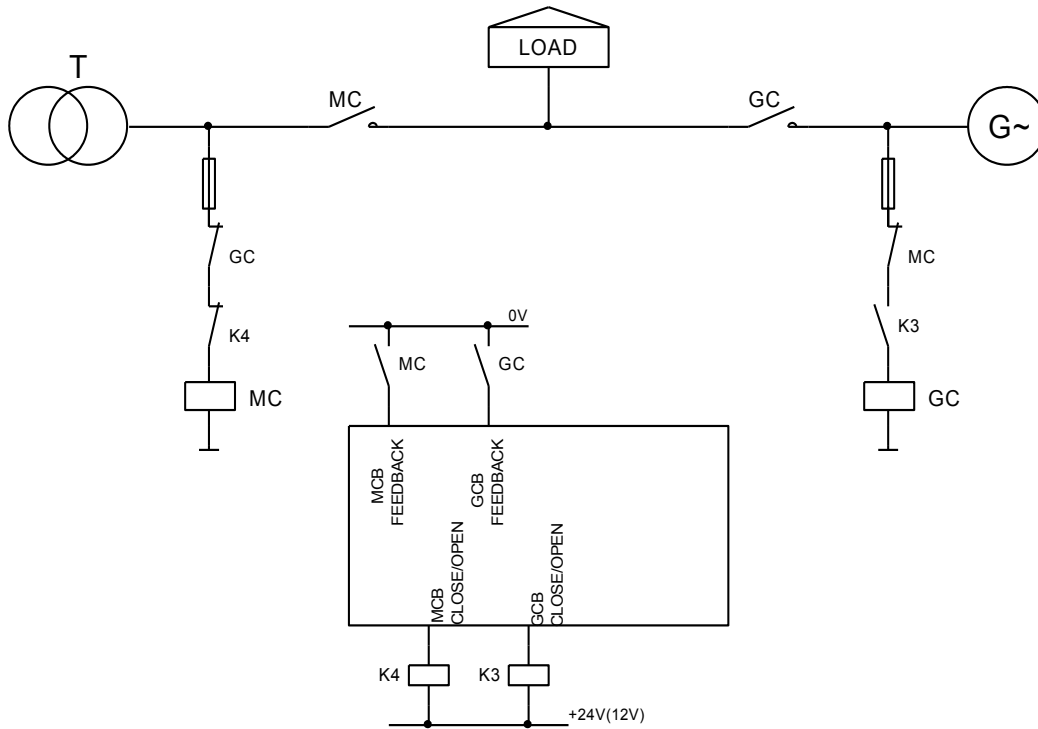
Hint:

MCB and GCB is recommended to be mechanically interlocked.

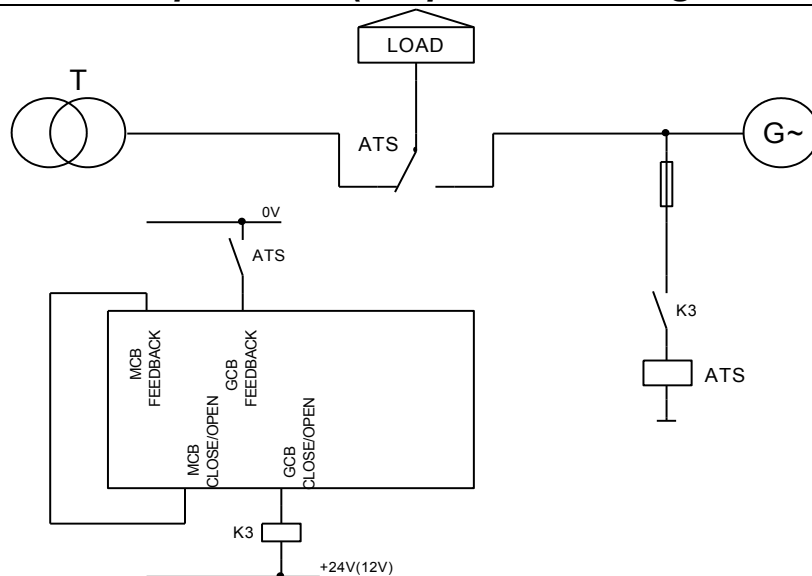
It is possible to start Volvo and Scania engines via CAN bus. See [Engines started via CAN bus.](#)

Stand-by Applications

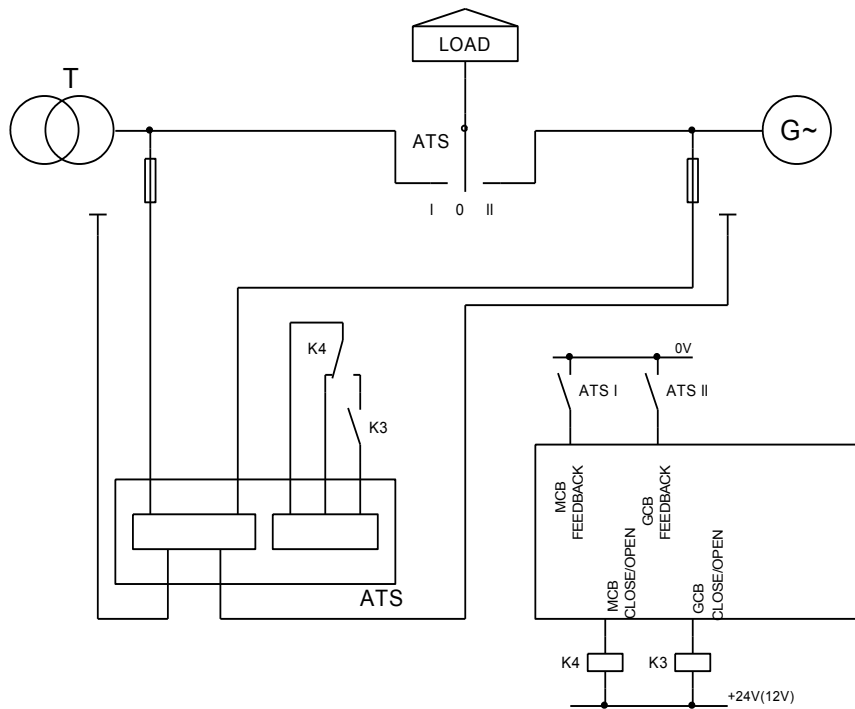
Contactors (set point MCB Logic = "CLOSE-OFF")



ATS with two stable positions (set point MCB Logic = "CLOSE-ON")



ATS with three stable positions (set point MCB Logic = "CLOSE-OFF")



Dual Mutual Standby (Dual AMF) application

Dual AMF is a system of two mutual stand-by gen-sets, which switches in supplying the load. Usual work operation is that after mains fails, the first gen-set starts, takes the load and works for a dedicated time interval, e.g. 6 hours. Then it hands over the load to the other gen-set, which runs for another 6 hours. This operation system continues as long as Mains is failed. Transfer of load from one gen-set to the other one is with blackout.

System works for two gen-sets with IL-NT-AMF26P controllers. One controller is Master and the second is Slave.

System needs one binary input and one binary output in each controller.

System works only in AUT mode

For correct operation, both controllers have to have set identical times/delays for mains protections, mains return delays, and other delays in the setpoint group AMF Settings.

Mechanical interlock between GCB of one gen-set, GCB of the second gen-set, and MCB breaker is required due to safety reasons.

Detailed description:

There is a basic communication interface between Master and Slave controller realized by the interconnection of two wires ([DualAMFCtrlIn](#), [DualAMFCtrlOut](#)) on both.

Binary input DualAMFCtrlIn and binary output DualAMFCtrlOut adjust their function automatically based on fact if there are used in Master or in Slave controller.

Master controller has information about Slave controller and when Slave failure or cannot work the Master will substitute it.

AMF start of Slave controller can be blocked by Master but when Master controller has failure or cannot work the Slave will substitute it.

When there is incorrect wiring or only one controller is configured as Master or Slave than the controller will display "*DAMF Disconnect*" in alarm list.

In case of incorrect configuration (two Masters, two Slaves, both controllers are not in AUT mode) the controller will display "*DAMF ConfigError*" in alarm list.

When there is any problem with Slave controller Master will display "*DAMF SlaveDown*" in alarm list.

Every time when any Alarm related to DAMF function is occurring both of the controllers are switched to normal AMF operation. That meaning that at least one of the controllers will be able to supplying the load until failure on both of them.

To decide which genset should start in case of mains fail, there is rule that if mains fails in time period 00:00AM – 11:59AM, than Master will start and take the load. If mains will fail in period 12:00PM – 23:59PM, than Slave will start and take the load.

Master controller will prevent unnecessary blackout in case, when it is over 12:00 AM (Slave starting period), and Master is already supplying load, but not in AUT mode with DualAMF function enabled, and mode is changed to AUT. Or if Master is already supplying load in AUT, and it is switched to DualAMF operation after 12AM (in Slave's starting period).

Setpoint "MCB Opens On" has to be setted to MAINSFAIL. Otherwise system would not correctly work if Slave would start to stand-by as first. Master would not know when to open MCB breaker.

In case one gen-set should run in stand-by, but it fails, the other gen-set runs instead. After failed gen-set recovers there is 60s delay for load transfer back to this gen-set.

Setpoints related to Dual AMF function are located in "AMF Settings" group.

Setpoint "DualAMFRole" with settings [MASTER, SLAVE] is determining if controller behaves as Master or Slave in Dual AMF system. One controller has to be set to MASTER and second as SLAVE, for correct function of system.

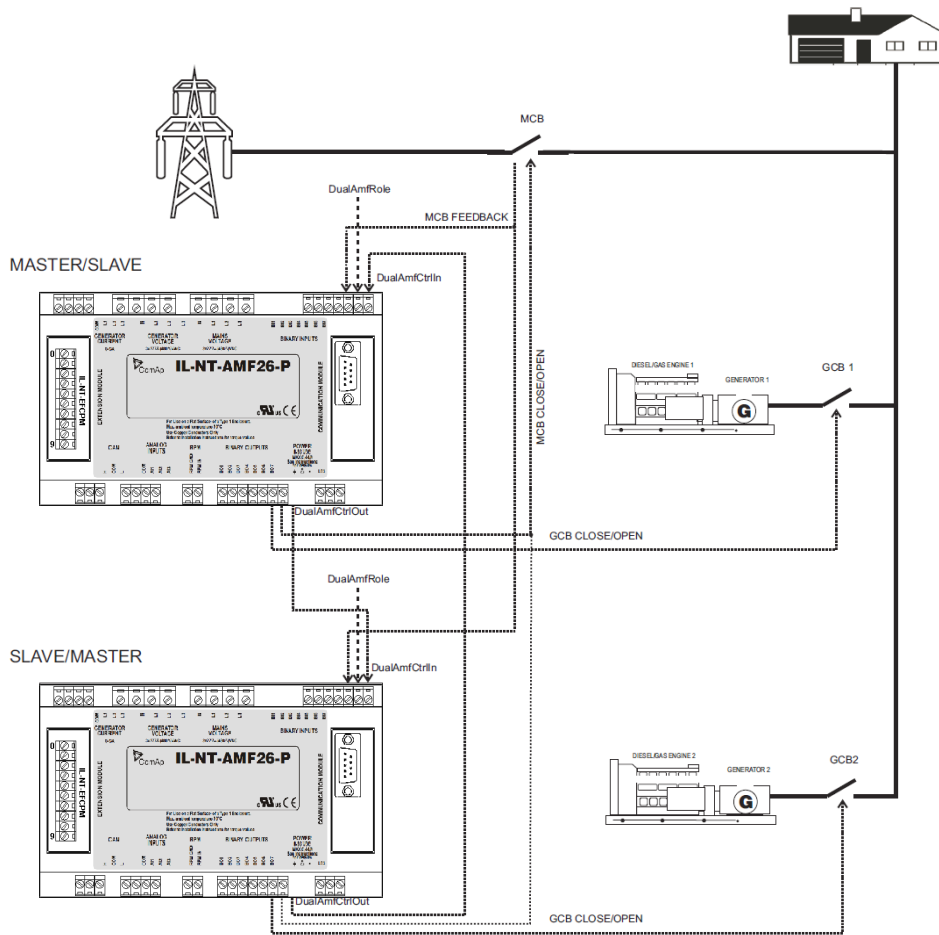
Binary input "DualAMFRole" can help in switching roles of both gen-sets. Both gen-sets can be easily transformed from Slave to Master and vice versa. Log1 = MASTER, Log 0 = SLAVE. Binary input has higher priority over manual setting of setpoint. If binary input is configured, manual change of setpoint is disabled.

Setpoint „DualAMFTime“ control time period of gen-sets switching in supplying the load. Settings are [1..24], step = 1 hour. Default setting is 6 hours. This timer is reset when load is transferred back to healthy mains

Example of setting the Dual AMF function:

- 1- Prepare two IL-NT-AMF26P controllers. Copy the identical configurations to both of them.
- 2- Use wiring with mechanical/electrical interlock between all breakers (GCB1, GCB2 and MCB)
- 3- Configure one binary input on each controller as DualAMFCtrlIn.
- 4- Configure one binary output on each controller as DualAMFCtrlOut.
- 5- Interconnect DualAMFCtrlOut from one controller with DualAMFCtrlIn on second controller. Interconnect DualAMFCtrlOut from second controller with DualAMFCtrlIn on first controller. So you have two wires interconnecting both controllers.
- 6- Set setpoint "MCB Opens On" to MAINSFAIL on both controllers.
- 7- Set „DualAMFTime“ to time period in which you wish to switch gensets in supplying the load. For example 6 hours. Make this setting on Master controller. Only Master controller controls this timer.
- 8- Set "Operation Mode" to MASTER on first controller and to SLAVE on second controller.
- 9- Change the mode of both controllers to AUT.
- 10- System is now ready for DualAMF function.

Wiring of system with selectable MASTER and SLAVE role settings:



Hint:
GCB and MCB breakers feedbacks are recommended, but not required.

Getting Started

How to install

During the configuration of controller or setpoints changes is required a password to the controller. The default password from ComAp is "0".

General

To ensure proper function:

Use grounding terminals.

Wiring for binary inputs and analog inputs must not be run with power cables.

Analog and binary inputs should use shielded cables, especially when length >3m.

Wiring

Tightening torque, allowable wire size and type, for the Field-Wiring Terminals:

Based on terminal type:

PA256:



Specified tightening torque 0,5Nm (4,4 In-lb)
2EDGK:



Specified tightening torque 0,4Nm (3,5 In-lb)

For field type terminals:

Use only diameter 2,0-0,5mm (12-26AWG) conductor, rated for 75°C minimum.

For Mains(Bus) Voltage and Generator Voltage terminals

Use only diameter 2,0-0,5mm (12-26AWG) conductor, rated for 90°C minimum.

Use copper conductors only.

Grounding

The shortest possible piece of wire should be used for controller grounding.

Use cable min. 2,5mm²

Brass M4x10 screw with star washer securing ring type grounding terminal shall be used.

The negative "-" battery terminal has to be properly grounded.

Switchboard and engine has to be grounded in common spot. Use as short as possible cable to the grounding point.

Power supply

To ensure proper function:

Use min. power supply cable of 1,5mm²

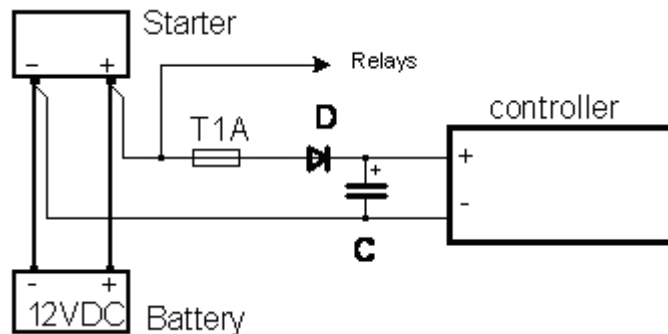
Maximum continuous DC power supply voltage is 36VDC. Maximum allowable power supply voltage is 39VDC. The IL-NT's power supply terminals are protected against large pulse power disturbances. When there is a potential risk of the controller being subjected to conditions outside its capabilities, an outside protection device should be used.

It is necessary to ensure that potential difference between generator current COM terminal and battery "-" terminal is maximally $\pm 2V$. Therefore is strongly recommended to interconnect these two terminals together.

Hint:

The IL-NT controller should be grounded properly in order to protect against lightning strikes!!
The maximum allowable current through the controller's negative terminal is 4A (this is dependent on binary output load).

For the connections with 12VDC power supply, the IntelliLite^{NT} includes internal capacitors that allow the controller to continue operation during cranking if the battery voltage dip occurs. If the voltage before dip is 10V, after 100ms the voltage recovers to 7 V, the controller continues operating. During this voltage dip the controller screen backlight can turn off and on but the controller keeps operating. It is possible to further support the controller by connecting the external capacitor and separating diode or I-LBA module:

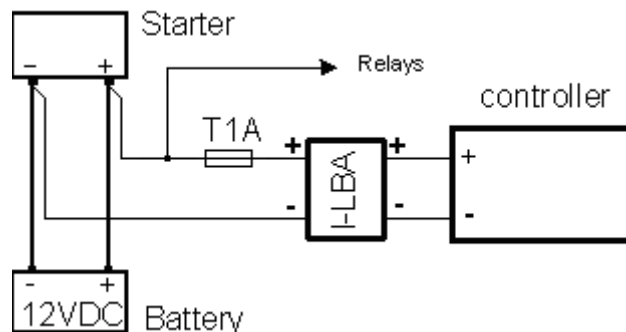


The capacitor size depends on required time. It shall be approximately thousands of microFarads. The capacitor size should be 5 000 microFarad to withstand 150ms voltage dip under following conditions:
Voltage before dip is 12V, after 150ms the voltage recovers to min. allowed voltage, i.e. 8V

Hint:

Before the battery is discharged the message "Low BackupBatt" appears.

Or by connecting special I-LBA Low Battery Adaptor module:



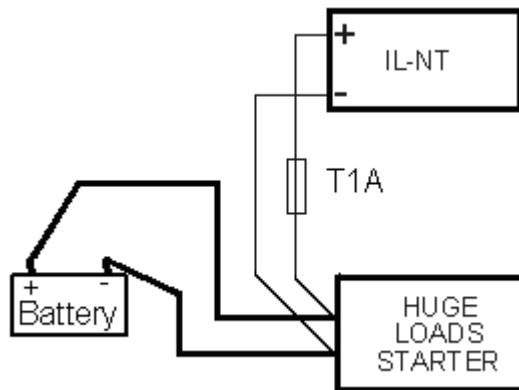
The I-LBA module ensures min. 350ms voltage dip under following conditions:
RS232 and other plug-in module is connected.
Voltage before dip is 12V and after 350ms the voltage recovers to min. allowed voltage 5V.
The I-LBA enables controller operation from 5VDC (for 10 to 30 sec).
The wiring resistance from battery should be up to 0,1 Ohm for I-LBA proper function.

Hint:

I-LBA may not eliminate voltage drop when used with low temperature (-40°C) version of controller and display heating element is on (below 5°C). Current drain of heating element exhausts LBA capacitors very fast .

Power supply fusing

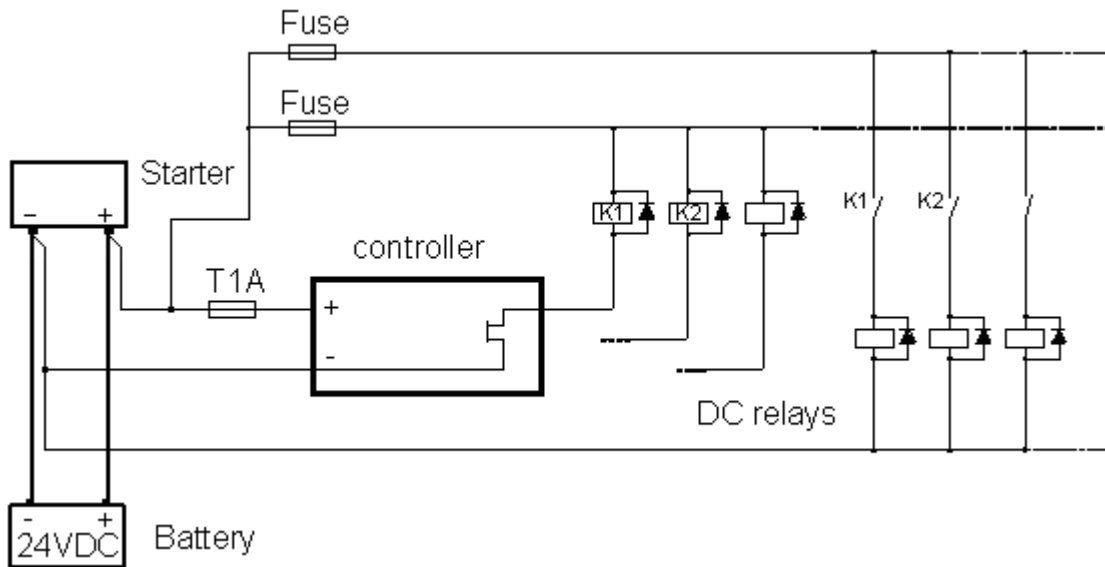
A one-amp fuse should be connected in-line with the battery positive terminal to the controller and modules. These items should never be connected directly to the starting battery.
Fuse value and type depends on number of connected devices and wire length.
Recommended fuse (not fast) type - T1A. Not fast due to internal capacitors charging during power up.



Binary output protections

Hint

Do not connect binary outputs directly to DC relays without protection diodes, even if they are not connected directly to controller outputs.

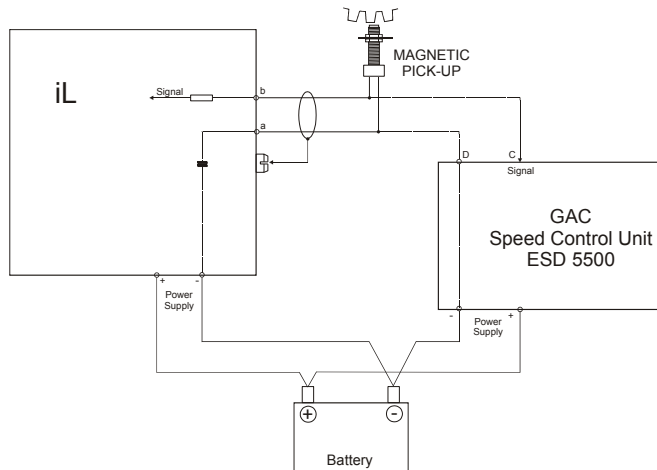


Grounding

To ensure proper function:
 Use as short as possible cable to the grounding point on the switchboard
 Use cable min. 2,5mm²
 The “-“ terminal of the battery has to be properly grounded

Magnetic pick-up

To ensure proper function:
 Use a shielded cable



Be aware of interference signal from Speed governor when one speed pick-up is used.
 If engine will not start:

- Check ground connection from pick-up to controllers, eventually disconnect ground connection to one of them
- Galvanically separate IL-NT RPM input using ComAp separation transformer RPM-ISO (1:1)
- Use separate pick-up for Speed governor and IntelliLite^{NT}

Hint:

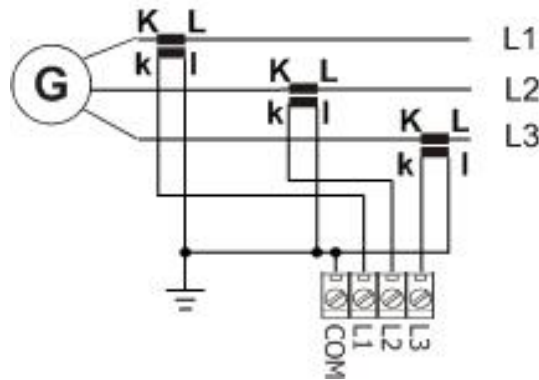
In some cases the controller will measure a RPM value even though the gen-set is not running: RPM is measured from the generator voltage (Gear Teeth = 0)
IL-NT is measuring some voltage value on input terminals due to open fusing.
If RPM > 0 the controller will be put into a Not ready state and the engine will not be allowed to start.

Current measurement

To ensure proper function
Use cables of 2,5mm²
Use transformers to 5A

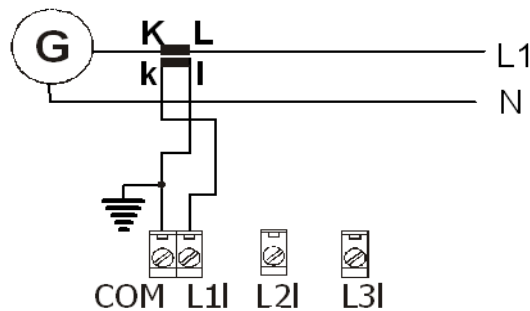
Number Of CTs = 3CTs

Connect CT according to following drawings

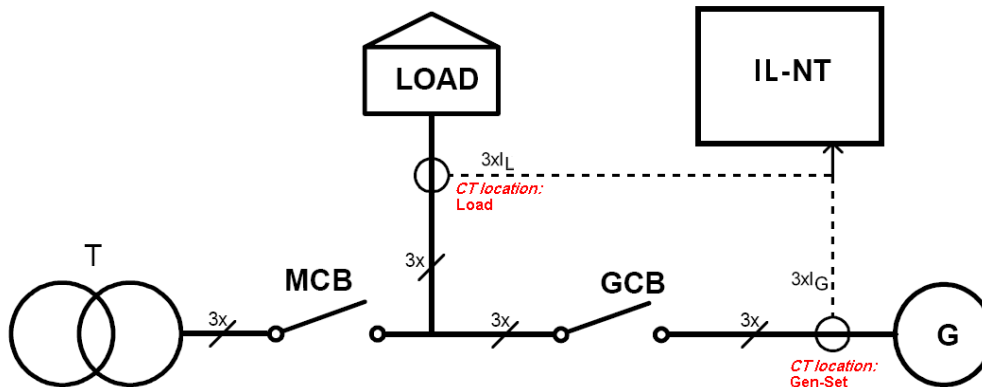


Number Of CTs = 1CT

Connect CT according to following drawings. Terminals L2I and L3I are opened.



CT location



There are two options of *CT location*.

- a) Load
- b) Gen-Set

According to the connection you use you should set either *CT location: Load* or *CT location: Gen-Set*.

Earth Fault measurement (module)

The Earth Fault protection is done by extension module [IL-NT-EFCPM](#) or [IL-NT-EFCPM2](#).

Technical characteristics

- Input current range up to 8,32 mA (IL-NT-EFCPM)
- Input current range up to 10 mA (IL-NT-EFCPM2)
- Measurement range from 0,03 to 5A
- Operating frequency 50 or 60 Hz
- Tripping current software programmable from 0,03 to 5 A or DISABLED
- Tripping delay software programmable from 0,03 to 5 seconds
- Included two binary outputs and one binary input (in case of IL-NT-EFCPM)
- Included seven binary inputs or seven binary outputs (in case of IL-NT-EFCPM2)

For more technical details see [IL-NT-EFCPM interface](#) and [IL-NT-EFCPM2 interface](#) parameters.

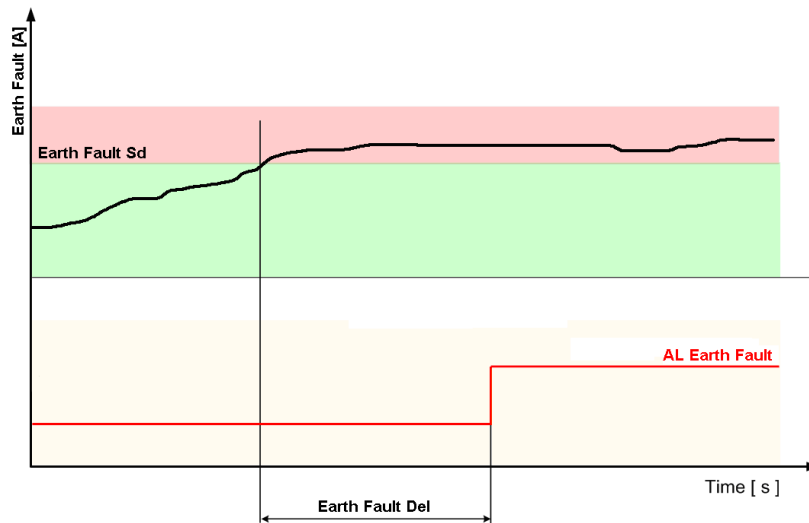
Earth Fault Current protection has been adjusted

- The Earth Fault Current protection is evaluated regardless of the MCB state.
- The protection is newly enabled also when MCB is closed.

Operating principle

The IL-NT-EFCPM uses toroidal transformer connected to the earth wire ([Figure 2](#)). When the measured current exceeds the set value, this indicates that part of the current is dispersed to earth and after the set *Earth Fault Del* then *Earth Fault Sd* protection, AL EARTH FAULT and BREAKER TRIP output are activated. Earth Fault protection is not active when MCB is closed and also when *EF Protection: DISABLED*.

For manual protection simulation can be used [EF Prot Test](#) or [Earth Fault Protection Test](#) function.



IL-NT-EFCPM wiring

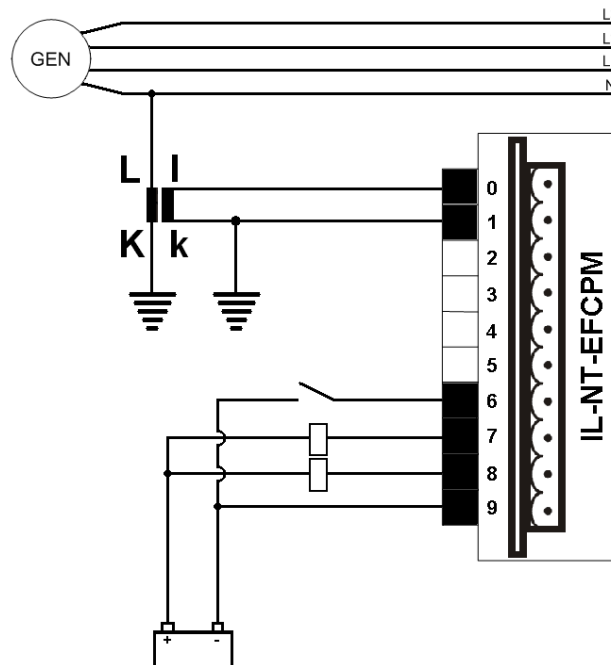


Figure 2: Wiring IL-NT-EFCPM

Wiring of IL-NT-EFCPM2 module is analogical. It is just possible to choose in LiteEdit PC SW which channel is used as binary input and which as binary output. The wiring should be accordant with that.

IL-NT-EFCPM

Input	Description
0	Input range up to 8,32 mA (earth fault protection input)
1	Common (earth fault protection input)
2	NC
3	NC
4	NC
5	NC
6	Binary input 1 – EMERGENCY STOP*

7	Binary output 1 – PREHEATING*
8	Binary output 2 – BREAKER TRIP*
9	Power supply – Minus

*Untill version IL-NT-AMF26-P-1.0 and LiteEdit-4.4.1 these funcuions are fixed, since IL-NT-AMF26-P-2.0 and LiteEdit-4.4.2 the BI/BOs are fully configurable.

IL-NT-EFCPM2

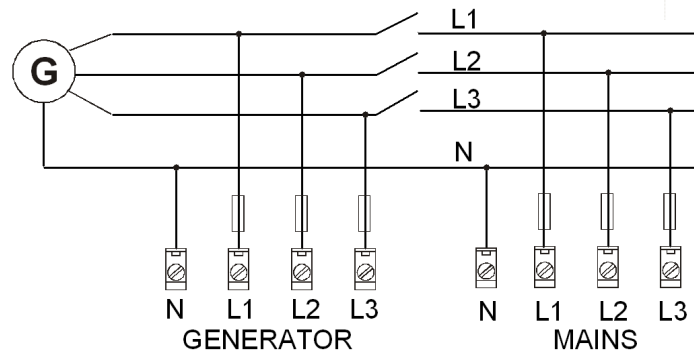
<i>Input</i>	<i>Description</i>
CT I	Input range up to 10 mA (earth fault protection input)
CT k	Common (earth fault protection input)
BIO1	Binary input/output*
BIO2	Binary input/output*
BIO3	Binary input/output*
BIO4	Binary input/output*
BIO5	Binary input/output*
BIO6	Binary input/output*
BIO7	Binary input/output*
BATT-	Power supply – Minus

*Depends on configuration in LiteEdit PC software (supported from LiteEdit-4.4.2).

Voltage measurement and generator connection types

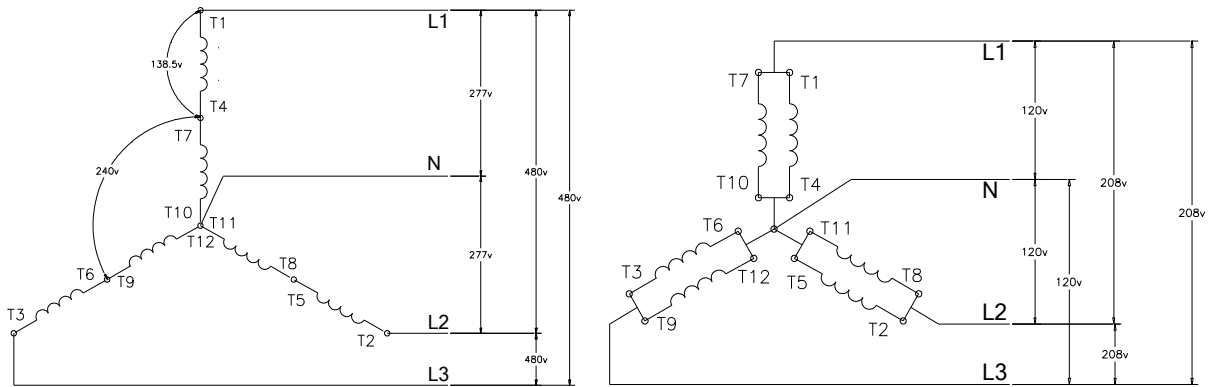
There are 4 voltage measurement **ConnectionType** options, every type matches to corresponding generator connection type.

ConnectionType: 3 Phase 4 Wires

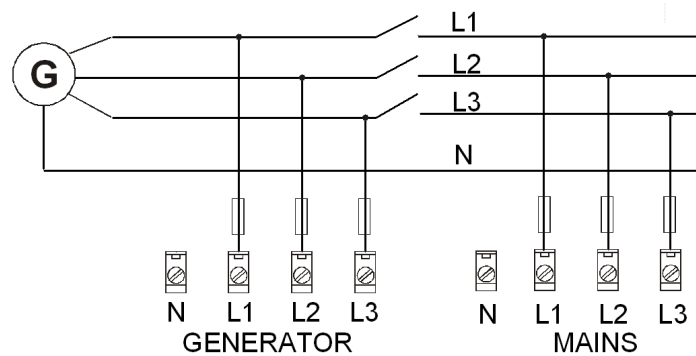


Three phase “wye” measurement – 3PY

3 Phase 4 Wires - STAR Connecti



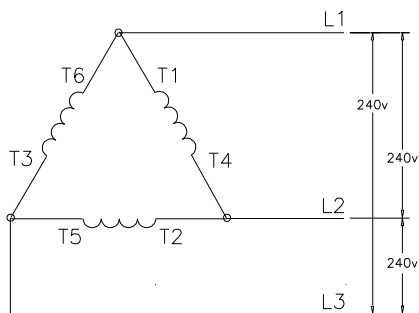
ConnectionType: 3 Phase 3 Wires



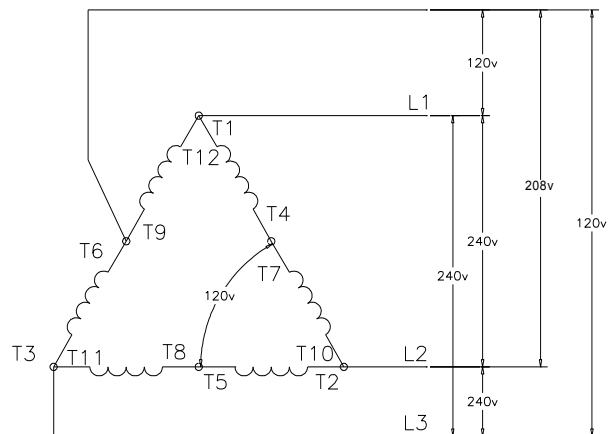
Three phase “delta” measurement – 3PD

3 Phase 3 Wires

– DELTA Connection



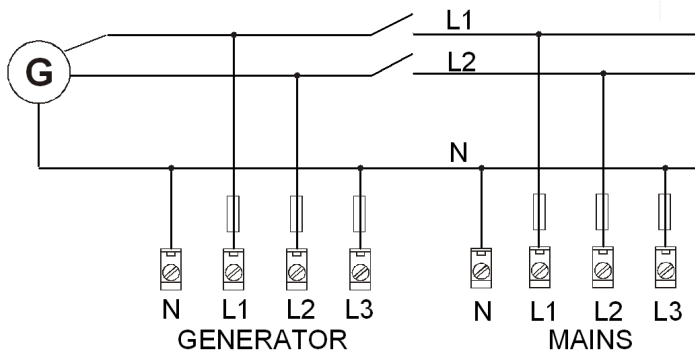
– EDISON DELTA Connection



Hint:

Only L1, L2 and L3 wires should be connected. In case of EDISON DELTA connection **the N (neutral) wire** (in the diagram connected between T6 and T9) **has to be disconnected**. No separation transformers for three wires voltage connection (without N) are needed.

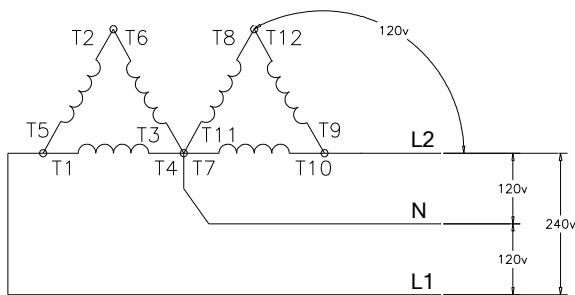
ConnectionType: Split Phase



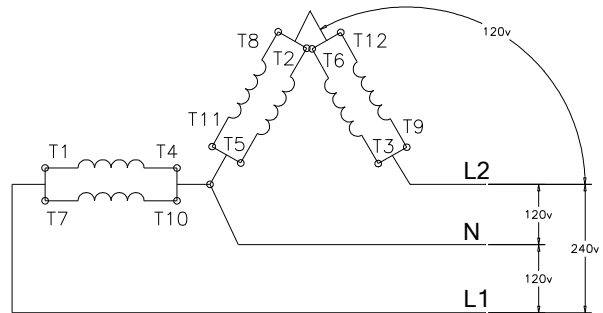
Single-phase measurement – 1PH

Split Phase

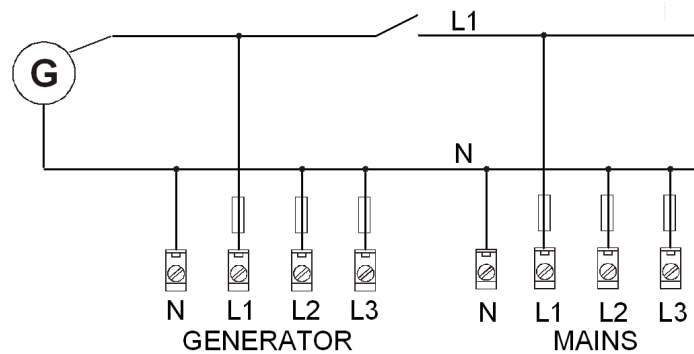
– DOUBLE DELTA Connection



– ZIG ZAG (DOG LEG) Connection

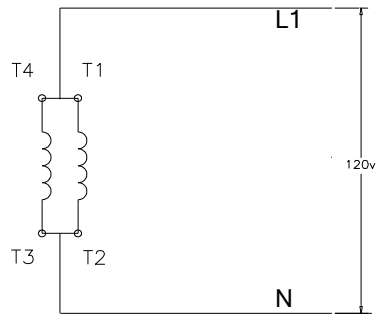


ConnectionType: Mono Phase



Single-phase measurement – 1PH

Mono Phase – MONOPHASE Connection



Hint:

Switchboard lighting strike protection according standard regulation is expected **for all 4 connection types!!!**

Analog inputs

Three analog inputs are available on the IL-NT

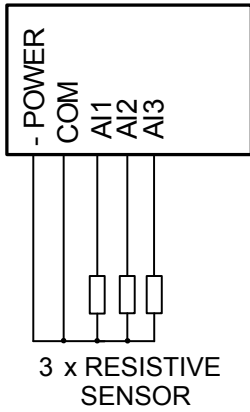
Configuration

Each analog input can be configured by LiteEdit software following way.

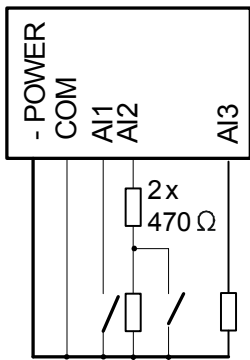
Analog input item	LiteEdit		Possibility
Type	Type	Not used Alarm	Analog input isn't used
Analog input name	Name		Up to 14 ASCII characters
Config of input	Config	Analog Binary (not supp. by PTM) Tri-state (not supp. by PTM) ECU	Analog measuring in specified range. Binary: open/close - threshold 750 Ω. Three-state: open/close - threshold 750 Ω, Failure <10 Ω or > 2400 Ω Value is read from ECU
Physical dimension	Dim	bar,%,°C, ...	Up to 4 ASCII characters (Valid only for analog inputs)
Polarity	Contact type	NC NO	Valid only for binary and three-state inputs Valid only for binary and three-state inputs
Protection direction	Protection	Over	Overstep. Sensor Fail does not activate protection.
		Over+FIs	Overstep and Sensor Fail activates protection.
		Under	Under step. Sensor Fail does not activate protection.
		Under+FIs	Under step and Sensor Fail activates protection.
Sensor characteristic	Sensor	Predefined user curves	User changeable and configurable
Resolution	Resolution	0 – 0,00001	Sensor resolution (Valid only for analog inputs)

Each Analog input has separate set points for two level alarm setting. Analog input alarm levels and delay adjust in **Extension I/O** and **Engine Protect** group.

Connection of IL-NT analog inputs



Standard connection of three resistive sensors to analog inputs.



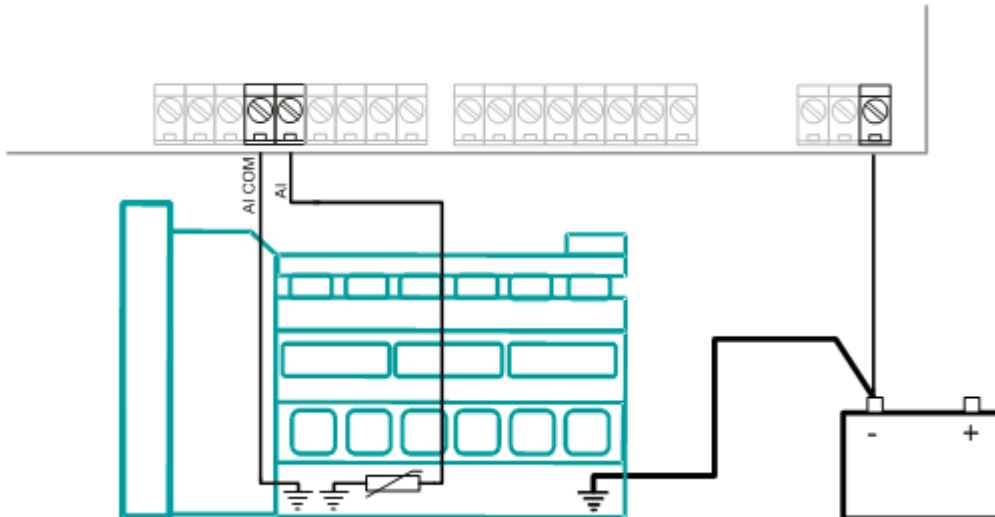
Mixed connection of IL-NT analog inputs:

- AI1 – binary input
- AI2 – three state input
- AI3 – analog resistive input

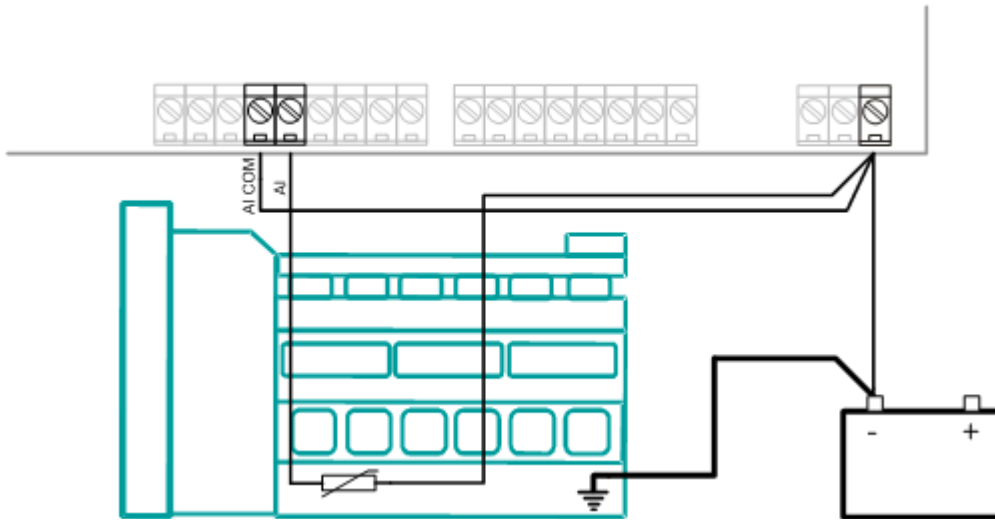
Wiring

Wiring diagrams of analog inputs

WIRING OF ANALOG INPUTS-GROUNDED SENSORS



WIRING OF ANALOG INPUTS-ISOLATED SENSORS



Analog inputs are designed for resistive sensors with resistance in range of 0Ω to $2,4k\Omega$. To ensure a proper function use shielded cables, especially for length over $>3m$.

COM terminal is dedicated to measure ground voltage potential difference between engine and controller.

As binary input

Open, close state are detected, threshold level is 750Ω .

As three state input

Open, close and failure state are detected. Threshold level is 750Ω , failure is detected when circuit resistance is $<10\Omega$ or $>2400\Omega$.

Hint:

Protections on binary and three state inputs are following:

<i>IL-NT:</i>	AI1	Shutdown	<i>IG-IOM:</i>	AI1	Shutdown
	AI2	Shutdown		AI2	Shutdown
	AI3	Warning		AI3	Shutdown
				AI4	Shutdown

Unused analog inputs

Configure Type = Not used

Example of analog input configuration

Configure Water Temp input for measuring in $^{\circ}C$, VDO $40-120^{\circ}C$ sensor, range -16 to $120^{\circ}C$. Alarm protection level set to $90^{\circ}C$, shut down level $110^{\circ}C$.

Start LiteEdit and select – Controller - Configuration – Modify – Water Temp.

Set configuration for Water Temp analog input:

Type: Selection between Not used and Alarm

“Not used” – analog input isn’t used

”Alarm” – analog input is used

Set to: Alarm

Name: Name of the analog input. Maximally 14 letters.

Set to: Water Temp

Config: Selection between Analog, Binary Tri-state input.

“Analog” – resistor sensor is connected to Analog input.

“Binary” – open/close contact is connected between Analog input and COM terminal of Analog inputs. Analog input detects only open/close state.

“Tri-state” – open/close contact is connected parallel to one of two serial resistors between Analog input and COM terminal of Analog inputs.

Set to: Analog

Alarm Properties: Selection between different direction of protection – Under Limit, Over Limit or combination with Fail sensor.

“Engine running only” – check this setting if you wish to active protection on analog input only while engine is running, not, when it stops.

Set to: Over Limit

Contact type: selection of polarity only when analog input is configured as Binary or Tri-state. When is analog input configured as analog this setting has no sense.

„NC“ – polarity of binary or tri-state input

„NO“ – polarity of binary or tri-state input

Sensor: selection of sensor characteristic

„Unused input“ - when Analog input is not used. On the IL-NT screen is displayed „#####“ value, no alarm is detected.

Default user curves predefined on AI1 – AI3:

„VDO 10 Bar“ – VDO pressure sensor

„VDO 40-120 °C“ – VDO temperature sensor

„VDO level %“ – VDO level sensor

Set to: VDO 40-120 °C

When you choose the predefined or user curve the Sensor Name, Dim and Resolution are setted automatically according to curve, user modification is possible.

Sensor Name: Name of used sensor, up to 14 letters can be used.

Dim: Name of measured unit (Bar, °C, %, ...), up to 4 letters can be used.

Resolution: setting of resolution of measured value.

„0“ - e.g. 360 kPa, 100%, 50 °C

„1“ – e.g. 360,0 kPa

„2“ - e.g. 360,00 kPa

„3“ - e.g. 360,000 kPa

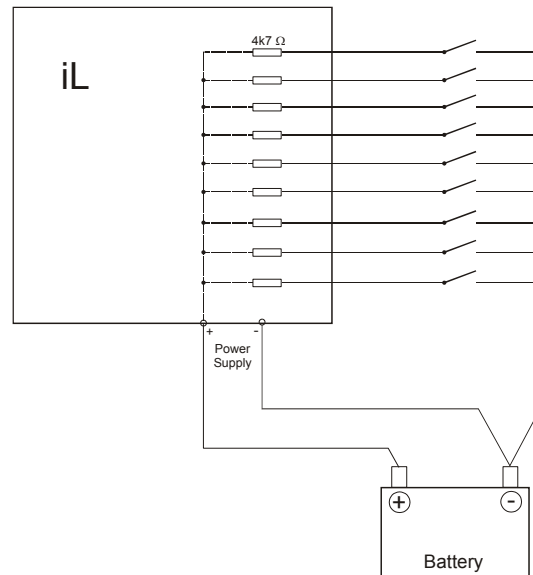
Set to: 1

When Analog input configuration is finished set the setpoints *AI1 Wrn*, *AI1 Sd*, *AI1 Del* in **Engine Protect** group.

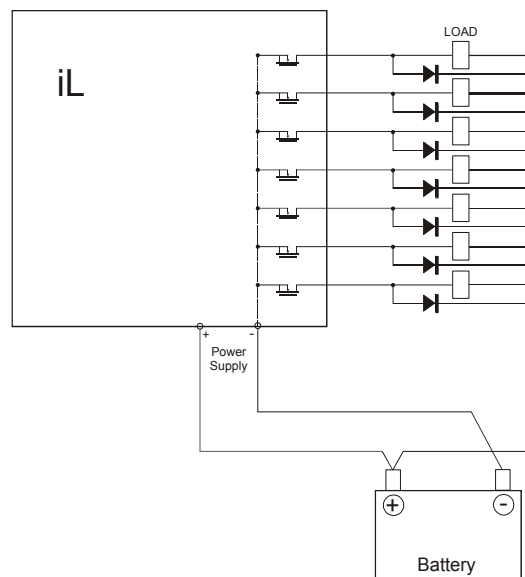
Each Analog input has separate triplet of setpoints: *Wrn level*, *Sd level*, *AI del*. Names of these setpoints are fix defined

Number of decimal points of *Wrn level* and *Sd level* is the same as the configured number of decimal points of measured value.

Connection of IL-NT binary inputs



Connection of IL-NT binary outputs



Recommended CAN/RS485 connection

CAN bus connection

The bus has to be terminated by 120 Ohm resistors at both ends.

External units can be connected on the CAN bus line in any order, but keeping line arrangement (no tails, no star) is necessary.

Standard maximum bus length is 200m

Shielded cable has to be used, shielding has to be connected to PE on one side (controller side).

A) For shorter distances (all network components within one room) – **picture 1**

Interconnect H and L; shielding connect to PE on controller side

B) For longer distances (connection between rooms within one building) – **picture 2**

Interconnect H, L, COM; shielding connect to PE in one point

C) In case of surge hazard (connection out of building in case of storm etc.) – **picture 3**

We recommend to use following protections:

- Phoenix Contact (<http://www.phoenixcontact.com>):
PT 5-HF-12DC-ST with PT2x2-BE (base element)
- Saltek (<http://www.saltek.cz>):
DM-012/2 R DJ

Recommended data cables: BELDEN (<http://www.belden.com>)

- A) For shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors)
- B) For longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)
- C) In case of surge hazard: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

RS485 connection

The line has to be terminated by 120 Ohm resistors at both ends.

External units can be connected on the RS485 line in any order, but keeping line arrangement (no tails, no star) is necessary.

Standard maximum link length is 1000m.

Shielded cable has to be used, shielding has to be connected to PE on one side (controller side).

A) For shorter distances (all network components within one room) – **picture 1**

interconnect A and B; shielding connect to PE on controller side

B) For longer distances (connection between rooms within one building) – **picture 2**

interconnect A, B, COM; shielding connect to PE in one point

C) In case of surge hazard (connection out of building in case of storm etc.) – **picture 3**

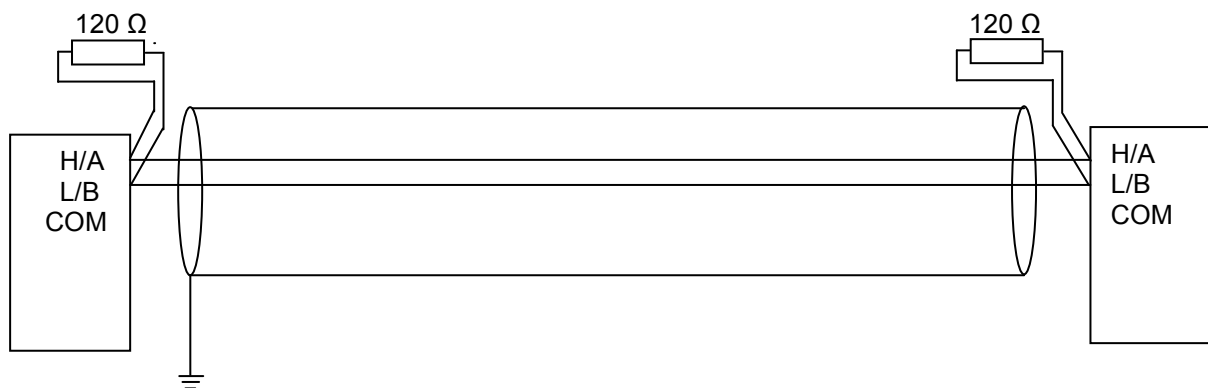
We recommend to use following protections:

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

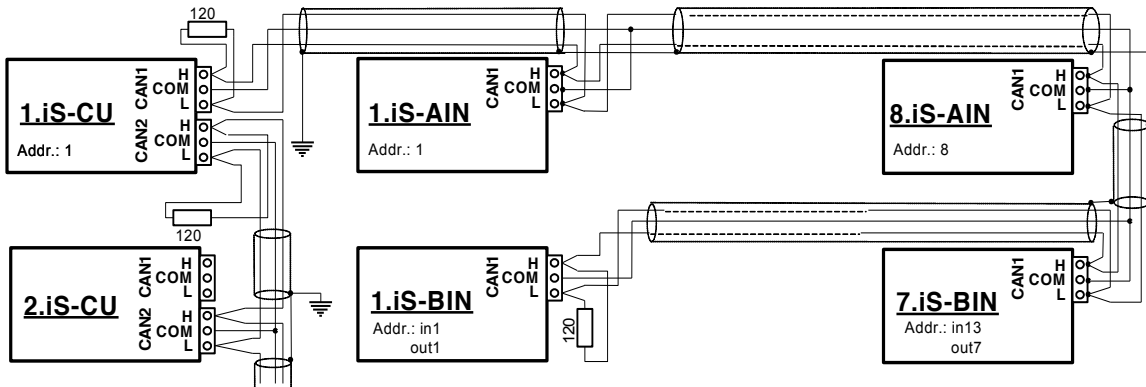
Recommended data cables: BELDEN (<http://www.belden.com>)

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

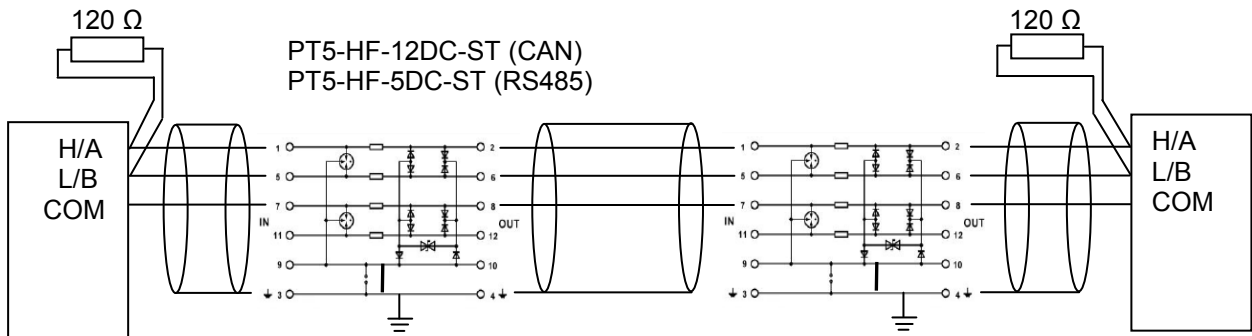
Picture 1 - shorter distances (all network components within one room)



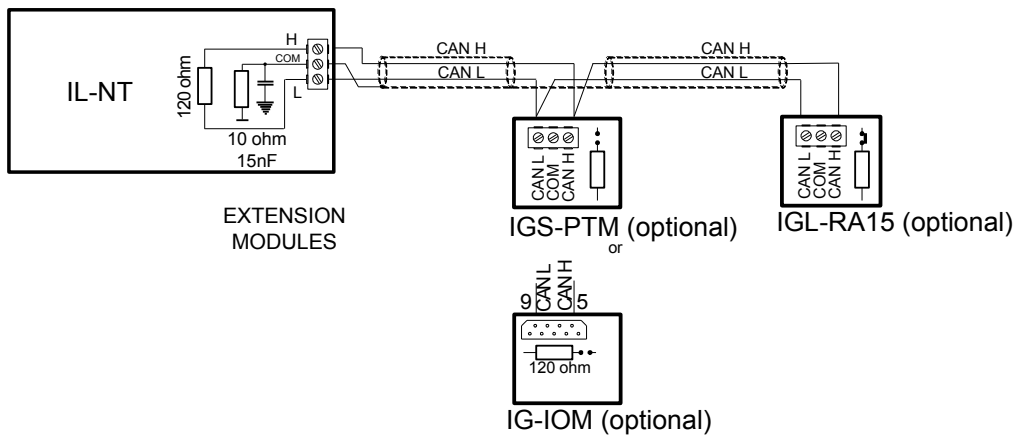
Picture 2 - longer distances (connection between rooms within one building)

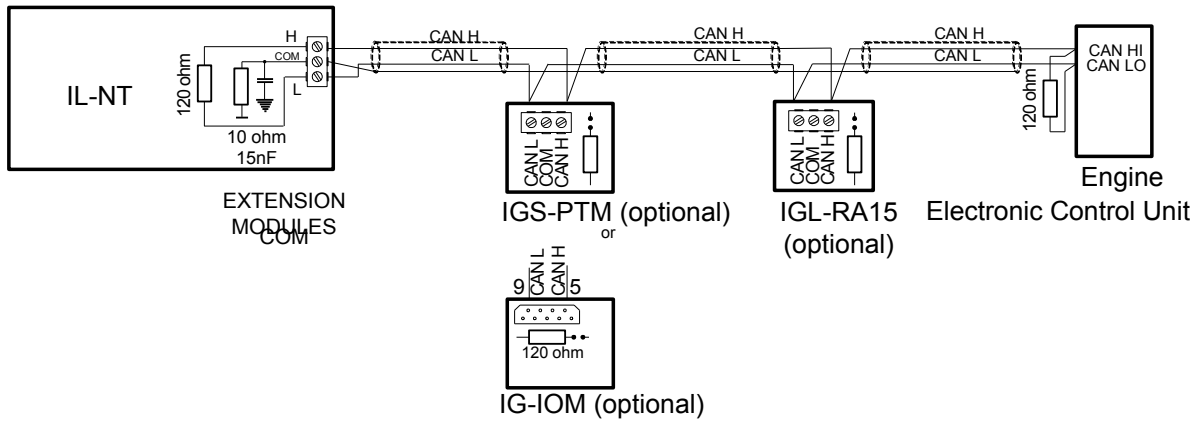


Picture 3 - surge hazard (connection out of building in case of storm etc.)



Extension modules (CAN bus) connection





Connection rules

CAN bus line must be connected in series, from one unit to the next (no star, no cable stubs, no branches) both ends must be by the 120-ohm (internal or external) resistor terminated. Maximal CAN bus length is up to 200 meters.

For CAN data cables details see chapter Technical data – Communication interface. CAN cable shielding connect to IL-NT COM terminal.

IL-NT contains internal fix 120-ohm resistor and must be located on the CAN bus end.


New IG-IOM and IGS-PTM units contain internal jumper removable 120-ohm resistor (in older IOM types are fix resistors). To be sure check resistor presence by ohmmeter. Unit with internal resistor connect to the end of CAN line.

Following connections are supported (IOM, PTM, ECU order is not important).

- IL- NT – IG-IOM
- IL- NT – IGS-PTM
- IL- NT – IGL-RA15
- IL- NT – IG-IOM – IGL-RA15
- IL- NT – IGS-PTM – IGL-RA15

It is possible to connect only one IG-IOM or IGS-PTM and one IGL-RA15 to IL-NT.



Use  button in LiteEdit configuration window to activate CAN (J1939) interface.

Inputs and Outputs

For Inputs/Outputs overview table see chapter Technical Data.

Hint:

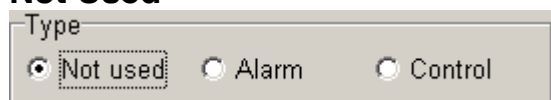
Any Binary input or output can be configured to any IL-NT controller terminal or changed to different function by LiteEdit software. There is fix 1 sec delay when any binary input is configured as protection.

Binary inputs IL-NT - default

BI1	Oil Pressure	(Control type)
BI2	High Eng Temp	(Control type)
BI3	Not Used	
BI4	MCB Feedback	(Control type)
BI5	GCB Feedback	(Control type)
BI6	Remote Start/Stop	(Control type)
BI7	MainsFailBlock	(Control type)

Binary inputs - list

Not Used



Binary input has no function. Use this configuration when Binary input is not connected.

Alarm



If the input is closed (or opened) selected alarm is activated.

Binary Alarm configuration items

Name		14 characters ASCII string
Contact type	NC	Normally closed
	NO	Normally opened
Alarm type	Warning	
	Shut down	
Alarm active	All the time	Valid if checkbox "Engine running only" is not checked
	Engine running only	Valid if checkbox "Engine running only" is checked

Control:



There is a list of following (prearranged) logical binary inputs under Control option.

GCB Feedback

Use this input for indication, whether the generator circuit breaker is open or closed. If the feedback is not used, connect this input to the output GCB CLOSE/OPEN

MCB Feedback

This input indicates whether MCB is closed or opened.

Rem Start/Stop

External request for engine run. AUT mode only.

Hint:

If the binary input Rem Start/Stop is active and mains failure occurs, the MCB breaker opens, and after FwRet Brk delay the GCB breaker is closed. Once the mains is OK, the RetTransf delay elapses and the GCB breaker is opened. Then after FwRet Brk delay is MCB breaker closed. Gen-set remains running as long as Rem Start/Stop is active.

Emergency Stop

If the input is opened, shut down is immediately activated. Input is inverted (normally closed) in default configuration.

Hint:

In case of controller hardware or software fail, safe stop of the engine doesn't have to be ensured. To back-up the Emergency Stop function it is recommended to connect separate circuit for disconnection of Fuel Solenoid and Starter signals.

Sd Override

If the input is closed all alarms are disabled except the binary input EMERGENCY STOP and "engine overspeed protection".

- all IL alarms are detected,
- IL front panel gen-set RED LED blinks or lights,
- alarm is recorded on the IL alarm list screen,
- BUT gen-set remains running.

Hint:

Warning *Sd Override* is indicated in the AlarmList if Sd Override mode is active to inform the operator that the engine is not protected.

Oil Pressure

If the input is closed, gen-set is shut down

High Eng Temp

If the input is closed, gen-set is shut down

Access Lock

If the input is closed, no setpoints can be adjusted from controller front panel and gen-set mode (OFF-MAN-AUT-TEST) cannot be changed.

Hint:

Access Lock does not protect setpoints and mode changing from LiteEdit. To avoid unqualified changes the selected setpoints can be password protected.

Also the button Fault reset is not blocked at all and buttons Start and Stop in MAN mode are not blocked.

Remote OFF

If closed, iL is switched to OFF mode (there are four modes OFF-MAN-AUT-TEST). When opens controller is switched back to previous mode.

Hint:

This binary input should be connected to schedule timer switch, to avoid start of engine.

Remote MAN

If the input is active, MAN mode is forced to the controller independently on the position of the MODE selector.

Remote AUT

If the input is active, AUTO mode is forced to the controller independently on the position of the MODE selector. If another of „remote“ inputs is active, then the REMOTE AUT input has the lowest priority.

Remote TEST

If closed, IL-NT is switched to TEST mode (there are four modes OFF-MAN-AUT-TEST). When opens controller is switched back to previous mode.

Rem TEST OnLd

Affects the behaviour in TEST mode. When input is closed, the controller automatically transfers load from the mains to the gen-set. Setpoint **AMF Settings: ReturnFromTEST** must be set to MANUAL. Load is automatically transferred back to the mains when any gen-set shut down protection activates. In case **AMF Settings: ReturnFromTEST** is set to AUTO, then only gen-set is started, but MCB is not opened and GCB is not closed, except there is a Mains fail.

For more details see description of the setpoint **AMF Settings: [ReturnFromTEST](#)**.

RemControlLock

If the input is active, setpoints writing or command sending from the external terminal is disabled.

EF Prot Test

If the binary input is activated (edge 0 -> 1 on the binary input is detected) then EF Prot Test is executed. This function is the same as the one which can be executed using EF Prot Test command in Man Operations group or using controller buttons combination. For more details about these options see **Man Operations: [EF Prot Test](#)** and **[Earth Fault Protection Test](#)** description.

Hint:

Any time binary input EF PROT TEST is activated “Wrn EFProtTest” message appears on controller display to inform operator that the protection was activated manually and also that the binary input EF PROT TEST remains in active position. The message is active whole time the binary input is kept in active position even if Fault Reset acknowledging the Earth Fault Sd protection is pressed. Wrn EFProtTest message has only informative character and it is not recorded in the controller history.

Emergency MAN

If the input is activated the controller behaves like when switched to OFF Mode. Opens all binary outputs. There is one exception – STOP SOLENOID doesn't activate on this transition.

Detection of "running" engine and subsequent alarm message "Sd Stop Fail" is blocked.

The controller shows “EmergMan” state and the engine can not be started.

Generator current and power measurement is active in this mode, regardless of the actual state of the engine.

After the input is open again, the controller recovers to previous state and behaves according to the actual situation .

Function is active in any controller mode.

Start Button

Binary input has the same function as **START BUTTON** on the IL-NT front panel. It is active in MAN mode only.

Stop Button

Binary input has the same function as **STOP BUTTON** on the IL-NT front panel. It is active in MAN Mode only.

Hint:

Changed function of Stop Button. After the first pressing from running state, there is a standard delay and controller change state to cooling. After holding the button down for 2 seconds controller goes to stop state. The same holds true for BI “Stop Button”.

FaultResButton

Binary input has the same function as **FAULT RESET** button on the IL-NT front panel.

HornResButton

This binary input can be used for horn resetting. When Horn binary output is active it can be deactivated by activating HornResButton input.

GCB Button

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

MCB Button

Binary input has the same function as **MCB** button on the IL-NT front panel. It is active in MAN mode only.

MainsFailBlock

If the input is closed, the automatic start of the gen-set at Mains failure is blocked and in case of running gen-set (after [MFB MReturnDel](#)) the GCB is opened, MCB is closed and gen-set goes to Cooling procedure and stops. The input simulates healthy Mains.

Lang Selection

Not configured

Language selection is done only through the controller display. Pressing **ENTER** and **PAGE** buttons concurrently and then only **PAGE** button separately.

Configured on any binary input

If the input is opened the first (default) language is active and if the input is closed then the second language is active. In case there is more languages available in the controller it is not possible to select any other language even through the controller display.

Preheating

When controller receives information that engine preheating is active (binary input PREHEATING is active) at the moment of Start request, then (after prestart period is finished) prestart timer remains at 0 and Start sequence is blocked till the moment the Preheating is deactivated.

Hint:

To secure proper functionality of this function **Engine Params: Prestart Time** has to be set for at least 1 second ([Prestart Time](#) >= 1) otherwise there might be not enough time to block the start sequence.

Hint:

There is an analogical function implemented in Deutz EMR2 (ECU), where the information about preheating is not shared through binary input but through CAN bus and J1939 protocol. The Deutz EMR2 Preheating function is supported in the controller only in case [EMR2Preheating](#) setpoint is set to ENABLED and Deutz EMR2 ECU is configured.

AltCfgSwitch A

If the input is closed and setpoint **Alternate Cfg**: [Config Switch](#) is set to BinSelect, the combination of AltCfgSwitch inputs defines what **Alternate Cfg** group (of gen-set nominal values) is active.

AltCfgSwitch B

If the input is closed and setpoint **Alternate Cfg**: [Config Switch](#) is set to BinSelect, the combination of AltCfgSwitch inputs defines what **Alternate Cfg** group (of gen-set nominal values) is active.

AltCfgSwitch A	0	1	0	1
AltCfgSwitch B	0	0	1	1
Chosen Configuration group	Basic Settings*	Configuration1	Configuration2	Configuration3

*In case of 0,0 combination values are not transferred between **Basic Settings** and **Alternate Cfg** groups.

For more details about Alternate Configuration see [Alternate Cfg](#) group setpoints description.

There are two new logical binary inputs Remote Start and Remote Stop

REMOTE START:

- active only in AUT mode
- when REMOTE START activated gen-set is started and loaded
- when REMOTE START deactivated in case Mains is OK, Load is transferred back to Mains, not immediately, but after AMF settings: *MainsReturnDel* (this is valid only in case REMOTE START is deactivated before AMF settings: *MainsReturnDel* is started)
- when REMOTE START deactivated in case Mains is NOT OK, Load is not transferred

REMOTE STOP

- **active only in AUT mode**
- REMOTE STOP only blocks the gen-set starts caused by Mains fail
- gen-set is started in case REMOTE STOP is active in following cases:
 - SD OVERRIDE is active (the system behaves as the the REMOTE STOP is not active)
 - REM START/STOP is active (but even in case of MainsFail GCB is not closed)
 - REMOTE START is active (the system behaves as the the REMOTE STOP is not active)
- in case of Mains fail *Start Del* is counted and MCB state is set according to AMF Settings: *MCB Opens On*

Nom Freq 60Hz

If the input is closed, *Nominal Freq* is switched from its current value (Nominal Freq A) to *Nominal Freq* = 60Hz. At the same moment *Nominal RPM* is switched from its current value (Nominal RPM A) to new value (Nominal RPM B) which is calculated according to the following equation.

$$\text{Nominal RPM B} = \text{Nominal RPM A} * 60 / \text{Nominal Freq A}$$

When the input is active it is not possible to change *Nominal Freq* and *Nominal RPM* parameters values, neither from LiteEdit nor from controller display.

When the input is opened both parameters are switched back to their previous values (Nom Freq A and Nominal RPM A) and it is again possible to change their values from LiteEdit and/or from controller display.

Hint:

The most common example will be switching from 50 to 60Hz and 1500 to 1800 RPM.

Nominal RPM B = $1500 * 60 / 50$

Nominal RPM B = 1800 RPM

DualAMFRole

This binary input could be used for switching between Master and Slave controller in Mutual Standby Application (Dual AMF).

DualAMFCtrlIn

Control input for Mutual Standby Application. This binary input of controller 1 must be configured and interconnected with binary output [DualAMFCtrlOut](#) of controller 2 for correct Mutual Standby function.

Hint:

More information about [Dual mutual Standby](#) is in chapter Stand-by Application.

Binary outputs *IL-NT - default*

BO1	Starter
BO2	Fuel Solenoid
BO3	Glow Plugs
BO4	GCB Close/Open
BO5	MCB Close/Open
BO6	Fuel Pump
BO7	Horn

Hint:

The description of binary outputs of a controller relates also to IOM/PTM modules.

Binary outputs - list

Not Used

Output has no function.

Starter

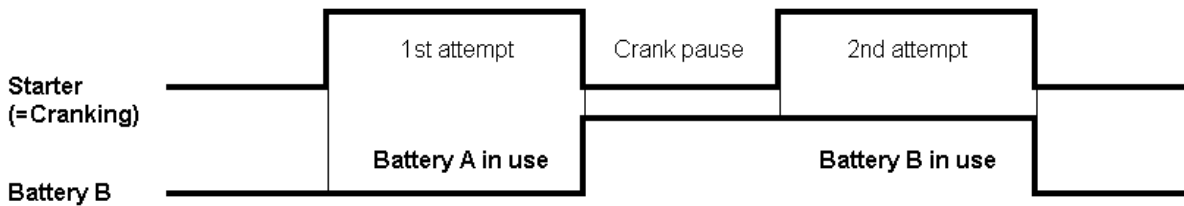
The closed relay energizes the starter motor.

The relay opens if:

- the “firing” speed is reached or
- maximum time of cranking is exceeded or
- request to stop comes up

Battery B

This output should be used in case that two batteries for starting are used. Battery B output switches between 2 alternative sources of power battery A and battery B. Battery B output is opened for the first cranking cycle which is designated for Battery A and closes for the second cranking cycle which is designated for Battery B (in case that 2 batteries for cranking are used).



Fuel Solenoid

Closed output opens the fuel solenoid and enables the engine start.
The output opens if:

- EMERGENCY STOP comes or
- Cooled gen-set is stopped or
- in pause between repeated starts

Stop Solenoid

The closed output energizes stop solenoid to stop the engine.
The output is active at least for *Stop Time*, if the stop lasts longer, it stays active until all symptoms say the engine is stopped.

The engine is stopped if:
RPM < 2 and
Generator voltage < 10V and
Oil pressure < **Engine Params: Starting Oil P.**

Hint:

The engine can be started anytime, if all symptoms say the engine is steady regardless of the fact the *Stop Solenoid* can still be active (in that case it is deactivated before cranking).

Stop Pulse

The output is active for 1 second after *Stop Solenoid* output activation. This signal is sent to ECU in case of engine stop request.

Ignition

The output closes after reaching value of crank RPM, fixed 30RPM. Opens after stopping of the engine or in pause during repeated start.

Prestart

The output closes prior to the engine start (*Prestart*) and opens when *Starting RPM* speed is reached. During *Crank Attempts* the output is closed too.
The output could be used for pre-glow, pre-heat or prelubrication.

Hint:

For more information see picture describing [Glow Plugs](#) binary output.

Cooling Pump

The output closes when gen-set starts and opens after stop of the engine.

Idle/Nominal

The output IDLE/NOMINAL closes after the timer *Idle Time* elapses. The *Idle Time* counter starts to countdown when *Starting RPM* reached. The Underspeed protection is not evaluated during fixed 5

seconds period after reaching *Starting RPM*. A *Start Fail* protection occurs if the RPM drop below 2RPM during idle.

Hint:

Connect Binary output Idle/Nominal to speed governor to switch the speed: opened = IDLE, closed=NOMINAL. If the IDLE contact is not supported on the governor, set the *Idle Time* nevertheless to minimum 5s to avoid Underspeed possibly caused by instability of the engine short after start.

Air Valves

Closes together with *Prestart*. Opens after the engine is stopped.
Stopped engine conditions: RPM = 0, **Engine Params:** *Starting Oil P, D+* (when enabled).

Alarm

The output closes if :

- any alarm comes up or
- the gen-set malfunctions

The output opens if

- **FAULT RESET** is pressed

The output closes again if a new fault comes up.

Horn

The output closes if:

- any alarm comes up or
- the gen-set malfunctions

The output opens if:

- **FAULT RESET** is pressed or
- HornResButton binary input is activated or
- Max time of HORN is exceeded (*Horn Timeout*)

The output closes again if a new fault comes up.

Emergency Stop

The output closes if:

- Emergency Stop is activated

The output opens if:

- alarm is not active and
- **FAULT RESET** is pressed

COMPARATOR OUT

The output is activated at the moment when Comparator ON limit is reached and is deactivated when Comparator OFF limit is reached

GCB Close/Open

The output controls the generator circuit breaker.

Hint:

Supposed time to close (reaction time) of GCB is 0,1 sec.

GCB ON Coil

The output activates Generator Circuit Breaker coil.

GCB Off Coil

The output deactivates Generator Circuit Breaker coil.

GCB UV Coil

The output controls Generator Circuit Breaker coil after voltage drop-out.

MCB Close/Open

The output controls the mains circuit breaker.

MCB On Coil

The output activates Mains Circuit Breaker coil.

MCB Off Coil

The output deactivates Mains Circuit Breaker coil.

MCB UV Coil

The output controls Mains Circuit Breaker coil after voltage drop-out.

Breaker Trip

The output is designated for auxiliary breaker tripping.

The output closes if:

- any BOC or SD alarm appears
- [EF PROT TEST](#) binary input is activated
- [EF Prot Test](#) command (in **Man Operations** setpoints group) is activated
- controller buttons' combination for [Eart Fault Protection Test](#) is used

The output opens if:

- No BOC and SD alarms are active and
- [FAULT RESET](#) is pressed

Hint:

In case there is a SD (caused by generator protections - like overvoltage, under voltage, under frequency, etc.), when the gen-set stops even in case of override, it does not issue the Breaker Trip command = Breaker Trip output is not activated (if you use it for a breaker, the breaker stays closed). In contrary "GCB open output" is in such case activated (and when used for breaker control, then GCB is opened).

Ready

The output is closed if following conditions are fulfilled:

- Gen-set is not running and
- No Shutdown protection is active
- Controller is not in OFF Mode

Ready To AMF

The output is active, if the controller is able to start the engine (the output *Ready* is active) or engine is already running and simultaneously the controller is in AUT Mode.

Ready To Load

The output is closed if gen-set is running and all electric values are in limits and no alarm is active - it is possible to close GCB or it is already closed. The output opens during cooling state.

Running

The output closes if the engine is in Running state.

Cooling

The output closes when gen-set is in Cooling state.

Supplying Load

Closed when the generator current is > 0,5% of the CT ratio.

Exact formulas:

The output is closed when the current at least in one phase is for 1 sec over CT ratio/200+2

The output is opened when the current in all three phases is for 1 sec below CT ratio/200+2

Hint:

Values are truncated after division, not rounded.

Fault Reset

The output is a copy of Fault Reset button on controller and binary input FAULTRESBUTTON.

Gen Healthy

The output is a copy of generator status LED on IL-NT front panel. The output is closed if gen-set is running and all gen-set electric values are in limits.

Mains Healthy

The output is copy of mains status LED on IL-NT front panel. The output is closed if mains voltage and frequency are within limits.

Timer 1

The output closes when Timer 1 is active.

Timer 2

The output closes when Timer 2 is active.

Timer 3

The output closes when Timer 3 is active.

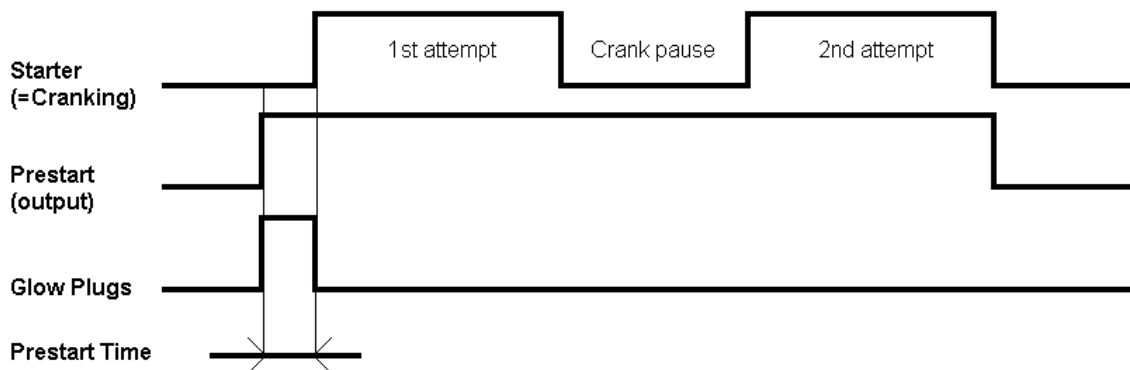
For more details about Timer options see [Date/Time: Timer1..3Function](#).

DualAMFCtrlOut

Control output for Mutual Standby Application. This binary output of controller 1 must be configured and interconnected with binary input [DualAMFCtrlIn](#) of controller 2 for correct Mutual Standby function

Glow Plugs

The output closes prior to the engine start (by Prestart Time) and opens at the beginning of cranking time. In case of repeated crank attempts the output doesn't close again and stays inactive.



Fuel Pump

Automatic evaluation:

Automatic function is evaluated based on *Fuel Pump ON* and *Fuel Pump OFF* values, which are placed in Basic settings setpoint group. When Fuel level value (measured on Analog Input 3) drops below/on level given by **Engine Params: Fuel Pump ON**, then binary output FUEL PUMP is activated.

When Fuel level value increases again above/on level given by **Engine Params: Fuel Pump OFF** then the binary output FUEL LEVEL is deactivated. It is fixed that Fuel level value is taken from Analog input #3.

The FUEL PUMP is immediately deactivated in following cases:

- Any Shutdown and/or BOC alarm
- Controller is switched to OFF mode
- There is a sensor fail on analog input 3 (used for Fuel Level)

Manual operation:

When **FUEL PUMP** button (on controller front side) is pressed the FUEL PUMP output is activated. The output is always activated at least for 1 second even in case the button is pressed for less than 1 second.

The output is active all the time when the **FUEL PUMP** button is pressed regardless *Fuel Pump ON* and *Fuel Pump OFF* setpoints and regardless there is a sensor fail on analog input #3. The output is only disabled when 100% of Fuel Level is reached. This limitation is active only in case “%” are chosen as unit for analog input #3, otherwise the output can be activated by the **FUEL PUMP** button.

Setpoints adjustment:

Newly the setpoints for FUEL PUMP output activation (**Engine Params: Fuel Pump ON** and **Engine Params: Fuel Pump OFF**) are connected with analog input #3 and they respect resolution setting of analog input #3 and so high limits and low limits of the setpoints changes according to the following table then.

Resolution	Fuel Pump OFF high limit	Fuel Pump ON low limit
1	10000	-100
0,1	1000	-10
0,01	100	-1
0,001	10	-0,1
0,0001	1	-0,01
0,00001	0,1	-0,001

Hint:

Both controls are independent each other, while at least one of them is active the Fuel Pump output is activated.

See also [Setpoints: Fuel Pump ON/OFF](#)

Preheating

The output closes when the value of Engine Temp (AI2) drops or lies under the value of *Preheating ON* setpoint and opens when value of *Preheating OFF* setpoint is reached.

See also [Setpoints: Preheating ON/OFF](#)

Dummy Load 1

When L1 Amps <= DummyLd 1 ON and Dummy Load function is active then Dummy Load 1 =1
When L1 Amps >= DummyLd 1 OFF and Dummy Load function is active then Dummy Load 1 = 0

Dummy Load 2

When L1 Amps <= DummyLd 2 ON and Dummy Load function is active then Dummy Load 2 =1
When L1 Amps >= DummyLd 2 OFF and Dummy Load function is active then Dummy Load 2 = 0
The outputs are activated/deactivated according to Dummy Ld 1..2 ON/ Dummy Ld 1..2 OFF parameters and also according to [Dummy Load](#) parameter which determines when the function/output

should be activated – either when only GCB is closed, only MCB is closed, either GCB or MCB is closed or controller is in Ready To Load state.

See also [Engine Params: Dummy Load ON/OFF](#)

OverrideNeeded

The output closes when either Engine Temp (AI2) or Oil Pressure (AI1) warnings are activated and automatically opens when both warnings are deactivated.

Maintenance

The output closes if the Maintenance alarm activates, i.e. the gen-set has been running for more than **Engine Protect: WrrnMaintenance**.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

Ctrl HeartBeat

The output signalizes Watchdog Reset. In a healthy state it blinks at 500ms : 500ms rate. When Watchdog Reset occurs, it stops blinking.

Mode OFF

The output is closed, if OFF Mode is selected.

Mode MAN

The output is closed, if MAN Mode is selected.

Mode AUT

The output is closed, if AUT Mode is selected.

Mode TEST

The output is closed, if TEST mode is selected.

The output opens if:

- alarm is not active and
- **FAULT RESET** is pressed

AL D+ Fail

The output closes if gen-set is running and D+ input not energized.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

Hint:

Treshhold level for D+ input is 80% supply voltage.

AL Gen >V

The output closes if the generator overvoltage shutdown alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Gen <V

The output closes if the generator undervoltage shutdown alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Gen Volts

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

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Gen Freq

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

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Gen >Freq

The output closes if the generator over frequency alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Gen <Freq

The output closes if the generator under frequency alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Mains Fail

The output closes if the mains over/under voltage alarm, voltage asymmetry alarm or mains over/under frequency alarm activates.

The output opens, if alarm is not active.

AL Mains Volts

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

The output opens, if alarm is not active.

AL Mains Freq

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

The output opens, if alarm is not active.

AL Overload

The output closes if the generator overload alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Stop Fail

The output closes when the engine have to be stopped, but speed or frequency or voltage or oil pressure is detected. This protection goes active 60s after stop command. With start goes this protection inactive.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Underspeed

The output closes if the gen-set underspeed alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Start Fail

The output closes after the gen-set start-up fails.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Overspeed

The output closes if the gen-set overspeed alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Overcurrent

The output closes if the generator:

- IDMT over current or
- current unbalance or
- short current alarm activates

The output opens, if:

- Alarm is not active and
- **FAULT RESET** is pressed

AL BatteryFail

The output closes when IL-NT performs reset during start procedure (probably due to weak battery) or when battery under/over voltage warning appears.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL Earth Fault

The output closes when Earth Fault Sd alarm appears.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL GenCCW Rot

The output closes when wrong generator phase sequence is detected.

The output opens, if:

- No warning alarm is active and
- **FAULT RESET** is pressed

AL MainsCCWRot

The output closes when wrong mains phase sequence is detected.

The output opens, if:

- No warning alarm is active and
- **FAULT RESET** is pressed

AL Common Wrn

The output closes when any warning alarm appears.

The output opens, if:

- No warning alarm is active and
- **FAULT RESET** is pressed

AL Common Sd

The output closes when any shut-down alarm appears.

The output opens, if:

- No Sd alarm is active and
- **FAULT RESET** is pressed

AL Common BOC

The output closes when any BOC alarm appears.

The output opens, if:

- No BOC alarm is active and
- **FAULT RESET** is pressed

AL Common Fls

The output closes when any Sensor Fail alarm appears.

The output opens, if:

- No warning alarm is active and
- **FAULT RESET** is pressed

AL AI1 Sd

The output closes if the oil pressure (if configured to the first analog input) shutdown alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL AI1 Wrn

The output closes if the oil pressure (if configured to the first analog input) warning alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

Hint:

AI1 is dedicated, but not used by default for Oil Pressure measurement.

AL AI2 Sd

The output closes if the engine temperature (configured to the second analog input) shutdown alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

AL AI2 Wrn

The output closes if the engine temperature (configured to the second analog input) warning alarm activates.

The output opens, if:

- alarm is not active and
- **FAULT RESET** is pressed

Hint:

AI2 is used by default for Engine Temp measurement.

AL AI3 Sd

The output closes if the Fuel Level (configured to the third analog input) shutdown alarm activates.

AL AI3 Wrn

The output closes if the Fuel Level (configured to the third analog input) warning alarm activates.

Hint:

AI3 is used by default for Fuel Level measurement.

BI1..7 Status

IOM BI1..8 Status

The outputs give an information about the assigned binary input.

In case the assigned binary input is configured to alarm type, then the output closes when the alarm activates. It opens if

- alarm is not active and
- **FAULT RESET** is pressed

In case the assigned binary input is configured to any control function, the output propagates the state of the input.

AL IOM AI1..4 Wrn

The output closes if warning alarm on the appropriate IOM/PTM analog input activates.

The output opens, if

- alarm is not active and
- **FAULT RESET** is pressed

AL IOM AI1..4 Sd

The output closes if shutdown alarm on the appropriate IOM/PTM analog input activates.

The output opens, if

- alarm is not active and
- **FAULT RESET** is pressed

ECU Comm OK

If the ECU is not communicating and all values from ECU show ##### the output is not active. If the ECU communicates the output is active.

ECU Comm Error

The output is an inversion of binary output ECU COMM OK, i.e. the output is closed when ECU is not communicating and all values from ECU show #####. Communication error causes stop of the engine.

ECU YellowLamp

The output copies warning information from ECU.

ECU RedLamp

The output copies shutdown information from ECU.

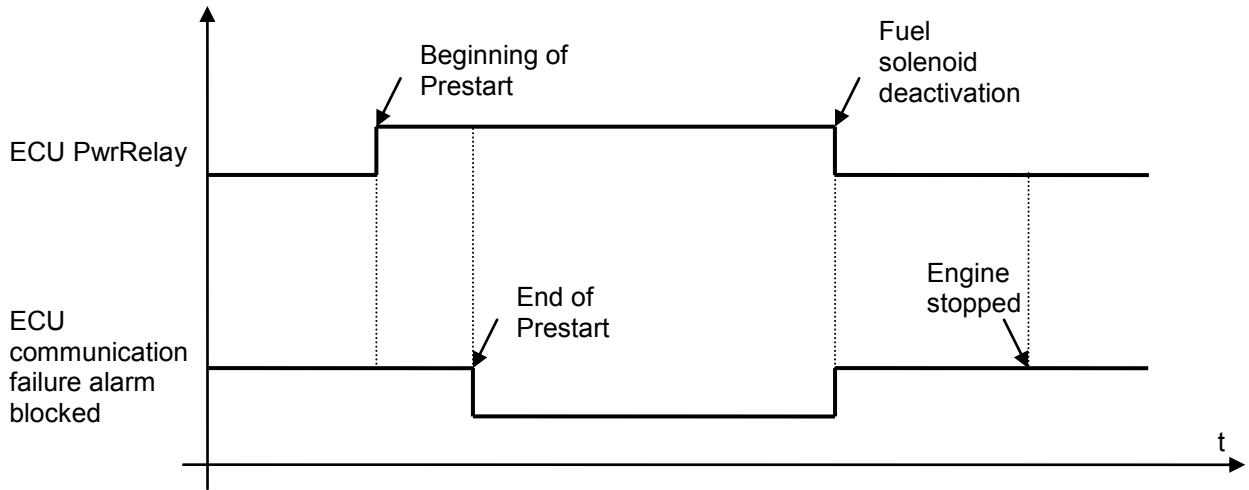
ECU PowerRelay

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 IntelliLite^{NT} AMF26-P, SW version 2.4, ©ComAp – January 2016
AMF26-P-2.4 Reference Guide.pdf

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.



Configuration1..3

The output closes when respective configuration (of nominal values) in [Alternate Cfg](#) group is active in case [Config Switch](#) is set to AutDetect.

Remote Connect

This output copies state of "R" letter which is visible on controlle display in case any Remote connection is active. When "R" is visible the output is active, when not visible the output is not active.

Analog inputs

It is possible to configure on each Analog input:

- Reading from IL Analog inputs or from Engine Control Unit via CAN bus (J1939)
- Sensor characteristics – from the list, or custom sensor curve
- Value dimension (e.g. psi - bars, °F - °C, % - l)
- Sensor resolution

Warning and shut-down limits are adjusted in **Engine Protect** group.

The analog inputs are configurable. Use LiteEdit software to modify configuration. Default configuration is:

Not Used

This input is designed for Oil pressure analog input and is automatically connected with internal controller logic mainly setpoint **Engine Params: Starting Oil P.**

Engine Temp

Engine temperature analog input. Default range 40 to 120 °C.

Fuel Level

Fuel Level analog input. Default VDO sensor 0-180R = 0-100%

Hint:

For further information about analog inputs' configuration see [Analog inputs](#).

LBO Fuel Pump must not be configured, when AIN3 is set for Binary/Tristate, LBO Preheating must not be configured, when AIN2 is set for Binary/Tristate

CAN J1939 interface

Following values can be received from Engine Control Unit via CAN bus instead of measuring on IL-NT terminals when J1939 interface is enabled.

Value	Value is received from	
	J1939 enabled	J1939 disabled
RPM	ECU	IL-NT – RPM terminals
Oil pressure	ECU or IL-NT AI1	IL-NT AI1 terminals
Engine temperature	ECU or IL-NT AI2	IL-NT AI2 terminals
Fuel Level	ECU or IL-NT AI3	IL-NT AI3 terminals
ECU State	ECU	
Fuel Rate	ECU	
Manifold temp	ECU	
Boost Pressure	ECU	
Percent Load	ECU	

Use LiteEdit to enable/disable J1939 interface and to configure IL-NT analog inputs.

Hint:

RPM reading is automatically switched to pickup or generator voltage measuring (depends on **Basic Settings: Gear Teeth** value) if J1939 fails.

Analog outputs

Optional plug in card IL-NT AOU8 provides eighth Pulse-With-Modulation (PWM) outputs. These are intended to drive VDO style analog gauges. This is to provide visual indication of typically ECU values




without installing additional sensors on the engine. PWM signal emulates sensor which would be typically mounted on the engine.

Any value from controller may be configured to the outputs. Use LiteEdit PC SW to configure corresponding sensor/gauge curve and value selection.

Setpoints

Password

EnterPassword

Password is a four-digit number. Password enables change of relevant protected setpoints. Use  or  keys to set and  key to enter the password.

Hint:

There is only 1 level of a password.

ChangePassword

Use  or  keys to set and  key to change the password.

Hint:

At first the password has to be entered before the new password can be changed. Password is usually required during configuration of controller or for adjustment of password protected setpoints (the ones marked with asterisk when password not entered). Default controller password is "0". Maximum value of password is "9999".

Basic Settings

Gen-set Name

User defined name, used for IL-NT identification at remote phone or mobile connection. *Gen-set Name* is max 14 characters long and have to be entered using LiteEdit software.

Nominal Power [kW]

Nominal power of the generator
Step: 1kW
Range: 1 – 5000 kW

Nomin Current [A]

It is current limit for generator IDMT over current and short current protection and means maximal continuous generator current. See **Gener Protect: Amps IDMT Del, GShortCrct Sd** setpoints. *Nominal Current* can be different from generator rated current value.
Step: 1 A
Range: 1 - 10000 A

CT Ratio [/5A]

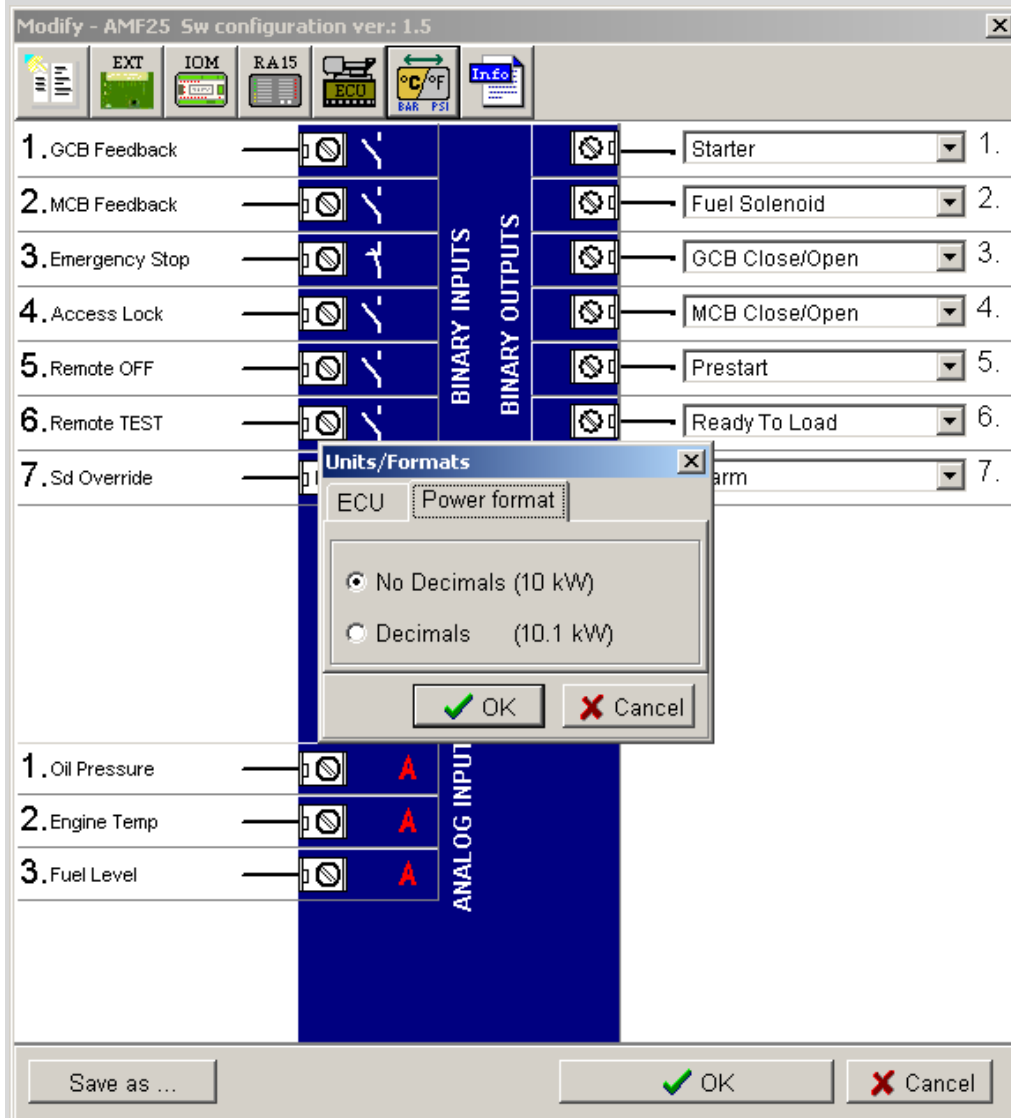
Gen-set phases current transformers ratio.
Step: 1 A
Range: 1 – 5000 A / 5A

Hint:

For firmware IL-NT-Pramac-1.0, 1.1, 1.2 and IL-NT-AMF26P-1.0:
For CT Ratio <= 250 the values of power and current are displayed in a controller with one decimal. For CT Ratio > 250 the values of power and current are displayed in a controller with integral numbers. If you change CT Ratio in LiteEdit or directly in the controller, decimal numbers will not be changed immediately. The change will be executed only by reconfiguring in LiteEdit. The statistics of power will be recounted at this time with regards to decimal numbers of power.
WARNING! When you change the firmware, statistics can be invalid!
WARNING! Change of CT ratio over value 250 without reconfiguring in LiteEdit can cause overflow of current measurement and improper function of controller!

For firmware IL-NT-AMF26P-2.0 and higher:

Decimal switching is not done via value of “CT ratio” setpoint, but in configuration window of LiteEdit software via icon „Units/Formats“:



Power format switching is available from LiteEdit version 4.4.

EF CT Ratio [1A]

Gen-set earth fault current transformer ratio.

Step: 1 A

Range: 1 – 2000 A / 1A

PT Ratio [1]

Gen-set potential transformers ratio.

Step: 0,1 V / V

Range: 0,1 – 500,0 V / V

Vm PT Ratio [1]

Mains potential transformers ratio.

Step: 0,1 V / V
Range: 0,1 – 500,0 V / V

NomVolts Ph-N [V]

Nominal generator voltage (phase to neutral)

Step: 1V
Range: 80 – 20000 V

NomVolts Ph-Ph [V]

Nominal generator voltage (phase to phase)

Step: 1V
Range: 138 – 35000 V

Hint:

There is a given ratio between *NomVolts Ph-N* and *NomVolts Ph-Ph*, based on *ConnectionType* setting. Once you change either *NomVolts Ph-N* or *NomVolts Ph-Ph* value, the other value is automatically recalculated. When you change *ConnectionType* setpoint new *NomVolts Ph-Ph* value is calculated based on *NomVolts Ph-N* which stays still during switchover between different connection types.

Nominal Freq [Hz]

Nominal generator frequency (usually 50 or 60 Hz)

Step: 1Hz
Range: 45 – 65 Hz

Gear Teeth [-]

Number of teeth on the engine gear for the pick-up.

Set Gear Teeth to 0, if no pick-up is used. Engine speed is counted from the generator frequency.

Step: 1
Range: 0 – 500

Hint:

Generator frequency can be used only when generator voltage (min 5V) is present before reaching of the firing speed (*Starting RPM*) after start.

Nominal RPM [RPM]

Nominal engine speed.

Step: 1RPM
Range: 100 – 4000 RPM

ControllerMode [OFF / MAN / AUT / TEST]

Equivalent to Controller mode changes by or buttons.

Hint:

Controller Mode change can be separately password protected.

Reset To MAN [ENABLED / DISABLED]

DISABLED: Controller stays in AUT Mode after Fault Reset .

ENABLED: Automatic switch from AUT (or TEST) to MAN Mode after Fault Reset to avoid automatic engine start. This function is active for Shut down protection only.

ConnectionType [3Ph4Wire / 3Ph3Wire / Split Ph / Mono Ph]

3Ph4Wire: STAR Connection, 3 phases and neutral - 4 wires,
Three phase “wye” measurement – 3PY

3Ph3Wire: DELTA Connection, 3 Phase without neutral - 3 Wires,

Split Phase: Three phase “delta” measurement – 3PD
DOUBLE DELTA Connection, Split Phase,
Single-phase measurement – 1PH
Mono Phase: MONOPHASE,
Single-phase measurement – 1PH

Hint:

For more details about connection types see [Voltage measurement and generator connection types](#).

CT Location [Load / GenSet]

Load: CT (current measurement) is located next to the load.
GenSet: CT (current measurement) is located next to the gen-set.

For more details about current measurement location see [Current measurement: CT location](#).

Number Of CTs [3CTs / 1CT]

3CTs:

It means that there are 3 CTs used for current measurement. This is valid in case of 3Ph4Wire or 3Ph3Wire connection type. This setting should be also used in case of Split Phase connection type, when there are just 2 CTs (as there are just two phases). This setting doesn't make sense in case of Mono Phase connection type (Even though you can use this setting in case of Mono Phase, but the result is the same as for 1CT).

1CT:

When 1CT is used for current measurement.

For more details about CT connection see [Current measurement: Number of CTs = 3CTs/1CT](#).

CB Feedbacks [ENABLED, DISABLED]

When ENABLED (default setting) and MCB and/or GCB configured, the feedback/s are evaluated.
When DISABLED then even when MCB and/or GCB configured they are not evaluated.

Comms Settings

ControllerAddr (1 .. 32) [-]

Controller identification number. It is possible to set controller address different from the default value (1) so that more IL controllers can be interconnected (via RS485) and accessed e.g. from Modbus terminal.

Hint:

When opening connection to the controller it's address has to correspond with the setting in PC tool. From LiteEdit it is only possible to connect to controllers with address 1.

COM1 Mode [DIRECT/MODEM/MODBUS/ECU LINK]

Communication protocol switch for the COM1 channel.

DIRECT: LiteEdit communication protocol via direct cable.

MODEM: LiteEdit communication protocol via modem.

MODBUS: Modbus protocol. See detailed description in IntelliCommunication guide.

ECU LINK: Protocol for communication with Cummins engines via Modbus.

Hint:

For details on communication speed and other technical parameters please see chapter Technical Data.

For detail description see chapter Modbus protocol. Since IL-NT version 1.3 controller supports register oriented modbus.

COM2 Mode [DIRECT/MODBUS/ECU LINK]

Communication protocol switch for the COM2 channel, if dual communication module is plugged in.

DIRECT: LiteEdit communication protocol via direct cable.

MODBUS: Modbus protocol. See detailed description in IntelliCommunication guide.

ECU LINK: Protocol for communication with Cummins engines via Modbus.

Hint:

For details on communication speed and other technical parameters please see chapter Technical Data. For detail description see chapter Modbus protocol. Since IL-NT version 1.3 controller supports register oriented modbus.

Hint:

Modbus TCP protocol using IB-Lite communication module requires setting COM1 Mode = DIRECT and COM2 Mode = MODBUS.

ModemIniString

If your modem needs some additional initialization AT commands (i.e. because of national telephony network differences), it can be entered here. Otherwise leave this setpoint blank.

ModbusComSpeed [9600,19200, 38400, 57600]

If the Modbus mode is selected on COM1 or COM2 channels, the Modbus communication speed in *bps* can be adjusted here.

Hint:

In case of using Modbus TCP, communication speed must be set on 57600, COM2

IBLite IP Addr [-]

If DHCP is DISABLED 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.

If DHCP is ENABLED this setpoint is used to display the IP address, which has been assigned by the DHCP server.

IBLite NetMask [-]

If DHCP is DISABLED 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.

If DHCP is ENABLED this setpoint is used to display the IP address, which has been assigned by the DHCP server.

IBLite GateIP [-]

If DHCP is DISABLED this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected.

If DHCP is ENABLED 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.

IBLite DHCP **[ENABLED/DISABLED]**

The setpoint is used to select the method how the ethernet connection is adjusted.

DISABLED:

The ethernet connection is adjusted fixedly according to the setpoints *IP Addr, NetMask, GateIP, DNS IP Address*.

This method should be used for classic ethernet or Internet connection. When this type of connection is opening the controller is specified by its IP address. That means it would be inconvenient if the IP address were not fixed (static).

ENABLED:

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.

ComAp Port **[0 - 65535]**

This setpoint is used to adjust the port number, which is used for ethernet connection to a PC with any of ComAp PC program (i.e. IntelliLite, IntelliMonitor). 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.

APN Name **[-]**

Name of APN access point for GPRS network provided by GSM/GPRS operator.

APN User Name **[-]**

User name for APN access point provided by GSM/GPRS operator.

APN User Pass **[-]**

User password for APN access point provided by GSM/GPRS operator.

AirGate **[Enable/Disable]**

Communication mode of internet connection.

Hint:

Valid for IB-Lite only.

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 its own AirGate server.

SMTP User Name **[-]**

Use this setpoint to enter the user name for the SMTP server.

SMTP User Pass [-]

Use this setpoint to enter the password for the SMTP server. User password of e-mail account for verification of e-mail sender on SMTP server. If parameter left empty, no verification is expected.

Hint:

Works for IB-Lite only.

SMTP Server IP [-]

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.

Hint:

IP address of SMTP server. Works for IB-Lite only.

Contr Mail Box [-]

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.

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 Address [-]

If DHCP is DISABLED 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.

If DHCP is ENABLED this setpoint is used to display DNS server, which has been assigned by the DHCP server.

Engine Params

Starting RPM [%]

"Firing" speed when IL controller stops cranking (starter goes OFF).

Step: 1% of nominal RPM

Range: 5 – 50 %

Starting Oil P [Bar]

When reached controller stops cranking (starter goes OFF).

Step: 0,1 bar

Range: 0,0 – 10,0

Hint:

There are three conditions for stop cranking: *Starting RPM*, *Starting Oil P* and *D+* (when enabled). Starter goes off when any of these conditions is void.

Prestart Time [s]

Time of closing of the *Prestart* output prior to the engine start.

Set to zero if you want to leave the output *Prestart* open.

Step: 1s
Range: 0 – 600 s

Hint:

Set Prestart time ≥ 1 when using [PREHEATING](#) binary input or [Preheating](#) within Deutz EMR2 ECU.

MaxCrank Time [s]

Maximum time limit of cranking.

Step: 1s
Range: 1 – 60 s

CrnkFail Pause [s]

Pause between Crank Attempts.

Step: 1s
Range: 5 – 60 s

Crank Attempts [-]

Max number of Crank Attempts.

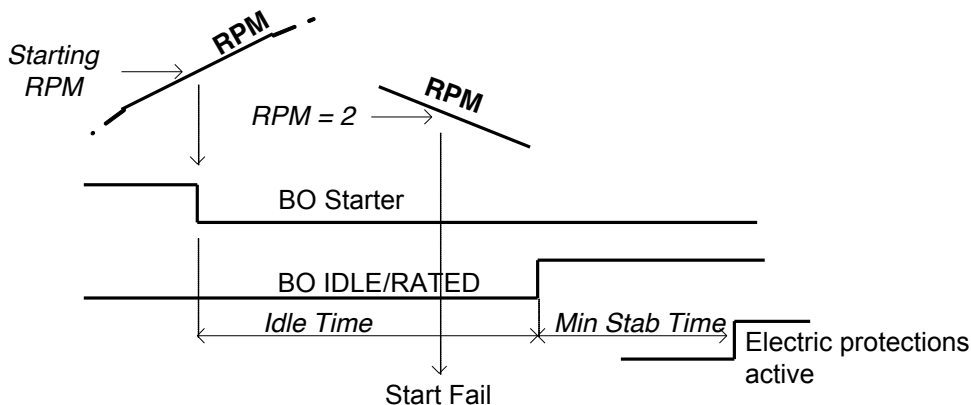
Step: 1
Range: 1 – 10

Idle Time [s]

Idle time delay starts when RPM exceeds *Starting RPM*. Start fail is detected when during Idle state RPM decreases below 2.

During the *Idle time* timer running the binary output *IDLE/NOMINAL* is opened when it elapses the *IDLE/NOMINAL* output closes. Binary output *IDLE/NOMINAL* opens during Cooling period again.

Step: 1 s
Range: 0 – 600 s



Hint:

If the *IDLE* function not supported on the governor, set the *Idle Time* nevertheless to minimum 5s to avoid Underspeed possibly caused by instability of the engine short after start.

Min Stab Time [s]

Minimum time after reaching of defined level of RPM to the closing GCB.

Step: 1s
Range: 1 – 300 (Max Stab Time) s

Max Stab Time [s]

Maximum time after start to get proper voltage level of the generator.

Step: 1s
Range: 1 (Min Stab Time) – 300 s

Hint:

When generator voltage within *Max Stab Time* does not reach defined limits (Generator protection group), an alarm occurs and the gen-set will shut down

Cooling Speed [IDLE / NOMINAL]

Selects the function of the binary output IDLE/NOMINAL during engine Cooling state.

NOMINAL : Cooling is executed at Nominal speed and generator protections are active.

IDLE: Cooling is executed at Idle speed and generator protections are switched off.

Hint:

Binary output IDLE/NOMINAL must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor

Cooling Time [s]

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

Step: 1s
Range: 0 – 3600 s

Hint:

Cooling is executed at nominal speed and generator protections are active.

Stop Time [s]

Under normal conditions the engine must certainly stop within this period. The period starts by issuing stop command.

Step: 1s
Range: 0 – 600 s

Hint:

Stop of engine is detected when all following conditions are met: RPM <2, Oil pressure < *Starting Oil P*
Generator voltage < 10 VAC and D+ input isn't active.

Stop fail is detected when there is difference between those conditions, e.g RPM<2 and Generator voltage > 10V.

Fuel Solenoid [DIESEL / GAS / EFuelFPmp]

Determines behavior of the binary output FUEL SOLENOID.

DIESEL: The output closes 1 sec before binary output STARTER. The output opens if Emergency Stop comes or Cooled gen-set is stopped and in pause between repeated starts.

GAS: The output closes together with binary output IGNITION if RPM is over the *30 RPM (fix value)*. The output opens after stop command or in pause between repeated start.

EFuelFPmp: When starting, running, stopping, shutting down, etc. it behaves the same way as Fuel Solenoid: DIESEL, except following situations:

- the output closes
 - a) at the beginning of prestart or
 - b) in MAN mode when the gen-set is stopped and STOP button is pressed
(..and in the same cases as Fuel Solenoid: DIESEL)
- the output opens

- a) when controller mode is changed from MAN to any other mode or
 - b) 60 seconds after it was activated by pressing the STOP button in MAN mode (in case it wasn't deactivated by second STOP button press, by protection alarm or by the mode change)
- (..and in the same cases as Fuel Solenoid: DIESEL)

Hint:

Fuel Solenoid - EFuelFPmp signal is used for feeding the fuel in engines that don't have a manual fuel pump (Electronic Fuel Feed Pump) when the gen-set is starting-up or when they run out of fuel.

D+ Function [ENABLED / CHRGFAIL / DISABLED]

- ENABLED: The D+ terminal is used for both functions – “running engine” detection and charge fail detection.
- CHRGFAIL: The D+ terminal is used for charge fail detection only
- DISABLED: The D+ terminal is not used.

Hint:

The magnetization current is provided independently on this setpoint value.
The D+ charge fail protection becomes active after **Engine Params:Idle Time** reaches zero.

ECU FreqSelect [PRIMARY / SECONDARY / DEFAULT]

This setpoint should be used only for Volvo and Scania engines.

Volvo – “Volvo Aux” is selected in ECU configuration:

Primary or secondary engine speed is set by *Frequency select* bits in **VP Status** frame.

Scania – “Scania S6 Singlespeed” is selected in ECU configuration:

Nominal engine speed is chosen by *Nominal speed switch 1 and 2* from **DLN1** frame when the engine is running on nominal speed, i.e. binary output IDLE/NOMINAL is active. When the output is not active (engine is running on Idle speed), the setpoint *ECU FreqSelect* is not taken into account.

Frequency change for Volvo Penta engines with EMS2

This description refers to the Volvo Penta Application bulletin 30-0-003.

The procedure for changing engine speed on the D9 and D16 engines is different from the D12 engine.

There is no system reset on the EMS2 unit; therefore the procedure is changed.

Procedure if ECU not energized:

1. Switch the IL controller to MAN Mode.
2. Power up the ECU.
3. Change the setpoint *ECU FreqSelect* and confirm it by pressing Enter
4. Press the Stop button on the IL controller.

The whole procedure (step 2 to 4) must not exceed **10 seconds**.

Procedure with ECU powered on:

1. Switch the IL controller to MAN Mode.
2. Press the Stop button on the IL controller.
3. Change the setpoint *ECU FreqSelect* and confirm it by pressing Enter
4. Press the Stop button on the IL controller.

The whole procedure (step 2 to 4) must not exceed **10 seconds**.

Volvo TAD ECU frequency selection procedure (EMS2):

1. ECU switched ON
2. press STOP button
3. change from Primary to Secondary or the other way around
4. press STOP button
5. power OFF the ECU for 15 seconds or more
6. power ON the ECU

The whole procedure (step 2 to 3) must not exceed **10 seconds**.

ECU SpeedAdj [%]

Enables to adjust engine speed in ECU via CAN bus. Nominal speed corresponds to 50%.

Step: 1%
Range: 0 – 100%

Hint:

The minimum value 0% is equal to 90% of nominal speed. Maximum value 100% is equal to 110% of nominal speed.

Fuel Pump ON [%]

When the actual value of Fuel Level (AI 3) is lower or equals to this value then the binary output Fuel Pump is activated.

Step: 1
Range: 0 – 100 %

Fuel Pump OFF [%]

When the actual value of Fuel Level (AI 3) becomes higher or equals to this value then the binary output FUEL PUMP is deactivated.

Step: 1
Range: 0 – 100 %

Preheating ON [°C]

When the actual value of Water Temp (AI 2) is lower or equals to this value then the binary output PREHEATING is activated.

Step: 1
Range: 0 – Preheating OFF °C

Preheating OFF [°C]

When the actual value of Water Temp (AI 2) becomes higher or equals to this value then the binary output PREHEATING is deactivated.

Step: 1
Range: Preheating ON – 100 °C

Hint:

Preheating function is switched off when *Preheating ON = Preheating OFF*.
The two setpoints above are compared to Analog Input 2 (usually used for Water Temp)
For more details about Preheating function see description of [PREHEATING](#) binary output

Comparator IN [AI1; AI2; AI3; IOM AI1; IOM AI2; IOM AI3; IOM AI4]

Input to the comparator, it is possible to choose what analog input will be evaluated

Comparator ON []

Resolution = 1
ON limit - once this limit is reached the Comparator output is switched on.

Comparator OFF []

Resolution = 1

OFF limit - once this limit is reached the Comparator output is switched off.

ComparatorFunc [list of functions bellow]

It will be possible to choose from the list of following logical functions, which may be activated at the same moment when ON limit is reached and the Comparator output is activated.

List of functions:

No Func, Rem S/S, Rem Start, Rem Stop, EmergStop, Sd Ovrdd, Rem OFF, Rem MAN, Rem AUT, Rem TEST, Rem T OnLd, Emerg Man

Note:

If the same function is already configured on binary input or as function of timer, it will be in logical OR with the comparator function.

EMR2Preheating [ENABLED / DISABLED]

ENABLED: Should be used when Deutz EMR2 ECU is used and preheating function in its configuration is activated.

DISABLED: Should be used when conditions above are not fulfilled, what means for all the other ECU types, for mechanical engines and also for Deutz EMR2 when preheating function in its configuration is NOT activated.

For more information about this function see also [PREHEATING](#) binary input description.

Dummy Ld 1 ON [A]

Limit for Dummy Load 1 activation.

Step: 1 A

Range: 1 – 10000 A

Dummy Ld 1 OFF [A]

Limit for Dummy Load 1 deactivation.

Step: 1 A

Range: 1 – 10000 A

Dummy Ld 2 ON [A]

Limit for Dummy Load 2 activation.

Step: 1 A

Range: 1 – 10000 A

Dummy Ld 2 OFF [A]

Limit for Dummy Load 2 deactivation.

Step: 1 A

Range: 1 – 10000 A

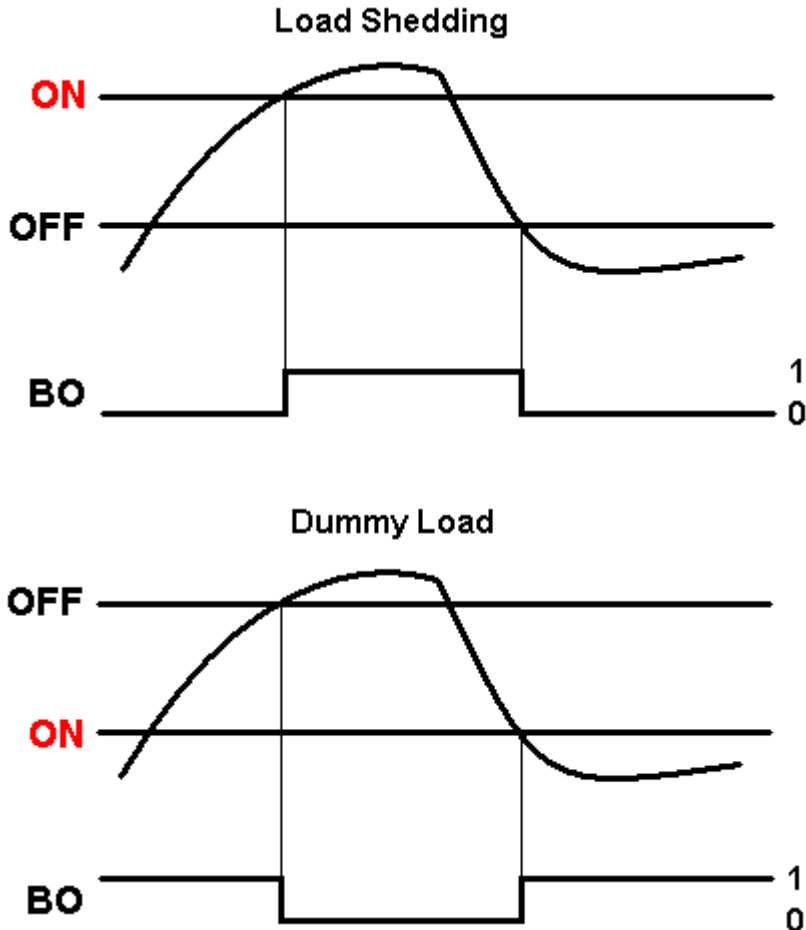
Dummy Load [GCB, MCB, GCB or MCB, ReadyToLd]

Common parameter determining when the Dummy Load function/output is active; either when only GCB is closed (default setting) or when only MCB is closed or when either GCB or MCB is closed or in case gen-set is in Ready To Load state (= Ready To Load output is active).

Evaluation of this function is based on L1 current value. There is fixed 15 seconds delay for function activation after Dummy Load parameter conditions are fulfilled (GCB and/or MCB closing and switching to Ready To Load state). Once the function is activated (after 15 seconds delay) Dummy Load ON/OFF limits are evaluated immediately without any delay.

Hint:

Dummy Load function is primarily dedicated to secure healthy gen-set running in case gen-set load is not sufficient (is too low). There are 2 independent parameters for two independent Dummy Load levels. Using opposite logic, Dummy Load function can be also used for Load Shedding purpose. It only depends on Dummy Ld ON and OFF values. When ON value is higher than OFF value, then the function can be used for Load Shedding, when lower then fro Dummy Load. See the logic in pictures below.



Engine Protect

ProtectHoldOff [s]

During the start of the gen-set, some engine protections have to be blocked (e.g. Oil pressure). The protections are unblocked after the *ProtectHoldOff* time. The time starts after reaching *Starting RPM*.

Step: 1s
Range: 0 – 300 s

Horn Timeout [s]

Max time limit of horn sounding. Set to zero if you want to leave the output HORN open. Horn timeout starts again from the beginning if a new alarm appears before previous Horn timeout has elapsed.

Step: 1s
Range: 0 – 600 s

Overspeed [%]

Threshold for over speed protection

Step: 1% of nominal RPM
Range: 100 – 150%

Hint:

The Overspeed protection value is increasing from 115 % to 125% of nominal RPM for the duration of 5sec (ProtectHoldOff delay). ProtectHoldOff delay takes place during the start of the gen-set when some engine protections have to be blocked. This delay starts after reaching 25% of nominal RPM. It holds true if the value GeerTeeth = 0.

AI1 Wrn [Bar]

Warning threshold level for ANALOG INPUT 1

Step: 0,1 bar
Range: -10 – 1000

AI1 Sd [Bar]

Shutdown threshold level for ANALOG INPUT 1

Step: 0,1 bar
Range: -10 – 1000

AI1 Del [s]

Delay for ANALOG INPUT 1

Step: 1 s
Range: 0 – 900 s

AI2 Wrn []

Warning threshold level for ANALOG INPUT 2

Step: 1 °C
Range: -100 – 10000

AI2 Sd []

Shutdown threshold level for ANALOG INPUT 2

Step: 1 °C
Range: -100 – 10000

AI2 Del [s]

Delay for ANALOG INPUT 2 alarm.

Step: 1 s
Range: 0 – 900 s

AI3 Wrn []

Warning threshold level for ANALOG INPUT 3

Step: 1 %
Range: -100 – 10000

AI3 Sd []

Shutdown threshold level for ANALOG INPUT 3

Step: 1 %
Range: -100 – 10000

AI3 Del [s]

Delay for ANALOG INPUT 3

Step: 1 s
Range: 0 – 900 s

Hint:

If the analog value goes over or under limit of analog input, delay setpoint is not evaluated and genset triggers the protection when IDLE time is elapsed.

BI6 Delay [s]

Delay for binary input number 6.

Step: 0,1 s
Range: 0 – 3600 s

BI7 Delay [s]

Delay for binary input number 7.

Step: 0,1 s
Range: 0 – 3600 s

Hint:

There is a possibility to set programmable delay on alarms configured for binary output 6 and/or 7. If set, it blocks alarms of the respective binary input all the time when the delay is active. If the reason for the alarm persists after the delay elapses, the alarm is activated. If not, the alarm is not activated. This feature allows user to perform “filtering” of alarms.

Batt Undervolt [V]

Warning threshold for low battery voltage.

Step: 0,1 V
Range: 8V – 40 (Battery >Volts)

Batt Overvolt [V]

Warning threshold for hi battery voltage.

Step: 0,1 V
Range: 8V – 40 (Battery <Volts)

Batt Volt Del [s]

Delay for low battery voltage alarm.

Step: 1s
Range: 0 – 600 s

Maintenance [h]

Counts down when engine running. If reaches zero, an alarm appears. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappears in controllers statistics.

Step: 1h
Range: 0 – 10000h

Gener Protect

All electric protections when activated result in shutdown.

Overload BOC [%]

Threshold for generator overload (in % of Nominal power)

Step: 1% of Nominal power
Range: 0 – 200%

Overload Del [s]

Delay for generator overload alarm.

Step: 0,1s
Range: 0 – 600,0 s

GShortCrct Sd [%]

Shutdown occurs when generator current reaches *GShortCrct Sd* limit.

Step: 1 % of *Nominal current*

Range: 100 - 500 %

GShortCrct Del [s]

Delay for generator short current alarm.

Step: 0,01s

Range: 0,00 – 10,00 s

Amps IDMT Del [s]

IDMT curve shape selection. *Amps IDMT Del* is Reaction time of IDMT protection for 200% overcurrent $I_{gen} = 2 * Nomin Current$.

Step: 0,1 s

Range: 0,1 - 60,0 s

IDMT is “very inverse” generator over current protection. Reaction time is not constant but depends on generator over current level according following formula.

$$\text{Reaction time} = \frac{\text{Amps IDMT Del} * \text{Nomin Current}}{I_{gen} - \text{Nomin Current}}$$

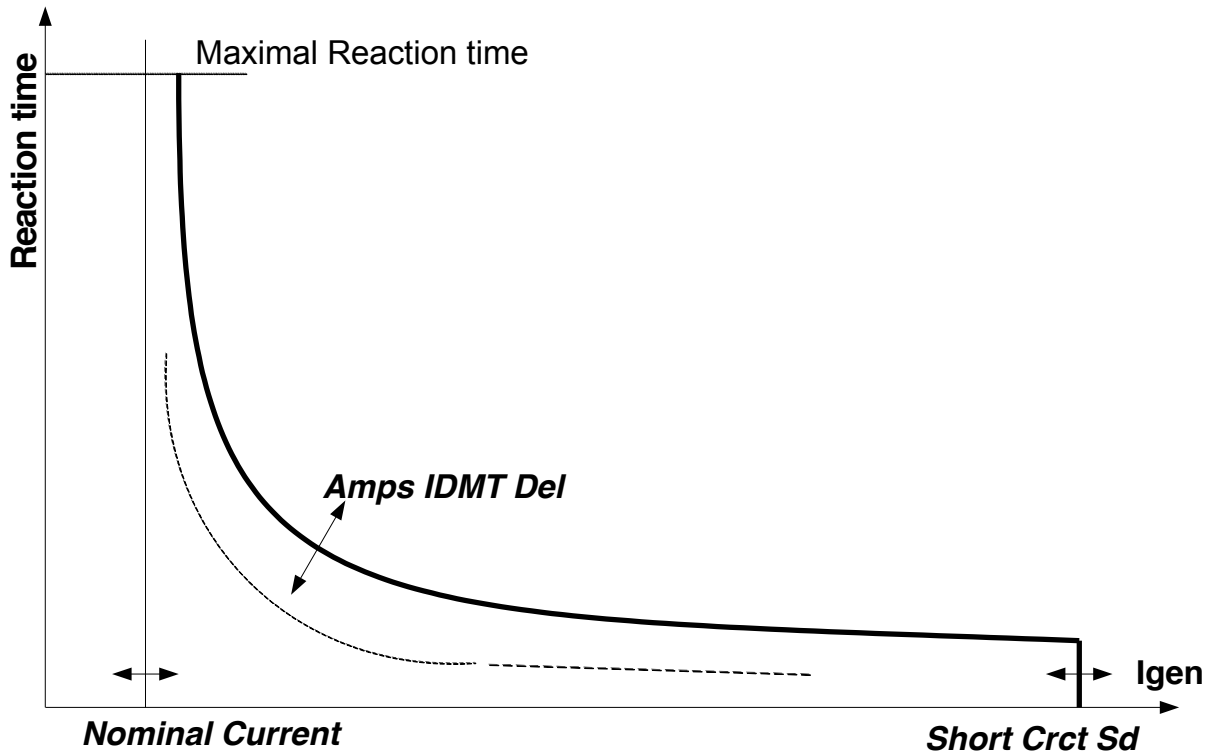
Hint:

Reaction time is limited up to 900 sec = 15 minutes. IDMT protection is not active for Reaction time values longer than 15 minutes.

I_{gen} is maximal value of all measured phases of generator current.

EXAMPLE of Reaction time for different over current levels. Values in column 200% are *IDMT Curr Del*.

	Overcurrent			
	200 % = IDMT Curr Del	≤ 100 %	101 %	110 %
Reaction time	0,2 s	No action	20 s	2 s
	2 s	No action	200 s	20 s
	20 s	No action	No action (time > 900 s)	200 s



Amps Unbal Sd [%]

Threshold for generator current asymmetry (unbalance).

Step: 1% of Nominal current

Range: 1 – 200% of Nominal current

Amps Unbal Del [s]

Delay for generator current unbalance

Step: 0,1 s

Range: 0,0 – 600,0 s

EF Protection [ENABLED / DISABLED]

ENABLED: Earth Fault Protection is evaluated according to *Earth Fault Sd* and *Earth Fault Del* setting. This setting makes sense only in case that IL-NT-EFCPM module is used.

DISABLED: Earth Fault Protection is NOT evaluated. This setting should be chosen in case that IL-NT-EFCPM module is NOT used.

Earth Fault Sd [A]

Threshold for *Earth Fault Sd* protection.

Step: 0,01

Range: 0,03 to 5,00

For more information about Earth Fault Protection see [Earth Fault measurement](#).

Earth Fault Del [s]

Delay for *Earth Fault Sd* evaluation

Step: 0,01

Range: 0,03 to 5,00

Gen >V Sd [%]

Threshold for generator overvoltage. All three phases are checked. Maximum out of three is used.

Step: 1% of Nominal voltage
Range: 0(Gen <V BOC) – 200%

Gen <V BOC [%]

Threshold for generator undervoltage. All three phases are checked. Minimum out of three is used.

Step: 1% of Nominal voltage
Range: 0% – 200 (Gen >V Sd)%

Hint:

Over- and undervoltage protection is evaluated according to [Basic Settings: ConnectionType](#) setting. 3Ph4Wire and 3Ph3Wire connections are evaluated according to Ph-Ph nominal voltage (NomVolts Ph-Ph) and Split Phase and Mono Phase connections are evaluated according to Ph-N nominal voltage (NomVolts Ph-N).

Gen V Del [s]

Delay for generator undervoltage and overvoltage alarm

Step: 0,1s
Range: 0,0 – 600,0 s

Volt Unbal Sd [%]

Threshold for generator voltage unbalance alarm.

Step: 1% of Nominal voltage
Range: 0 – 200% of Nominal voltage

Hint:

Voltage unbalance protection is evaluated the same way as overvoltage (Gen >V Sd) and undervoltage (Gen <V BOC) protections described above.

Volt Unbal Del [s]

Delay for generator voltage unbalance alarm.

Step: 0,1s
Range: 0,0 – 600,0 s

Gen >Freq Sd [%]

Threshold for generator phase L3 overfrequency.

Step: 0,1% of Nominal frequency
Range: 0 (Gen <Freq BOC) – 200,0% of Nominal frequency

Gen <Freq BOC [%]

Threshold for generator phase L3 underfrequency.

Step: 0,1% of Nominal frequency
Range: 0,0 – 200 (Gen >Freq Sd) % of Nominal frequency

Gen Freq Del [s]

Delay for generator underfrequency and overfrequency alarm.

Step: 0,1s
Range: 0,0 – 600,0 s

AMF Settings

Operation Mode [AMF/MRS/SLAVE/MASTER]

Based on this setpoint is defined basic controller function.

AMF: Normal AMF operation

MRS: When MRS mode is selected the controller will not perform AMF functions anymore. MCB button will be inactive and also mains measurement and protections will be disabled. The controller will keep TEST mode and the genset in AUT mode will be able to start by *Rem Start/Stop* binary input.

Hint:

When the AMF controller operates in MRS mode and detects voltage on Mains terminals Wrn MainsV Det. is displayed in Alarm list.

SLAVE/MASTER:

When SLAVE or MASTER is selected the controller will perform [Dual Mutual Standby](#) function.

Hint:

MASTER or SLAVE can be also defined by binary input DualAMFRole with higher priority than Operation Mode setpoint.

DualAMFTime [h]

Within this time period are gen-sets switching in supplying the load.

Step: 1h
Range: 1 – 24h

RetFromIsland [MANUAL / AUTO]

MANUAL: After closing GCB, IL goes to MAN Mode automatically.
AUTO: No automatic switching to MAN Mode.

EmergStart Del [s]

Delay after the mains failure to the start of the gen-set

Step: 1s
Range: 0 – 6000 s

MainsReturnDel [s]

Delay after the mains return to the GCB opening.

Step: 1s
Range: 1 – 3600 s

MFB MReturnDel [s]

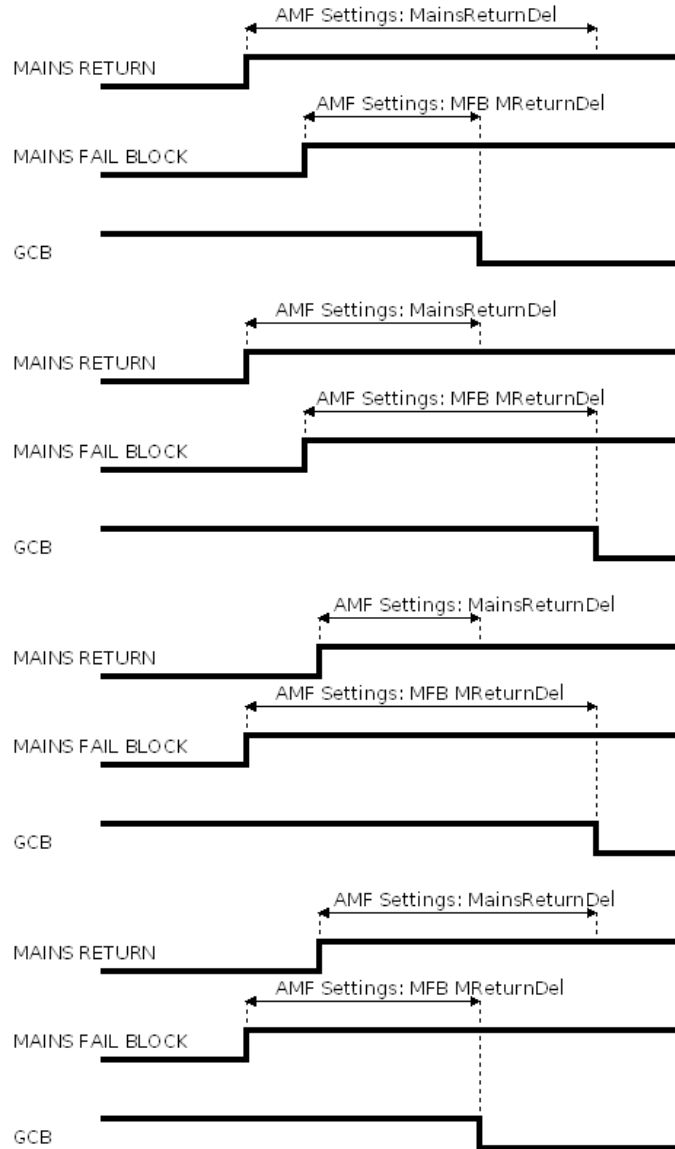
Delay after the mains return to the GCB opening in case BI: *MainsFailBlock* is active .

Step: 1s
Range: 1 – 3600 s

Hint:

In case the LBI:[MainsFailBlock](#) is activated in AUT mode in Island Operation (IsIOper) then **AMF Settings: MFB MReturnDel** parameter is used instead of **AMF Settings: MainsReturnDel** parameter for transition to Mains Operation (MainsOper).

In case both events (MainsFailBlock and Mains Return) appears concurrently (closely one after another) and their delays could overlap each other then the manual control (BI: MainsFailBlock) has higher priority comparing the real Mains return as shown in the following diagram.



Transfer Del

[s]

Delay after GCB opening to MCB closing during the return procedure.

Delay after MCB opening to GCB closing if the setpoint *MCB Opens On* set to GENRUN

Step: 0,1s

Range: 0 – 600,0 s

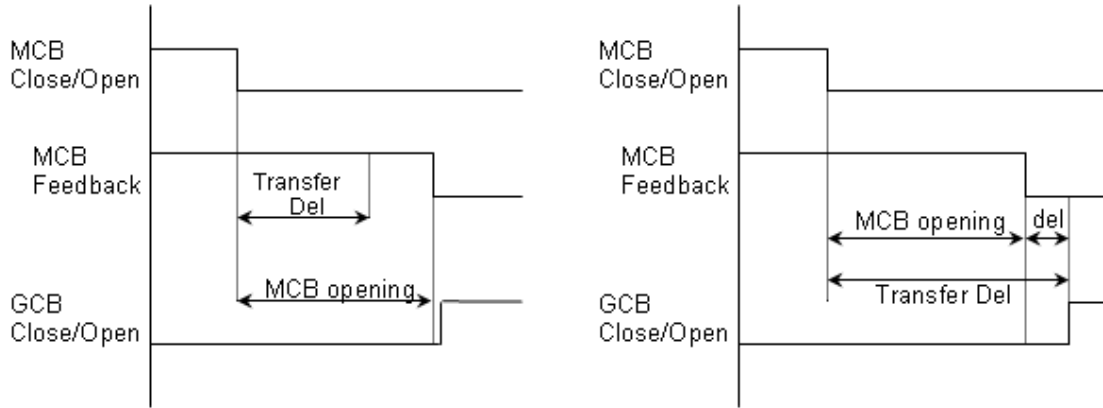
The time charts bellow show recommended setting of **AMF Settings: Transfer Del** setpoint.

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If the *Transfer Del* setpoint is set shorter than the time required for opening of the breaker, the controller closes *GCB Close/Open* output straight away (100ms) after the *MCB feedback* input deactivates.

If some delay between *MCB feedback* deactivation and closing of *GCB Close/Open* circuit output is required, then the *Transfer Del* must be set to sum of “MCB opening”+“del” time.



MCB Close Del [s]

Delay after mains returns to MCB closing, if gen-set is not running (e.g. is in start-up procedure)

Step: 0,1s
Range: 0 – 60,0 s

MShortCrct [A]

When mains current reaches *MShortCrct* limit for at least *MShortCrct Del* time *WrnMShort Crct* alarm is activated and MCB is opened. This alarm is active (and MCB cannot be closed again) unless **FAULT RESET** is pressed.

Step: 1 A
Range: 1 - 10000 A

MShortCrct Del [s]

Delay for *MShortCrct* evaluation.

Step: 0,01s
Range: 0,00 – 10,00 s

Mains >V [%]

Threshold for mains overvoltage. All three phases are checked. Maximum out of three is used.

Step: 1% of Nominal voltage
Range: 50 (Mains <V) – 150%

Mains <V [%]

Threshold for mains undervoltage. All three phases are checked. Maximum out of three is used.

Step: 1% of nominal voltage
Range: 50% – 150 (Mains >V)%

Mains V Del [s]

Delay for mains undervoltage and overvoltage

Step: 0,1 s
Range: 0 – 600,0 s

Mains V Unbal [%]

Threshold for mains voltage unbalance
Step: 1% of Nominal voltage
Range: 1 – 150%

Mains VUnb Del [s]

Delay for mains voltage unbalance
Step: 0,1 s
Range: 0- 60,0

Mains >Freq [%]

Threshold for mains overfrequency. All three phases are checked. Maximum out of three is used.
Step: 0,1% of Nominal frequency
Range: 50 (Mains <Freq) – 150,0%

Mains <Freq [%]

Threshold for mains underfrequency. All three phases are checked. Maximum out of three is used.
Step: 0,1% of Nominal frequency
Range: 50% – 150,0(Mains >Freq)%

Mains Freq Del [s]

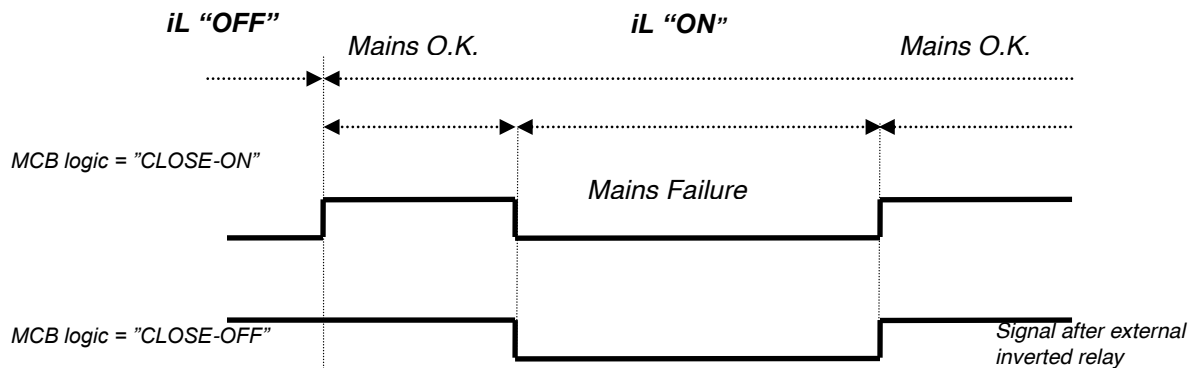
Delay for mains underfrequency and overfrequency
Step: 0,1s
Range: 0 – 60,0 s

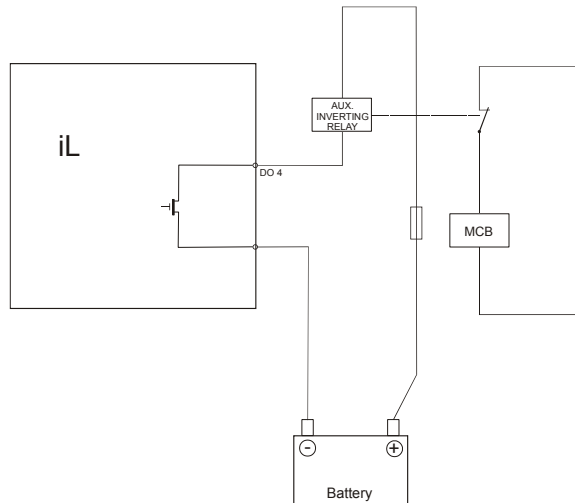
MCB Logic [CLOSE-ON / CLOSE-OFF]

The set point influences the behavior of the output MCB CLOSE/OPEN

CLOSE-ON: When the output MCB CLOSE/OPEN is closed – MCB should be closed.

CLOSE-OFF: When the output MCB CLOSE/OPEN is closed – MCB should be opened.





Hint:

In the case MCB Logic = "CLOSE-OFF" it is necessary to change externally the polarity of the output signal.

ReturnFromTEST [MANUAL / AUTO]

The set point influences the behavior of the TEST mode.

MANUAL:

- 1) Select TEST, gen-sets starts and running unloaded
- 2) To transfer load from mains to the gen-set press **MCB ON/OFF** or wait for power-cut.
- 3) When mains recovers, the gen-set remains running loaded.
- 4) To stop the gen-set select AUTO Mode
- 5) In AUT Mode:
 - a) After the *MainsReturnDel* IL-NT opens the GCB
 - b) After the *Transfer Del* delay IL-NT closes the MCB.
 - c) The gen-set is cooled and stopped

AUT:

- 1) Select TEST, gen-sets starts and running unloaded
- 2) To transfer load from mains to the gen-set wait for the power-cut. the controller does not response for **MCB ON/OFF** button.
- 3) When the mains recovers:
 - a) After the *MainsReturnDel* the controller opens the GCB
 - b) After the *Transfer Del* delay the controller closes the MCB.
- 4) The gen-set remains running.
- 5) To stop the gen-set select a different mode than TEST.

MCB Opens On [MAINSFAIL / GENRUN]

MAINSFAIL: The command to open the MCB is given immediately after mains fail condition evaluated.

GENRUN: The command to open the MCB is not given till the Gen-set starts (with respecting the setpoint *EmergStart Del*), reaches Running state, reaches proper voltage and frequency and Min Stab Time elapses. After that, the MCB is opened, Transfer Del timer is started and the GCB is closed after the timer elapses.

Hint:

This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.

Date/Time

Time Stamp Per [min]

Time interval for periodic history records.

Step: 1 min

Range: 0 – 200min

Hint:

Time stamps are only recorded into history while gen-set is running. There are no time stamps records made when engine is stopped.

#SummerTimeMod [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.

Timer1..3Function [No Func/TEST/TEST OnLd/MFail Blk/Mode OFF]

It is possible to choose out of 5 following Timer functions. Binary output [TIMER](#) is always activated when Timer is active regardless of chosen Timer function.

No Func: There is no any other function, but binary output TIMER1..3 activation.

TEST: When this option is chosen then the Timer output is also internally connected to the REMOTE TEST binary input.

TEST OnLd: When this option is chosen then the Timer output is also internally connected to the REM TEST ONLD binary input.

MFail Blk: When this option is chosen then the Timer output is also internally connected to the MAINSFAILBLOCK binary input.

Mode OFF: When this option is chosen then the Timer output is also internally connected to the REMOTE OFF binary input.

Timer1..3 Repeat

[NONE/MONDAY/TUESDAY/WEDNESDAY/THURSDAY/WEDNESDAY/FRI DAY/SATURDAY/SUNDAY/MON-FRI/MON-SAT/MON-SUN/SAT-SUN/SUN-MON/12 Hours/8 Hours/6 Hours/4 Hours/3 Hours/2 Hours/1 Hour]

Defines time of TIMER 1..3 activation.

NONE:

Timer function is disabled

MONDAY, TUESDAY, WEDNESDAY, THURSDAY, WEDNESDAY, FRIDAY, SATURDAY, SUNDAY: Timer is activated on daily basis.

MON-FRI, MON-SAT, SAT-SUN, SUN-MON:

Timer is activated on selected day interval.

12 Hours/8 Hours/6 Hours/4 Hours/3 Hours/2 Hours/1 Hour:

Timer is activated at midnight for TimerXDuration time. Then is activated again after period chosen for TimerX Repeat parameter. This cycle will be repeated with the same period.

Example:

For instance when Timer1 Repeat = 6 hours and Timer1Duration = 180 minutes then Timer1 Function is activated periodically every 6 hours starting at midnight and running every time for 180 minutes (3 hours). So Timer is active from midnight to 3 am, then from 6 am to 9 am, then from noon to 3 pm, then from 6 pm to 9 pm and then the whole cycle starts again at midnight.

Hint:

There is an exception in case that TimerXDuration is higher then TimerX Repeat. In this case Timer is started again in next full cycle. For instance when you set Timer2 Repeat = 2 hours and Timer2Duration = 180 minutes Timer2 will be activated at midnight for 3 hours and then again at 4 am again for 3 hours, then next cycles would follow.

Timer1..3 ON Time

Day time when Timer output activates.

Timer1..3Duration

Specify length of Timer activation.

Step: 1 min

Range: 1 – 1440 s

Sensors Spec

AI1,AI2,AI3Calibration [..]

Calibrating constant to adjust the measured value of IL analog inputs. Physical dimension of calibrating constant is corresponding to Analog input.

Step: 1

Range: -1000 – +1000

Hint:

Calibration constants have to be adjusted when measured value is near the alarm level
User curves can be defined by LiteEdit software.

Extension I/O

IOM AI1..4 Wrn []

The warning level for IOM ANALOG INPUT 1..4 alarm detection.

Step: 1

Range: -100 – +10000

IOM AI1..4 Sd []

The shutdown level for IOM ANALOG INPUT 1..4 alarm detection.

Step: 1

Range: -100 – +10000

IOM AI1..4 Del [s]

Delay for IOM ANALOG INPUT 1..4 alarm.

Step: 1 s

Range: 0 – 900 s

Hint:

IG-IOM/IGS-PTM analog inputs protection alarms can be configured following way.

Configuration	Protection
Under	Protection is activated only when measured value is under measured level.
Over	Protection is activated only when measured value is over measured level.
Under+fls	Level 2 protection is activated by Sensor Fail as well.
Over+fls	Level 2 protection is activated by Sensor Fail as well.

IOM AI1..4 Calibr [...]

Calibrating constant to adjust the measured value of IOM/PTM analog inputs. Physical dimension of calibrating constant is corresponding to Analog input.

Step: 1
Range: -1000 – +1000

SMS/E-Mail

Remote alarm messaging

If a GSM modem and/or Internet bridge is connected to the controller, the controller can send SMS messages and/or emails in the moment when a new alarm appears in the Alarm list. The message will contain a copy of the Alarm list.

To enable this function, you should select with setpoints Yel Alarm Msg, Red Alarm Msg or Event Msg, which levels of alarms shall be announced (red/yellow/both) and also enter valid GSM phone number and/or e-mail address to the setpoints TelNo/Addr Ch1-2 and TelNo/Addr Ch3-4. It is possible to put either a GSM* number or e-mail* to both setpoints.

There is also possibility to control the unit (e.g. read and/or write setpoints, send commands, etc.) using sms messages. For more details about this function see [SMS Message Control](#) and **SMS/Email:** [Report Period](#) setpoint description.

*The list of all supported terminals shows the table below:

Terminal	Active alarm sms	Active event sms	Active alarm email	Active event email
IB-Lite	N/A	N/A	YES	YES
IB-NT	N/A	N/A	YES/Ethernet	YES/Ethernet
IL-NT-GPRS	YES	YES	Not supported	Not supported

NOTE:

An internet module must be available for sending of e-mails. Similarly, a GSM modem is necessary for sending of SMS.

Hint:

Controller will display ActiveCallFailxCH after 100s after last attempt.

Yel Alarm Msg [DISABLED / ENABLED]

Set this setpoint to YES if you want to get messages when a **yellow** (warning) alarm occurs.

Hint

The target address (GSM phone number or e-mail address) must be set correctly to the setpoint(s) TelNo/Addr Ch1-4

Red Alarm Msg [DISABLED / ENABLED]

Set this setpoint to YES if you want to get messages when a **red** (shutdown) alarm occurs.

Hint

The target address (GSM phone number or e-mail address) must be set correctly to the setpoint(s)
TelNo/Addr Ch1-4

Event Msg [ON/OFF]

Set this setpoint to ON if you want to get messages when a new event occur .

TelNo/Addr Ch 1,2,3,4

Enter either a valid GSM phone number or e-mail address to this setpoint, where the alarm messages shall be sent. Type of active call is considered from the value of this parameter. If it consist „@“ it is supposed to be e-mail address and active e-mail is sent. If the value is number, without „@“, it is supposed to be the telephone number and active SMS is sent.

Hint:

For GSM numbers use either national format (i.e. like number you will dial if you want to make a local call) or full international format with "+" character followed by international prefix in the begin. Communication channels have to be used in order 1,2,3,4. It is not recommended to leave channels 1,2 blank and and use only 3,4.

Phone numbers can be modified from controller display, but in case of email address this setpoint can be modified from PC only!

Following buttons are used for phone number modification

- **ENTER** for - opening the modification
- confirmation of particular number change and jump to the next position
- confirmation of the last number and closing of the modification
- **↑** and **↓** for - particular number change

Particular numbers can take values: from "0" to "9", "+" symbol and empty space.

Report Period [h]

Automatic periodical SMS report sending period. The period is always counted from 2 AM. When set to 0 the automatic sending is disabled. When analog inputs' values are out of the range their values are not represented by "#####" as in LiteEdit or on controller display, but by value -32768. In case the message is not send following alarm and history record appears SmsRprtCH1Fail or SmsRprtCH2Fail.

Step: 1 h

Range: 0 – 1000 h

Periodical report includes following data:

Value	Communication object number
Fuel level	8229
Run Hours	8206
Engine Temp	8228
Bat voltage	8213
Oil Pressure	8227
Engine state*	8330
Breaker state**	8455
Gen V L1-N	8192
Gen V L2-N	8193
Gen V L3-N	8194
Gen Freq	8210
Gen PF	8204
Mains V L1-N	8195
Mains V L2-N	8196
Mains V L3-N	8197
Mains freq	8211

* Engine machine state

** Electric machine state

The format of the message is as follows:

#<Gen-set name>: <Fuel level>,<Run Hours>,<Engine Temp>,<Bat voltage>,<Oil Pressure>,<Engine state>,<Breaker state>,<Gen V L1-N>,<Gen V L2-N>,<Gen V L3-N>,<Gen Freq>,<Gen PF>,<Mains V L1-N>,<Mains V L2-N>,<Mains V L3-N>,<Mains freq>

For more details about this function see [SMS Message Control](#).

Man Operations

This group doesn't contain typical setpoints. The two items in this group are commands.

EF Prot Test

This command is normally in OFF state. When you set this command to ON state Earth Fault protection test is performed and command state is automatically returned to OFF state.

This test can be performed anytime (even in OFF mode), when Emergency Man mode is not active. When the test is performed *Earth Fault Sd* protection, [BREAKER TRIP](#) output and *Wrn EF Prot Test* alarm message are activated and stay active unless **FAULT RESET** is pressed.

Hint:

When Sd Override is active and *EF Prot Test* is set to ON, Sd Earth Fault is recorded into the history file and appears on controller display, but gen-set remains running and Breaker Trip output is NOT activated. If you deactivate Sd Override before Sd Earth Fault is acknowledged by pressing **FAULT RESET**, then gen-set is immediately stopped and Breaker Trip output is activated.

For more details about Sd Override see [Sd Override](#) description.

EF Prot Test command may be also executed using controller buttons combination (see more in chapter [Earth Fault Protection Test](#)) or by binary input [EF PROT TEST](#).

RestoreDefault

This command works the same way as the previous one. Normally is in OFF state. When you want to execute this command you have to change its value from OFF state either to SET1 or to SET2. There are two sets of default parameters. Once you choose one SET controller setpoints are restored to respective default setting and command state is automatically returned to OFF state.

Most of the setpoints are restored to default, but not all of them. There are following exceptions.

- GenSet name
- ControllerMode
- ControllerAddress
- COM1 mode
- COM2 mode
- ModemIniString
- ModbusComSpeed
- Maintenance
- SummerTimeMode
- Time
- Date

Hint:

These are the same setpoints which are not overwritten during configuration download.

In this particular cases it doesn't make sense to change the setpoints because of following reasons. GenSet name should be unique name, ControllerMode should stay the same to avoid any unwanted action, communication setting is usually changed according to the particular application and returning to the default setting would mostly cause lost of communication, time and date are usually up-to-date and it would set it out-of-date, Maintenance setpoint shouldn't be obviously changed at all and even if it should be judged seriously and changed separately and not as a part of restore to default command.

Alternate Cfg

Config Switch [MANUAL/AutDetect/BinSelect]

Configuration detection switch. Value of this setpoint cannot be changed when gen-set is running (since prestart period), setpoint adjustment is taken into account only when gen-set is stopped.

- MANUAL: Nominal values of the gen-set are defined by setpoints in [Basic Settings](#) group
- AutDetect: Nominal values of the gen-set are chosen from [Alternate Cfg](#) group during gen-set starting procedure. Autodetection process is described below.
- BinSelect:** Nominal values of the gen-set are chosen based on [AltCfgSwitch](#) binary inputs combination.

Autodetection process of configuration within Alternate Cfg group

There are three groups of nominal values. The valid nominal values configuration is evaluated during gen-set starting procedure (just after MinStabTO elapses) in case *Config Switch* parameter is set to AutDetect.

1) First detection of connection type is made. There are 3 possible groups: a) Mono Ph, b) Split Ph or c) 3Ph4Wire / 3Ph3Wire. Every phase with Gen V < 40V is taken as phase without voltage. When there is no suitable connection type found (within 3 Alternate Cfg groups) then autodetection fail is announced (GAutDtcFail / MAutDetecFail). In case suitable Connection Type is found autodetection process proceeds to the 2nd step.

2) Detection of nominal voltage. When the measured voltage is within +/- 10V of the nominal voltage of respective group (where suitable Connection Type was found) then this configuration group is considered as the valid configuration group and all the nominal values from this group are taken as valid nominal values (and these values are then copied to the Basic Settings group). When there is more groups which fit to this criteria then the one with the lowest ordinal number is chosen.

Autodetection procedure:

A) Detection is first made on Mains side. Once the detection is finished either one configuration is chosen (then one of the following messages *AlterCfg 1 Act*, *AlterCfg 2 Act* or *AlterCfg 3 Act* is written to the history and [CONFIGURATION](#) 1, 2 or 3 output is activated) or there is a Mains autodetection fail (MAutDetecFail).

B) Then in case MAN mode is active the controller is waiting for manual request for the gen-set start and in the meantime is periodically checking Mains status. In case the controller is in AUT mode gen-set start request is automatically issued.

C) Once the gen-set is started (regardless if in MAN or AUT mode) autodetection on gen-set side is started. Autodetection on gen-set side is made during every gen-set start regardless previous (successful or unsuccessful) autodetection made on Mains side.

Mains status is periodically checked and controller tries to make detection on Mains side all the time unless the detection on gen-set side is successfully finished.

D) Once the detection on gen-set side is finished either one configuration is chosen (*AlterCfg 1 Act*, *AlterCfg 2 Act* or *AlterCfg 3 Act* written to the history and Configuration 1, 2 or 3 output is activated) or there is a gen-set autodetection fail (Sd GAutDtcFail) and gen-set is shutted down.

Once the autodetection procedure is successfully finished values from chosen configuration group in Alternate Cfg group are written to the Basic Settings group. The nominal values can be changed then either from Alternate Cfg group (within the chosen group) or from Basic Settings group. When you change the values either in Alternate Cfg chosen group or in Basic Settings the setpoints' values are automatically changed in both groups simultaneously (till new gen-set start request when new evaluation is started).

Once the autodection is successful on gen-set side the chosen configuration is taken as valid configuration for the Mains side till next gen-set start (when new evaluation is performed) or till the controller is switched off. In case you need to make new autodection on Mains side you have to switch off and switch on the controller.

(Mains status is checked as well till the detection either on Mains side or gen-set side is successfully finished).

NominalPower1..3 [kW]

Three possible settings of generator nominal power

Step: 1kW
Range: 1 – 5000 kW

Nomin Current1..3 [A]

Three different configurations of generator nominal current

Step: 1 A
Range: 1 – 10000 A

NomVoltsPh-N 1..3 [V]

Three different configurations of generator nominal voltage (phase to neutral)

Step: 1V
Range: 80 – 20000 V

NomVoltsPh-Ph1..3 [V]

Three different configurations of generator nominal voltage (phase to phase)

Step: 1V
Range: 138 – 35000 V

Hint:

There is a given ratio between *NomVolts Ph-N* and *NomVolts Ph-Ph*, based on *ConnectionType* setting. Once you change either *NomVolts Ph-N* or *NomVolts Ph-Ph* value, the other value is automatically recalculated. When you change *ConnectionType* setpoint new *NomVolts Ph-Ph* value is calculated based on *NomVolts Ph-N* which stays still during switchover between different connection types.

Connect Type 1..3 [3Ph4Wire / 3Ph3Wire / Split Ph / Mono Ph]

Three different configurations of generator nominal voltage (phase to phase)

3Ph4Wire: STAR Connection, 3 phases and neutral - 4 wires,
Three phase “wye” measurement – 3PY
3Ph3Wire: DELTA Connection, 3 Phase without neutral - 3 Wires,
Three phase “delta” measurement – 3PD
Split Phase: DOUBLE DELTA Connection, Split Phase,
Single-phase measurement – 1PH
Mono Phase: MONOPHASE,
Single-phase measurement – 1PH

Hint:

For more details about connection types see [Voltage measurement and generator connection types](#).

Service Timers

ServiceBasicH [h]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. Alarm can be acknowledged from

controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset. Counter is active only, when the genset is running.

Step: 1h
Range: 0 –9999h

ServBasicDay [day]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Step: 24h
Range: 0 –9999day

ServiceLvl2-8H [h]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Counter is active only, when the genset is running.

Step: 1h
Range: 0 –9999h

ServLvl2-8Day [day]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Step: 24h
Range: 0 –9999day

ServLvlIOVH1H [h]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Counter is active only, when the genset is running.

Step: 1h
Range: 0 –9999h

ServLvlIOVH1Day [day]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Step: 24h
Range: 0 –9999day

ServLvIOVH2H [h]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Counter is active only, when the genset is running.

Step: 1h
Range: 0 –9999h

ServLvIOVH2Day [day]

It counts down when engine running. If reaches zero, an alarm appears. When the value 9999 is set, than the maintenance function is disabled and counter does not count. . Alarm can be acknowledged from controller front face panel or using Direct connection between controller and LiteEdit by double pressing Fault Reset.

Step: 24h
Range: 0 –9999day

Hint:

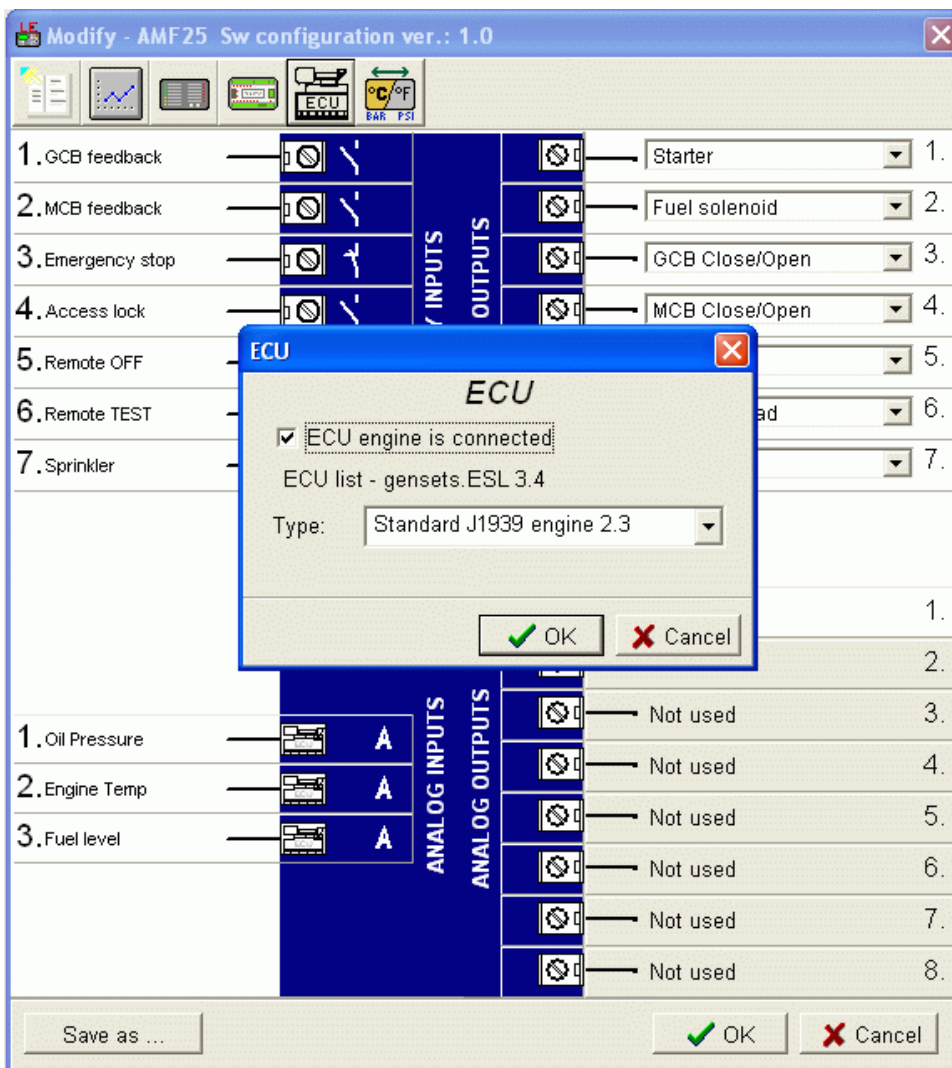
Alarm list can display only 16 alarms, if all Service timers are flagging at the same time some of them won't be display in the alarm list.

ECU-controlled engine support

There exists only one firmware branch for both standard and electronic controlled (monitored) engines.

Presence of the ECU on the CAN bus/RS232 is configured via LiteEdit like other peripherals (IG-IOM, IGL-RA15). Pressing the ECU button in Configuration window of LiteEdit opens ECU dialog window where the appropriate engine/ECU type should be selected. The actual list of ECU types is available on ComAp website in "ECU list - x.y.iwe" package. Download this package and import it into LiteEdit in the same way as standard firmware IWE package.

More information about ECU list packages, configuration and wiring recommendations can be found in *Comap Electronic Engines Support* manual.



If the connected engine is Cummins with GCS engine control unit communicating via Modbus it is necessary to set the setpoint **Basic settings:COM1 Mode = ECU LINK** or **COM2 Mode = ECU LINK**.

Loss of communication causes a warning alarm. On the contrary the ECU can be switched off at quiescent engine that means not-communicating ECU is in that moment normal situation. All values from ECU shall show ####, but no alarm is displayed. The output *ECU Comm OK* follows the real situation which means it is not active anytime when the ECU does not communicate.

The output *ECU PowerRelay* closes at the beginning of prestart and opens if the engine shall be stopped. It can be used to switch the ECU on and off. If the output is configured but not active the ECU communication alarm is blocked.

The engine is started via standard contact output or via CAN bus depending on ECU capabilities.

Identifying configured ECU

It is possible to identify what ECU is currently configured in IL-NT (FW version ≥ 2.0) controller on init screens. Navigate to default screen with gauge and press buttons **PAGE** and **ENTER** at the same time. Then press **PAGE** button to skip init screen (in case it is configured – by default not configured), then you will find info screen with name of the controller, SW version and also value "ESF:xx.y - (zzz)", where xx.y = ESF version number, zzz= Motor ID.

Explanation of Motor ID is in table below:

Motor ID	ESF - Electronic Engine
1	Volvo EMSI Singlespeed / EMSII
3	Scania S6 Singlespeed
4	Cummins CM570
5	Cummins MODBUS
7	John Deere
8	Deutz EMR2
9	DDC DDEC IV/V
10	Caterpillar J1939
12	Perkins ECM
14	Iveco NEF&Cursor
16	Scania S6 Singlespeed from ver.1794335
18	SISU EEM3 Gen-set
20	MTU ADEC J1939
25	Deutz EMR3
26	Cummins CM850
28	Iveco Vector
29	MAN MFR
31	VM Marine
32	VM Industrial
35	GM SECM
36	ISUZU ECM
44	E-control ECU
255	Standard J1939 engine

Values read from ECU

There is fixed set of values read from J1939 ECU by IL-NT controller:

- Engine speed (frame EEC1)
- Engine oil pressure (frame Engine Fluid Level/Pressure)
- Engine coolant temperature (frame Engine Temperature)
- Total engine hours (frame Engine Hours, Revolutions)
- Fuel rate (frame Fuel Economy)
- Boost pressure (frame Inlet/Exhaust Conditions)
- Intake manifold 1 temperature (frame Inlet/Exhaust Conditions)
- Engine oil temperature 1 (frame Engine Temperature 1)

When "ECU LINK"-Modbus option is selected, following values are read from Modbus Register Data (for QSK15, QSK45, QSK60):

- Engine Speed (Register Address:30001)
- Oil Pressure (Register Address:30003)
- Coolant Temperature (Register Address:30002)
- Engine Running Time (Register Address:30008-30009)
- Fuel Consumption Rate (Register Address:30018)
- Intake Manifold Absolute Pressure (Register Address:30530 (QSK45, QSK60 only))
- Intake Manifold Temperature (Register Address:30531 (QSK45, QSK60 only))

Hint:

Values read from ECU are not written to history besides the fault codes.

Diagnostic messages read from ECU

Diagnostic messages are read and displayed in extra ECU Alarm list. For Standard J1939 SPN (Suspect Parameter Number), FMI (Failure Mode Identifier) and OC (Occurrence Counter) are shown together with text description if available.

One SPN (Suspect Parameter Number) / FMI (Failure Mode Identify) couple describes one fail information. If FMI is equal to 0 or 1, WRN is displayed in the ECU Alarm list. For any other FMI values, FLS is displayed. Detail SPN/FMI code specification see in:

- SAE Truck and Bus Control and Communications Network Standards Manual, SAE HS-1939 Publication
- Or refer to corresponding engine manufacturer's ECU error codes list.

Complete list of text diagnostic messages for each ECU can be found in *Comap Electronic Engines Support manual*.

Hint:

IL-NT controller doesn't support J1587 diagnostic line on Volvo engines. This can cause in some cases a J1939 alarm message FC:000608 due to missing J1587 bus. Contact your Volvo distributor to update ECU firmware.

For Scania engines the fault codes are displayed in hexadecimal format.

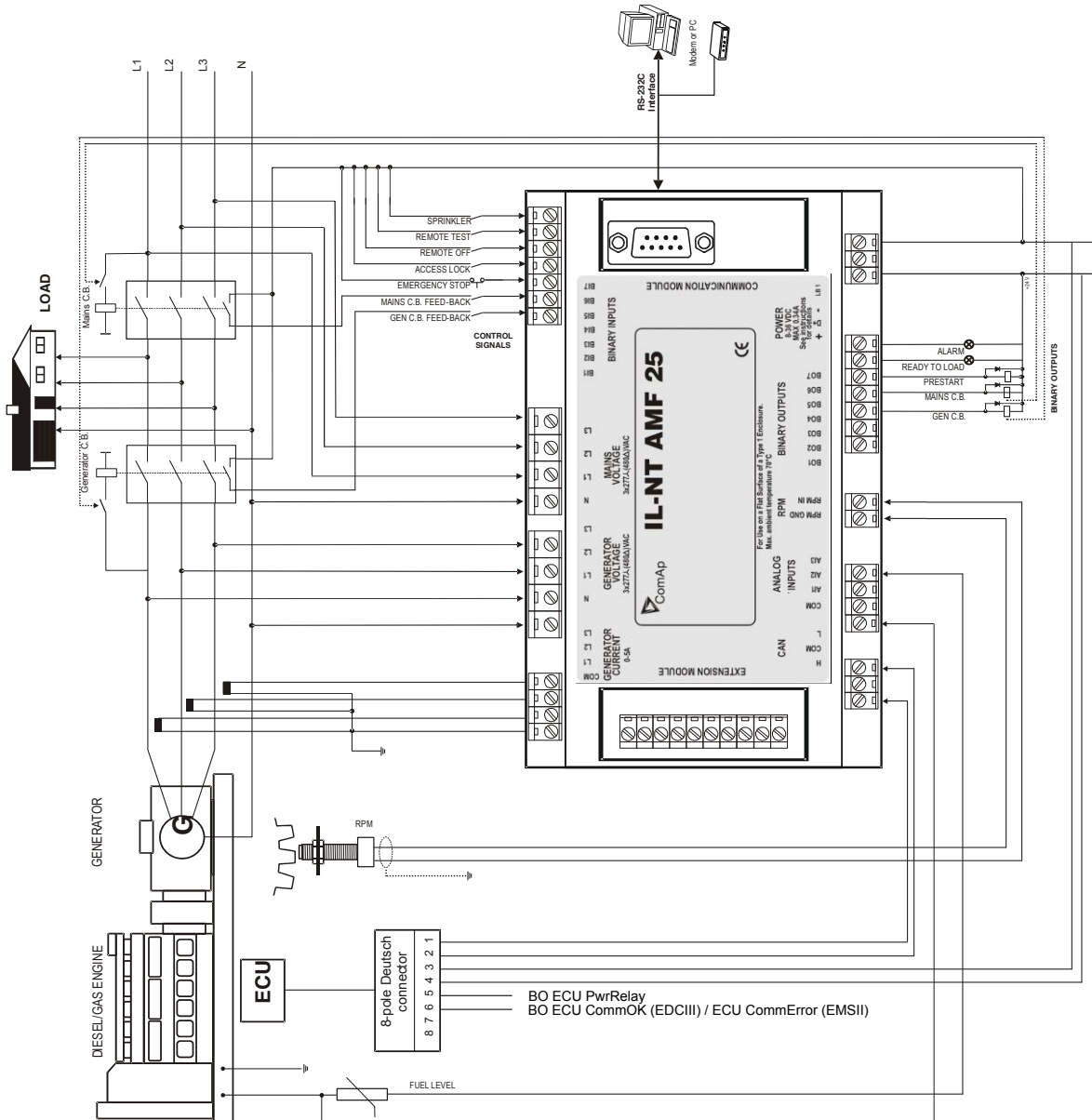
Analog inputs

Reading of mentioned values from ECU enables to use analog inputs of the unit for other purposes, e.g. measuring, displaying and alarm activation related to various quantities. The configuration thus allows to use three analog inputs on the central unit and four analog inputs on IG-IOM/IGS-PTM module if connected.

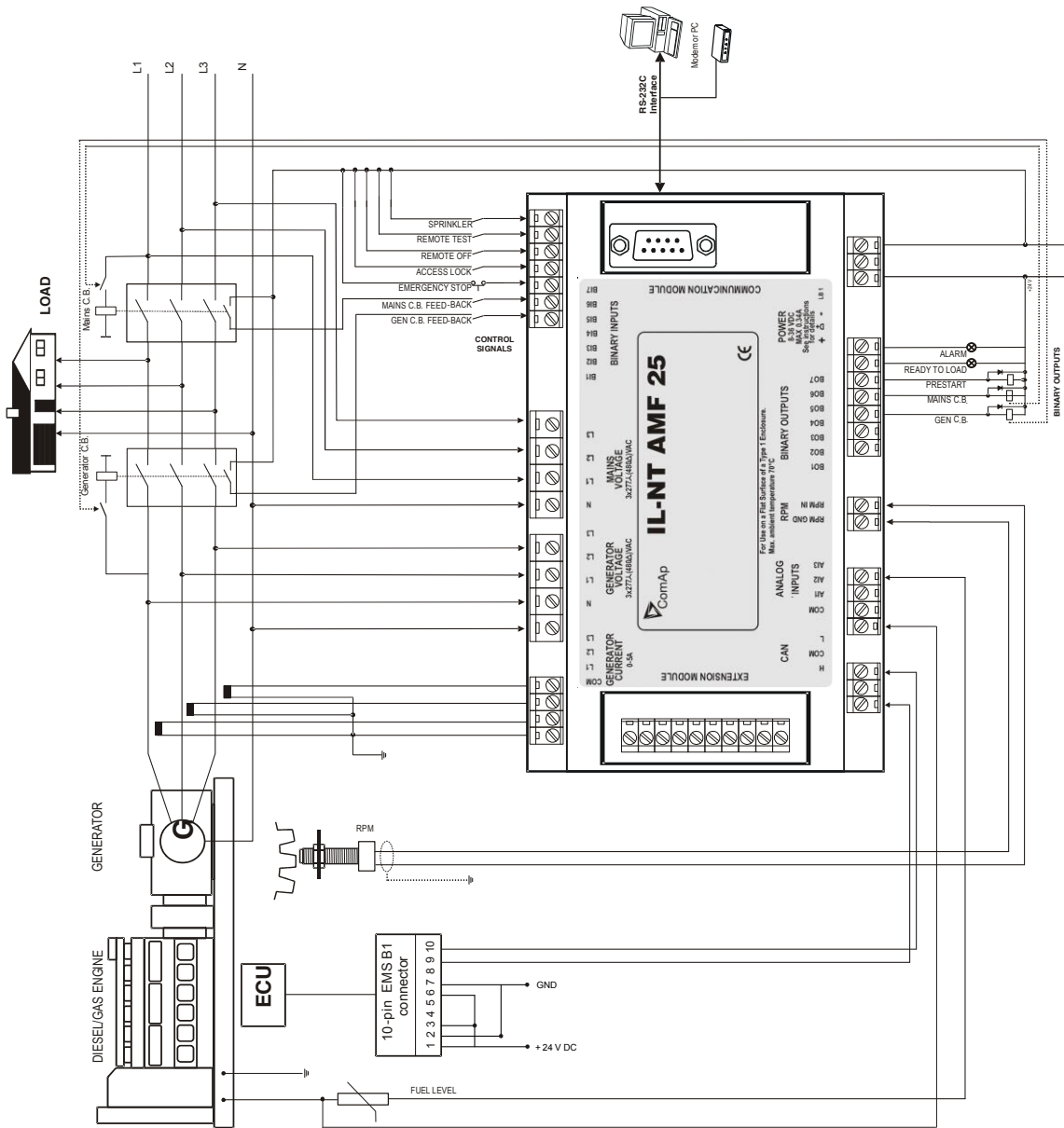
Connection description

The following diagrams show how to connect the engine control unit to the IL-NT controller:

Engines with J1939 support started via CAN bus VOLVO PENTA engines (EMS II, EDC III units)



SCANIA S6



Cummins engines with MODBUS communication

IL-NT set up:

Basic settings: *COM1 Mode* = ECU LINK or *COM2 Mode* = ECU LINK

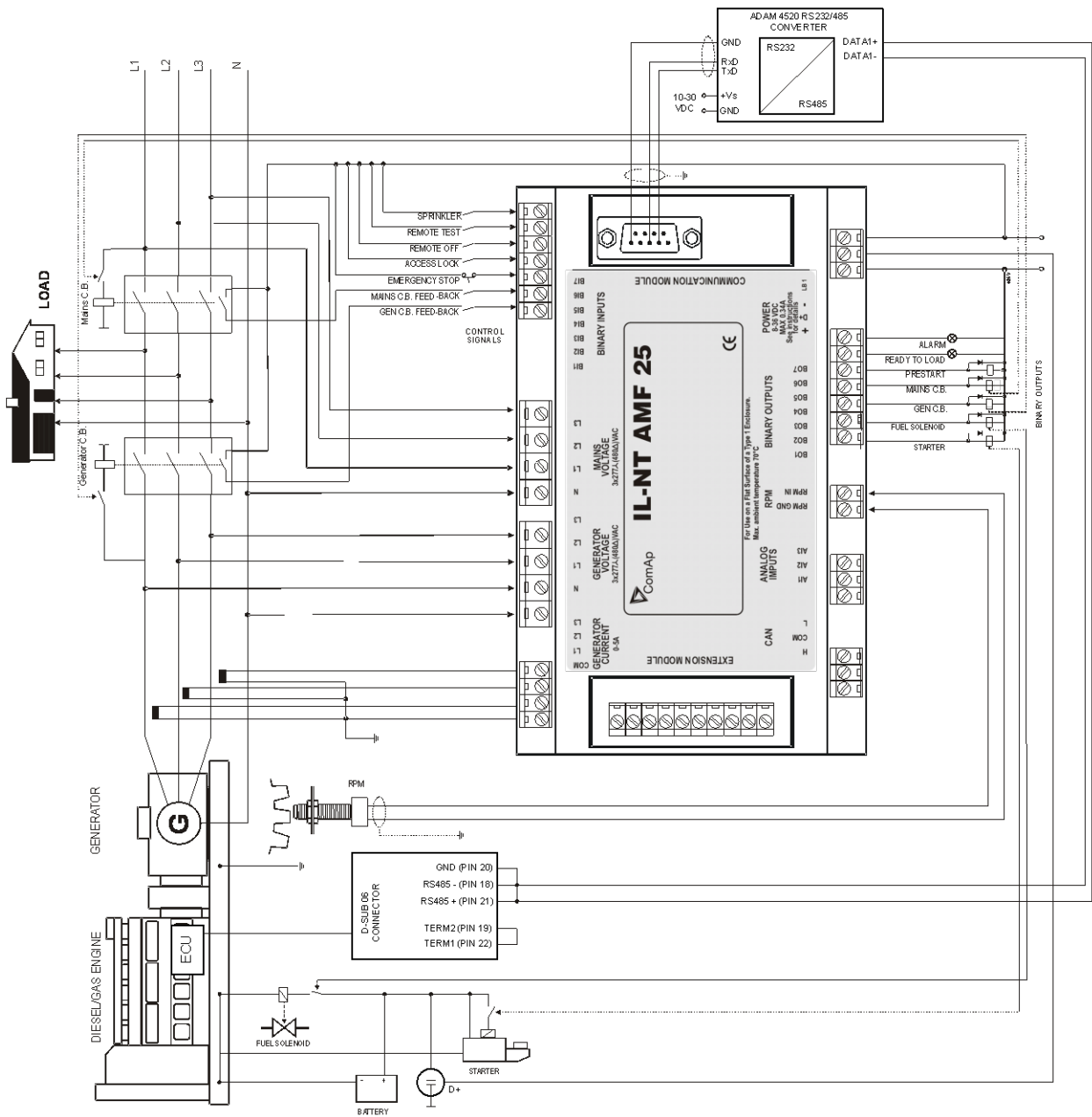
Software configuration: ECU → ECU engine is connected → Type: Cummins MODBUS

RS232/RS485 converter (see following diagram) set up:

Data format settings (SW1) 11 bits (1 start bit, 8 data bits, 2 stop bits)

Baud rate settings (SW2) 9600 bps

(more info available on http://www.advantech.com/products/Model_Detail.asp?model_id=1-D6FLH)



Support of communication with MTU ADEC without SAM

Values read from ADEC:

Value in controller	CAN ID	MUX
RPM	1000	1
Cool Temp ECU	1005	0
IntakeTemp ECU	1005	5
Oil Press ECU	1001	0
BoostPress ECU	1001	23
Oil Temp ECU	-	-
Fuel Rate ECU	1004	18
Run Hours	1004	14
ECU YellowLamp	1000	9
ECU RedLamp	1000	13
Actual Failure Codes*	1002	24

* for list of fault codes see:

ECU list – Pramac-1.0 new features list

Values written to ADEC:

Value in controller	CAN ID	MUX
ECU SpeedAdj setpoint	1019	0
Starter	1019	21
Stop solenoid	1019	7
Fault reset	1019	8
Nominal Freq (50 / 60)	1019	24
Sd Override	1019	3

- Yellow and Red Lamp behaviour

Yellow lamp is indicated in controller alarm list as “ECU YellowLamp”. Red lamp is indicated in controller alarm list as “ECU RedLamp” and it causes activation of shutdown protection. So if the ECU stops the engine and activates red lamp, the controller only shows red lamp alarm but doesn’t show undervoltage and underspeed alarms.

- Control signals for MTU ADEC with SAM over CAN

Signal	PGN	SPN	Source value
Override	FEF1	1237	Sd Override input
Alarm Reset	FF2D		Fault reset
50/60Hz	FF2D		setpoint Nominal Freq
Start	FF2D		Starter
Stop	F001		Stop pulse
Speed demand	0080	898	ECU SpeedAdj setpoint

- Running hours reading from ECU

The controller doesn’t display invalid values (if the ECU is sending non-valid running hours then the controller switches to it’s own hours measurement).

- Phone number modification – TelNo/Addr Ch1/2/3/4 setpoints

Phone number modification is completed when two space symbols one after another are inserted and the second space is confirmed by pressing **ENTER** button.

MTU ADEC showed random ECU fault codes. ECU sent 8 bytes of data, but controller expected only 1 byte value. Due to this controller evaluated rest of data as fault codes. The new function has been added, now the random values are masked. DM1_serve_tdc function is called only if the length of the incoming data is sufficient.

Background of the sensor calibration

To correct measuring error of each analog input (pressure, temperature, level) calibrating constants within 10 % of measure range should be set. Two calibrating constants are set in physical units - bar, °C, % .Calibration is made by adding the value of setpoint *AlxCalibration* directly to the calculated value at analog input.

Hint:

The calibration must be done at the operational point of the analog input (e.g. 80°C, 4,0Bar etc..)

Default sensor curves

There are 20 resistive curves available. The following table provides information on minimum/maximum values of respective sensors. Actual values especially of temperature curves may differ. Meaning is to prolong curve to the lower temperature values, so the cold engine will not raise alarm fail sensor.

Curve	Min Value	Max Value	Unit
Datcon 5 Bar	0	5	Bar
Datcon 7 Bar	0	7	Bar
Datcon 10 Bar	0	10	Bar
Datcon 80 Psi	0	80	Psi
Datcon 100 Psi	0	100	Psi
Datcon 150 Psi	0	150	Psi
Datcon Low °C	25	150	°C
Datcon High °C	25	160	°C
Datcon Low °F	80	300	°F
Datcon High °F	80	320	°F
Datcon Fuel %	0	100	%
VDO 5 Bar	0	5	Bar
VDO 10 Bar	0	10	Bar
VDO 72 Psi	0	72	Psi
VDO 145 Psi	0	145	Psi
VDO 40-120 °C	40	120	°C
VDO 50-150 °C	50	150	°C
VDO 100-250 °F	100	250	°F
VDO 120-300°F	120	300	°F
VDO Fuel %	0	100	%

Hint:

When measured value is 6% out of range the Sensor Fail FLS is detected. You can find detailed information on sensores in LiteEdit Reference Guide.

Function Description

OFF Mode

No start of the gen-set is possible. Outputs STARTER, GCB CLOSE/OPEN and FUEL SOLENOID are not energized.

No reaction if buttons **START**, **STOP**, **GCB ON/OFF**, **MCB ON/OFF** are pressed.

When power-cut comes, MCB CLOSE/OPEN opens. After mains returns, MCB CLOSE/OPEN closes with *MCB close del.*

MAN Mode

START - starts the gen-set.

GCB ON/OFF

- The controller closes GCB to dead bus.
- The controller opens GCB when closed.
- If the generator voltage is out of the limits, the controller does not respond to the **GCB ON/OFF**

MCB ON/OFF

- The controller closes MCB to dead bus.
- The controller opens MCB when closed.

STOP stops the gen-set.

Hint:

The engine can run without load unlimited time.

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

The controller does not start the gen-set when power cut comes.

!! The controller provides interlock between GCB and MCB, it means it is never possible to close both CB together

Start-stop sequence (simplified)

MODE = MAN (Engine start/stop request is given by pressing buttons **START** and **STOP**)

MODE = AUT (Engine start/stop request is evaluated form Mains failure/return)

State	Condition of the transition	Action	Next state
Ready	Start request	PRESTART on <i>Prestart Time</i> counter started	<i>Prestart</i>
	RPM > 2 or Oil pressure detected or Gen voltage > 10V or D+ active		<i>Stop (Stop fail)</i>
	OFF Mode selected or Shut down alarm active		<i>Not Ready</i>
Not Ready	RPM < 2, Oil pressure not detected, Vgen < 10V, D+ not Active no shutdown alarm active, other than OFF Mode selected		<i>Ready</i>
Prestart ³	<i>Prestart time elapsed</i>	<i>STARTER on</i>	<i>Cranking</i>

State	Condition of the transition	Action	Next state
		FUEL SOLENOID on ⁴ MaxCrank Time counter started	
Cranking ³	RPM > Starting RPM	STARTER off PRESTART off	Starting
	D+ input activated or oil pressure detected or Gen voltage > 25% Vgnom or D+ active for 1s	STARTER off PRESTART off	Cranking
	MaxCrank Time elapsed, 1st attempt	STARTER off FUEL SOLENOID off STOP SOLENOID on CrankFail Pause timer started	Crank pause
	MaxCrank Time elapsed, last attempt	STARTER off PRESTART off	Shutdown (Start fail)
Crank pause ³	CrankFail Pause elapsed	STARTER on FUEL SOLENOID on ⁴ STOP SOLENOID off MaxCrank Time counter started	Cranking
Starting ³	80% Nominal RPM reached	READY TO LOAD on ¹ Min, Max Stab Time counter started	Running
	RPM = 0 or any other shutdown condition	FUEL SOLENOID off STOP SOLENOID on	Shutdown
	60 sec. Elapsed	FUEL SOLENOID off STOP SOLENOID on	Shutdown (Start fail)
Running	Stop request	READY TO LOAD off Cooling Time timer started	Cooling
	RPM = 0 or any other shutdown condition	READY TO LOAD off ² FUEL SOLENOID off	Shutdown
	GCB CLOSE/OPEN closed		Loaded
Loaded	GCB CLOSE/OPEN opened		Running
	RPM = 0 or any other shutdown condition	FUEL SOLENOID off STOP SOLENOID on READY TO LOAD off	Shutdown
Cooling	Cooling Time elapsed	FUEL SOLENOID off STOP SOLENOID on	Stop
	RPM = 0 or any other shutdown condition	FUEL SOLENOID off STOP SOLENOID on	Shutdown
	Start request	READY TO LOAD on ¹	Running
Stop	RPM = 0, Oil pressure not detected, Vgen < 10V, D+ not active		Ready
	60 sec. Elapsed		Stop (Stop fail)

¹ if all generator parameters OK and Min Stab Time elapsed, indicates that GCB is possible to close. In AUTO Mode closes in this moment GCB automatically.

² If GCB output used GCB opens automatically

³ The start-up sequence can be interrupted in any time by coming stop request

⁴ Fuel solenoid is switched on with time advance of 1s fixed before starter motor is switched on.

Hint:

Threshold level for D+ input is 80% supply voltage, activation delay is 1s (to override short firings during cranking – for example in cold conditions).

AUT Mode

The controller does not respond to buttons **START**, **STOP**, **MCB ON/OFF**, **GCB ON/OFF**. Engine start/stop request is evaluated from Mains failure/return.

AMF sequence (simplified)

State	Condition of the transition	Action	Next state
Mains operation	Mains failed ¹ or MCB feedback dropout <i>MCB Opens On</i> = MAINSFAIL	MCB CLOSE/OPEN off <i>EmergStart Del</i> timer started	Mains failure
	Mains failed ¹ or MCB feedback dropout <i>MCB Opens On</i> = GENRUN	<i>EmergStart Del</i> timer started	Mains failure
Mains failure	Mains voltage and frequency OK <i>MCB Opens On</i> = MAINSFAIL	After elapsing <i>MCB Close Del</i> MCB CLOSE/OPEN on	Mains operation
	Mains voltage and frequency OK <i>MCB Opens On</i> = GENRUN	None	Mains operation
	<i>EmergStart Del</i> elapsed <i>MCB Opens On</i> = MAINSFAIL	Engine start sequence performed, then GCB CLOSE/OPEN on ²	Island operation
	<i>EmergStart Del</i> elapsed <i>MCB Opens On</i> = GENRUN	Engine start sequence performed, then MCB CLOSE/OPEN off, time delay <i>Transfer Del</i> performed and GCB CLOSE/OPEN on ²	Island operation
Island operation	Mains voltage and frequency OK	<i>MainsReturnDel</i> timer started	Mains return
Mains return	Mains failed		Island operation
	<i>MainsReturnDel</i> elapsed	GCB CLOSE/OPEN off, then after <i>Transfer Del</i> MCB CLOSE/OPEN on and then engine stop sequence performed ³	Mains operation

¹ **Mains failed** means mains over/under -voltage, over/under -frequency, voltage assymetry (preset delay must elapse)

² If during start-up sequence mains returns, then MCB is reclosed with delay *MCB Close Del* (if opened, depending on *MCB Opens On* setpoint) and start-up sequence is interrupted.

³ If mains fails during stop procedure (cooling) again, stop sequence is interrupted, MCB opened and GCB closed with delay *Transfer Del*.

See also chapter **Circuit breakers timing**.

TEST mode

The setpoint *ReturnFromTEST* influences the behavior of TEST mode.

Caution: The gen-set starts automatically and is always running in TEST mode!

The setpoint *ReturnFromTEST* = MANUAL

While TEST mode is selected, gen-set starts and is running unloaded.

To load the gen-set

- a) Power cut comes or
- b) **MCB ON/OFF** is pressed

When power cut: MCB is opened, after *Transfer Del* elapses, GCB is closed.

When the mains recovers gen-set stays supplying island load. To transfer the load back to the healthy mains, switch the controller to AUT Mode.

Hint:

The controller does not respond to **GCB ON/OFF**, **STOP**, **START**

The load is automatically transferred back to the mains when any gen-set shut down protection activates.

Test on load

When binary input REM TEST ONLD is closed, the controller automatically (if TEST mode selected) transfers load from the mains to the gen-set. Setpoint *AutoMainsFail: ReturnFromTEST* must be set to MANUAL.

The setpoint *ReturnFromTEST* = AUTO

While TEST mode is selected, gen-set is running unloaded.

When power cut comes the controller opens MCB.

After *Return break* elapses, GCB is closed.

When the mains recovers:

- a) After *MainsReturn Del* the controller opens the GCB
- b) After *Transfer Del* delay MCB is closed.
- c) The engine stays running

To stop the gen-set select other mode than TEST

Hint:

The controller does not respond to **GCB ON/OFF**, **MCB ON/OFF**, **STOP**, **START** Circuit breakers timing

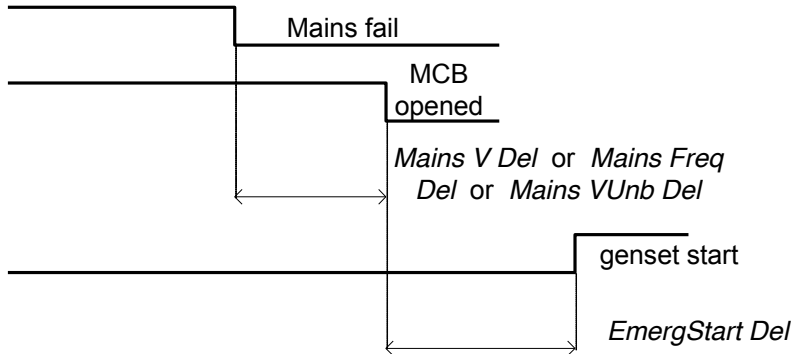
Relation between Mains fail and MCB and start of gen-set

MCB Opens On = MAINSFAIL:

Mains fail is detected as Mains <V, Mains >V, Mains V Unbal, Mains <Freq, Mains >Freq. After detection MCB is opened.

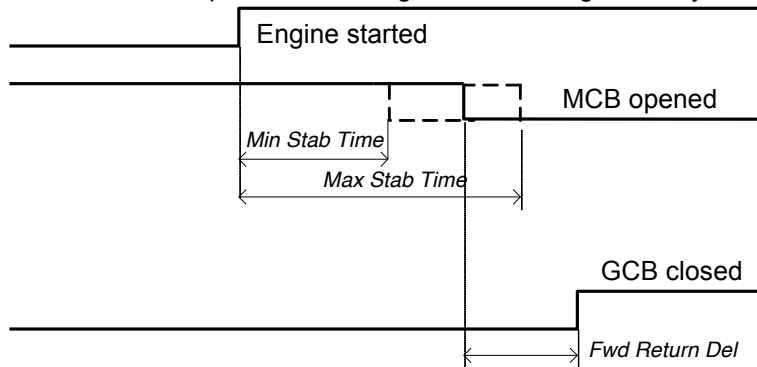
Hint

When MCB feedback drop-out and measured mains electrical limits (voltage, frequency) are still in limits, the controller switches MCB ON again.



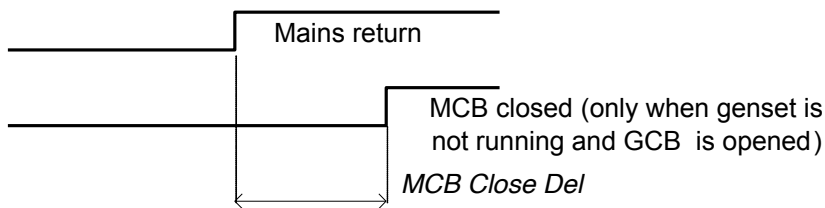
MCB Opens On = GENRUN:

The MCB is not opened till the engine starts and gets ready to take the load.



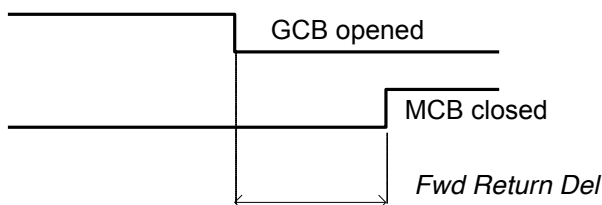
Relation between Mains return and MCB

OFF Mode, GCB and MCB are opened



Relation between GCB and MCB

Conditions: AUTO Mode, Mains =off, MCB = opened, GCB = closed, gen-set loaded.
Mains returns: GCB opens (according 3., *MainsReturnDel*), MCB closes (*Transfer Del*)



Relation between GCB and MCB (Test mode)

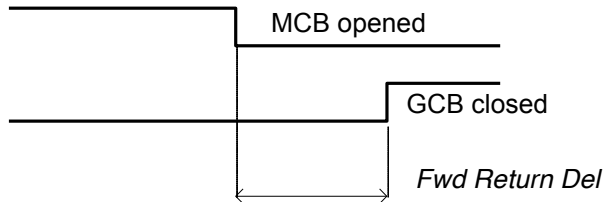
Situation 1: Mains =OK, MCB = closed, GCB = opened, RPM=0.

Change mode to TEST: gen-set starts, GCB = opened.

Mains cut: MCB opens (according 1.) , GCB closes (*Transfer Del*)

Situation 2: *ReturnFromTEST*=MANUAL, Mains =OK, MCB is closed, gen-set is running.

Press MCB on/off -> MCB opens, GCB closes (*Transfer Del*), gen-set is running loaded.



Alarm Management

Following alarms are available:

- Sensor Fail
- Warning
- Breaker open and cooling
- Shut down
- Mains failure

Sensor Fail (FLS)

Sensor Fail is detected when measured value is 6% out of selected sensor characteristic, or data from ECU is missing. Sensor Fail is indicated by ##### symbol instead measured value.

Warning (WRN)

When warning comes up, only alarm outputs and common warning output are closed.

Possible warnings:

See [List of possible events](#)

Breaker open and cooling (BOC)

When the BOC alarm comes up, IL-NT opens first output GCB CLOSE/OPEN (as well as binary output BREAKER TRIP is activated) to unload the gen-set and then after cooling time it also stops the gen-set. Alarm outputs and common shutdown output are activated. Active or not acknowledged protection disables gen-set start.

Possible BOC alarms:

See [List of possible events](#)

Shut down (SD)

When the shut-down alarm comes up, IL-NT opens outputs GCB CLOSE/OPEN, FUEL SOLENOID, STARTER and PRESTART to stop the engine immediately. Alarm outputs and common shutdown output are closed. Active or not reset protection disables start.

Possible shut-down alarms:

See [List of possible events](#)

Mains failure (MF)

Mains failure detection depends on **Auto mains failure** setpoints (levels and delays) adjusting. When the mains failure comes up, mains circuit breaker is opened.

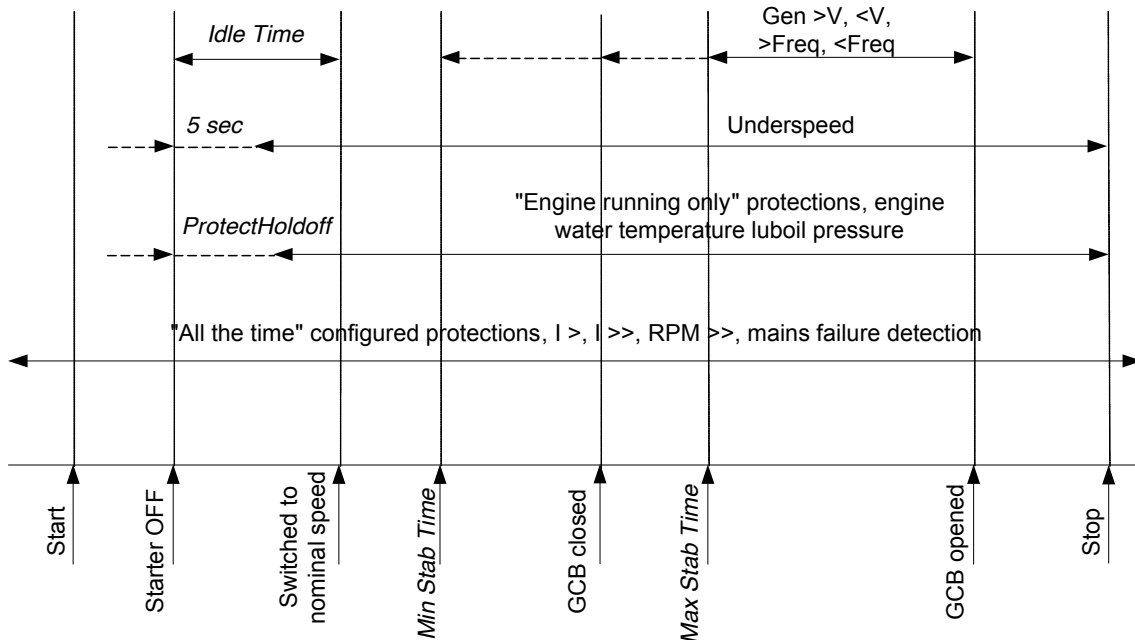
Possible mains failure reasons:

See [List of possible events](#)

Hint:

Mains failure is not written to alarm list!

Alarm time chart



Voltage phase sequence detection

IL-NT controller detects phase sequence on both generator and mains/bus voltage terminals. This protections are important after controller installation to avoid wrong voltage phases phase connection. Following alarms can be detected:

Wrong phase sequence

There is fix defined phase sequence in IL-NT controller L1, L2, L3. When the phases are connected in different order (e.g. L1,L3,L2 or L2,L1,L3) following alarms are detected:

Gen CCW Rot = wrong generator phase sequence

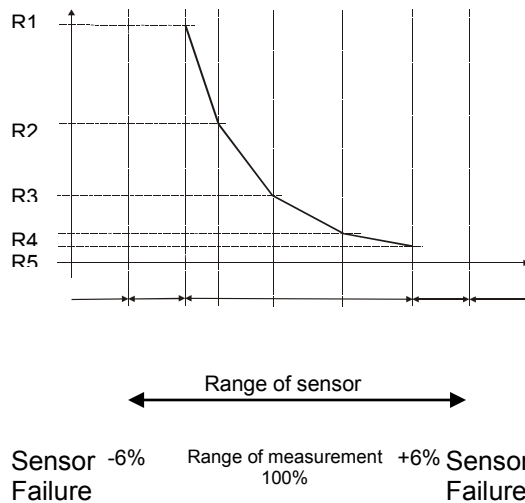
Mains CCW Rot = wrong mains phase sequence

Wrong Mains phase sequence detected. Voltage phases are not wired correctly. MCB closing is prohibited by controller.

Wrong Generator phase sequence detected. Voltage phases are not wired correctly. GCB closing is prohibited by controller.

Sensor Fail detection

Sensor Fail FIs is detected when measured value is 6 percent out of range. Controller screen displays in this case string ##### instead measured value.

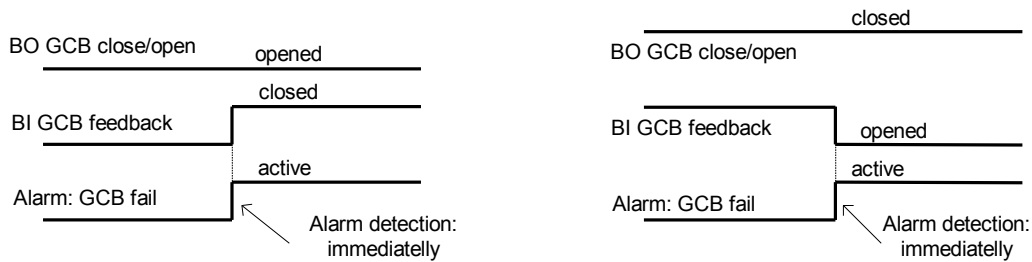


GCB, MCB fail detection

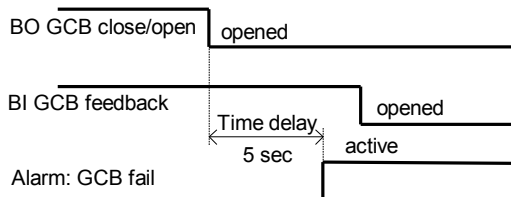
MCB and/or GCB fail detection is based on binary output CB CLOSE/OPEN comparing with binary input MCB and/or GCB FEEDBACK.

There are three different time delays for CB fail detection – see following diagrams.

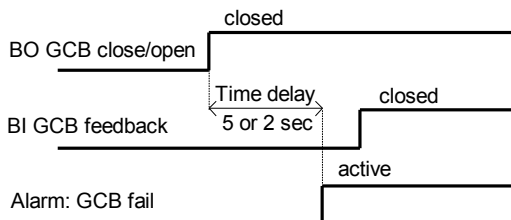
When is BO GCB close/open (MCB Close/Open) in steady state and GCB feedback (MCB feedback) is changed the GCB fail is detected immediately (no delay).



When BO GCB close/open (MCB Close/Open) opens there is 5 sec delay for GCB fail (MCB fail) detection.



When BO GCB close/open (MCB Close/Open) closes, there is 5sec delay for GCB fail (MCB fail) detection:



Hint:

You can solve state of MCB fail by pressing Fault Reset button.

Gen-set Operation States

Engine machine state

Init	Autotest during controller power on .
Not ready	Gen-set is not ready to start. For instance when shutdown alarm is active or unit is in OFF mode.
Prestart	Prestart sequence in process, Prestart output is closed. It could be also used for preheating or process executed prior gen-set start.
Cranking	Engine is cranking. Starter output is closed.
Pause	Pause between start attempts.
Starting	Starting speed is reached and the Idle timer is running.
Running	Gen-set is running at nominal speed.
Loaded	Gen-set is running at nominal speed and GCB OPEN/CLOSE is closed.
Stop	Stop. Automatic or manual stop command was issued, engine is stopping.
Shutdowns	Shut-down alarm activated.
Ready	Gen-set is ready to run.
Cooling	Gen-set is cooling before stop.
EmergMan	Emergency Manual gen-set operation. Used for bypass the controller and engine manual start.

Engine started” conditions

Engine speed (RPM) > Starting RPM or

AI: Oil press > Starting POil or

D+ terminal active (reached 80% of supply voltage) for minimum 1s or

Generator voltage > 25% of NomVolts Ph-N or NomVolts Ph-Ph (any phase)

HINT:

Any of these condition will disconnect starter of the engine, however for transition to next state RPM needs to be higher than Starting RPM.

Electric machine state

MainsOper	Mains is present
MainsFlt	Mains cut off – immediate state
MainsFlt	Mains cut off – takes EmergStart del
IslOper	Island operation
MainsRet	Mains recover
Brks Off	GCB, MCB opened
MinStabTO	Minimal Stabilization Timeout
MaxStabTO	Maximal Stabilization Timeout
Trans Del	Forward return break delay. Delay between GCB opening and MCB closing

List of possible events

Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
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Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
AI1 Wrn	WRN	YES	Value measured on analog input 1 is lower than <i>AI1 Wrn</i> setpoint.
AI1 Sd	SD	YES	Value measured on analog input 1 is lower than <i>AI1 Sd</i> setpoint.
AI2 Wrn	WRN	YES	Value measured on analog input 2 is greater than <i>AI2 Wrn</i> setpoint.
AI2 Sd	SD	YES	Value measured on analog input 2 is greater than <i>AI2 Sd</i> setpoint.
AI3 Wrn	WRN	YES	Value measured on analog input 3 is greater than <i>AI3 Wrn</i> setpoint.
AI3 Sd	SD	YES	Value measured on analog input 3 is greater than <i>AI3 Sd</i> setpoint.
Wrn Batt Volt	WRN	YES	Battery voltage is out of limits given by <i>Batt Undervolt/Batt OverVolt</i> setpoints.
IOM Alx Wrn	WRN	YES	Warning alarm configurable on the input of IG-IOM/IGS-PTM.
IOM Alx Sd	SD	YES	Shutdown alarm configurable on the input of IG-IOM/IGS-PTM.
Binary input	WRN/SD/BOC	YES	Configurable Warning, Shutdown or BOC alarms on the inputs of IL-NT.
Emergency Stop	SD	YES	If the input <i>Emergency Stop</i> is opened shutdown is immediately activated.
Sd Override	WRN	NO	The protection is active if the output <i>Sd Override</i> is closed.
Sd Gen Lx > V (Where x=1,2,3)	SD	YES	The generator voltage is out of limits given by <i>Gen >V Sd</i> setpoints.
BOC Gen Lx < V (Where x=1,2,3)	BOC	YES	The generator voltage is out of limits given by <i>Gen <V BOC</i> setpoints.
Sd Gen V Unbal	SD	YES	The generator voltage is unbalanced more than the value of <i>Volt Unbal Sd</i> setpoint.
Sd Gen > Freq	SD	YES	The generator frequency is out of limits given by <i>Gen >Freq Sd</i> setpoints.
BOC Gen <Freq	BOC	YES	The generator frequency is out of limits given by <i>Gen <Freq BOC</i> setpoints.
GenParamsFail	NONE	NO	Generator params are not OK, voltage or frequency are out of limits.
Sd Amps Unbal	SD	NO	The generator current is unbalanced (there is generator current asymetry).
BOC Amps IDMT	BOC	NO	Generator current exceeds the limit for IDMT protection given by <i>Nominal current</i> and <i>Amps IDMT Del</i> setpoints.
BOC Overload	BOC	YES	The load is greater than the value given by <i>Overload</i> setpoint.
Sd GShort Crct	SD	NO	Short circuit of generator.
Sd Earth Fault	SD	YES	This alarm is activated when Eart Fault value exceeds <i>Earth Fault Sd</i> limit for at least <i>Earth Fault Del</i> period.
Sd Overspeed	SD	YES	The protection comes active if the speed is greater than <i>Overspeed</i> setpoint.

Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
Sd Underspeed	SD	YES	During starting of the engine when the RPM reach the value of <i>Starting RPM</i> setpoint the starter is switched off and the speed of the engine can drop under <i>Starting RPM</i> again. Then the Underspeed protection becomes active. Protection evaluation starts 5 seconds after reaching <i>StartingRPM</i> .
Sd BatteryFlat	SD	YES	If the controller switches off during starting sequence due to bad battery condition it doesn't try to start again and activates this protection.
Sd Start Fail	SD	YES	Gen-set start failed.
Sd Stop Fail	SD	YES	Gen-set stop failed.
GCB Fail	SD	NO	Failure of generator circuit breaker.
MCB Fail	WRN	NO	Failure of mains circuit breaker.
ActCallCH1Fail	WRN	NO	This message appears after unsuccessful attempt for active call through channel 1.
ActCallCH2Fail	WRN	NO	Channel 2 - analogical to ActCallCH1Fail.
SmsRprtCH1Fail	WRN	NO	This message appears when periodical SMS report is not successfully sent through channel 1.
SmsRprtCH2Fail	WRN	NO	Channel 2 - analogical to ActCallCH1Fail.
ParamFail	NONE	NO	Wrong checksum of parameters. Happends typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters, write at least one new parameter.
Sd RPMMeasFail	SD	NO	Failure of magnetic pick-up sensor for speed measurement.
ChargeAlt Fail	WRN	YES	Failure of alternator for charging the battery.
Wrn RA Fail	WRN	NO	Warning alarm in case of lost connection to IGL-RA15 module.
Sd IOM Fail	SD	NO	Shutdown alarm in case of lost connection to IG-IOM/IGS-PTM module. Only when configured.
Wrn ECU Alarm*	WRN	NO	ECU alarm list is not empty
Wrn ECU Comm*	WRN	NO	There is no communication between controller and ECU
Gen CCW Rot	WRN		wrong generator phase sequence detected
Mains CCW Rot	WRN		wrong Mains phase sequence detected
WrnMShortCrct	WRN	NO	Short circuit of mains.
Mains Lx >, < V (Where x=1,2,3)	MF	YES	The generator voltage is out of limits given by <i>Gen <V Sd</i> and <i>Gen >V Sd</i> setpoints.
Mains V Unbal	MF	YES	The generator voltage is unbalanced more than the value of <i>Volt Unbal Sd</i> setpoint.
Mains >, < Freq	MF	YES	The generator frequency is out of limits given by <i>Gen >Freq Sd</i> and <i>Gen <Freq Sd</i> setpoints.

Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
Low BackupBatt	WRN	NO	RTC backup battery is flat
WrnMaintenance	WRN	YES	The period for servicing is set by the <i>Maintenance</i> setpoint. The protection comes active if the running hours of the engine reach this value.
Wrn EFProtTest	WRN	NO	a) Binary output EF PROT TEST is active (all the time even when performed EF Prot Test is acknowledged by FAULT RESET) b) Activated when EF Prot Test is performed using ENTER + FAULT RESET button's combination or by EFProtTest command in Man Operations group.
Sd GAutDtcFail	SD	NO	Gen-set autodetection failed = suitable configuration not found in Alternate Cfg group.
MAutDetecFail	WRN	NO	Mains autodetection failed = suitable configuration not found in Alternate Cfg group.
AlterCfg 1..3 Act			Successful autodetection. (chosen configuration group indication)

*Only when ECU is configured

History file

InteliLite NT stores a record of each important event into the history file. The history file seats 117 records. When the history file is full, the oldest records are removed.

Hint

To force history download in LiteEdit (direct, modem or Internet) open History window and select History | Read history command.

Record structure

Abbreviation	Historical value
Num	Number of historical event
Reason	Event specification
Date	Date of historical event in format DD/MM/YY
Time	Time of historical event in format HH:MM:SS
Mode	Controller's mode
RPM	Engine speed
Pwr	Generator active power
PF	Generator PF
LChr	Character of the load
Gfrq	Generator frequency
Vg1	Generator voltage L1
Vg2	Generator voltage L2
Vg3	Generator voltage L3
IL1	Generator current L1
IL2	Generator current L2
IL3	Generator current L3
EF	Earth fault current
Vm1	Mains voltage L1
Vm2	Mains voltage L2
Vm3	Mains voltage L3
Mfrq	Mains frequency
UBat	Battery voltage
OilP	IL-NT Analog input 1 value (default Oil pressure)
EngT	IL-NT Analog input 2 value (default Engine temperature)
FLvl	IL-NT Analog input 3 value (default Fuel Level)
BIN	Binary inputs IL-NT
BOU	Binary outputs IL-NT
FC*	ECU alarm FailureCode
FMI*	ECUalarm Failure Mode Identifier
AIM1*	IG-IOM, IGS-PTM Analog input 1 value (when configured IG-IOM, IGS-PTM)
AIM2*	IG-IOM, IGS-PTM Analog input 2 value (when configured IG-IOM, IGS-PTM)
AIM3*	IG-IOM, IGS-PTM Analog input 3 value (when configured IG-IOM, IGS-PTM)
AIM4*	IG-IOM, IGS-PTM Analog input 4 value (when configured IG-IOM, IGS-PTM)
BIM*	IG-IOM, IGS-PTM Binary inputs (when configured IG-IOM, IGS-PTM)
BOM*	IG-IOM, IGS-PTM Binary outputs (when configured IG-IOM, IGS-PTM)
BIOE*	Extension plug-in module inputs and/or outputs

*Depends if enabled in configuration (see more details in LiteEdit-4.4-Reference Guide.pdf)

Init Screens

Each IntelliLite NT AMF26-P controller holds information about serial number, uploaded firmware version and other information. This information is displayed on so called “Info Screen”. It is possible to call this screen together with other useful screens from any measurement screen by pressing **ENTER** and **PAGE** button concurrently. Then you can press just **PAGE** button to navigate through following screens.

Init Screen

This is a first screen which is dedicated for informations provided by customers such as contact numbers, service technician contact and customer message for end users of gen-set. Configuration of this screen is only done through LiteEdit PC software, where Init Screen may be disabled.

Info Screen

This screen consists of information about type of controller, controller manufacturer (ComAp), uploaded firmware branch, used ESF and currently configured electronic engine, firmware version, application type and branche.

Details about configured electronic engine are in the chapter [Identifying configured ECU](#).

Language Screen

IL-NT controller offers configurable language support. On this screen it is possible to switch between languages configured in the controller.

Another option how to switch between configured languages is using binary input [LANG SELECTION](#).

User Interface Screen

IntelliLite NT controller enables to choose the user interface as customer prefers. There are two choices available: USER or ENGINEER interface.

USER interface is ment for customers, who prefer simple and easy menu and don't wish to list in complex menu or change the settings of controller. In USER interface controller displays measuring, alarm and init screens.

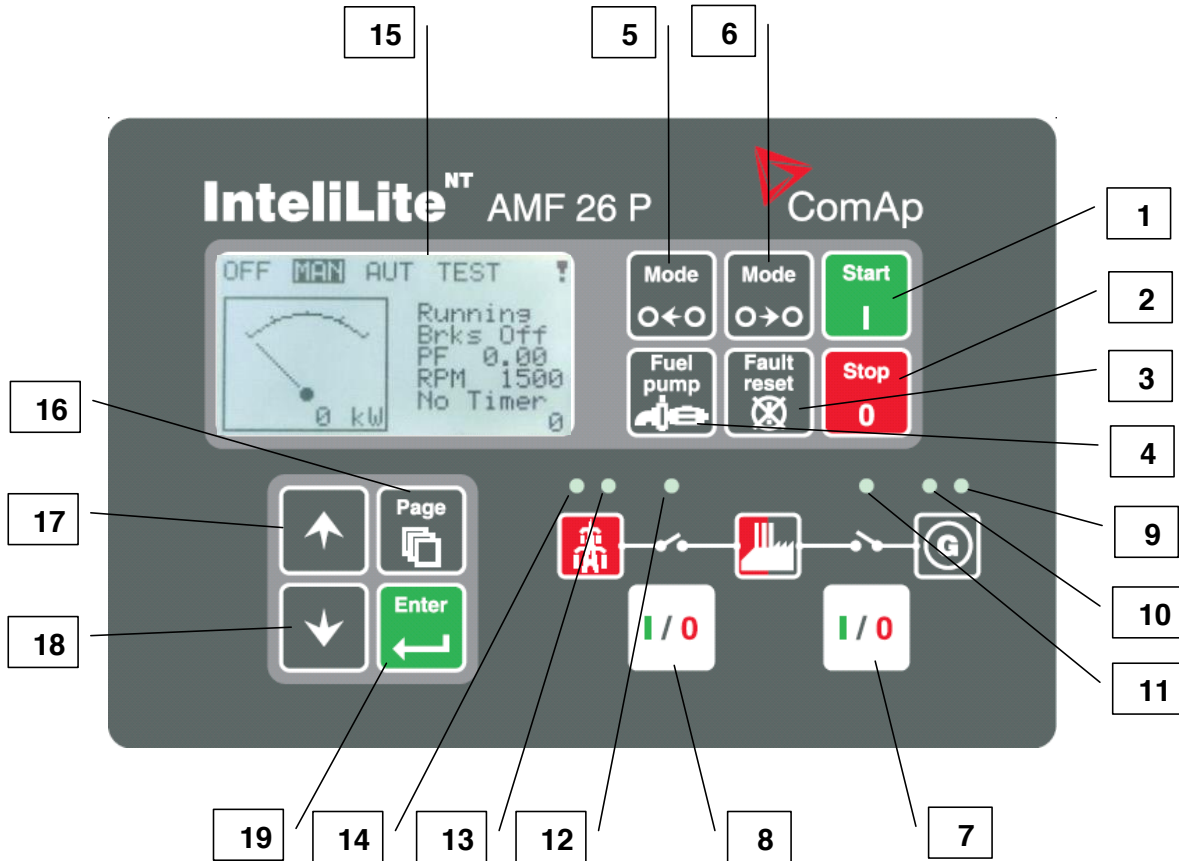
ENGINEER interface is dedicated for engineers and allow changing the settings of controller, reviewing the history, measurement, alarms and grant the full access to all controllers screens with are available. This mode is default.

Changing the mode of User Interface is possible from default measuring screen of controller by simultaneous pressing the ENTER and PAGE button and than press again PAGE. On screen will be displayed the choice of two different User Interfaces.

Last value displayed on screen is DiagData, which is internal ComAp information in case of FW or unit problems, which helps ComAp to analyze the root cause and find a proper solution.





You can see more in next chapter Operator Interface AMF under [Controller Information Screen](#).

Operator Interface AMF



GEN-SET CONTROL BUTTONS



POSITION	BUTTON	DESCRIPTION
1		START button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.
2		STOP button. Works in MAN mode only. Press this button to initiate the stop sequence of the gen-set. Repeated pressing or holding the button for more than 2s will cancel current phase of stop sequence (like cooling) and next phase will continue.
3		FAULT RESET button. Use this button to deactivate the horn output (1 st press) and acknowledge alarms (2 nd press). Inactive alarms will disappear immediately and status of active alarms will be changed to "confirmed" so they will disappear as soon as their reasons dismiss.
4		FUEL PUMP button. While this button is pressed FUEL PUMP is activated until Fuel Pump OFF level is reached.



5		<p>MODE LEFT button. Use this button to change the mode. The button works only if the main screen with the indicator of currently selected mode is displayed.</p> <p>NOTE: This button will not work if the controller mode is forced by one of binary inputs Remote OFF, Remote MAN, Remote AUT, Remote TEST.</p>
6		<p>MODE RIGHT button. Use this button to change the mode. The button works only if the main screen with the indicator of currently selected mode is displayed.</p> <p>NOTE: This button will not work if the controller mode is forced by one of binary inputs Remote OFF, Remote MAN, Remote AUT, Remote TEST.</p>
7		<p>GCB button. Works in MAN and TEST modes only. Press this button to open or close the GCB manually. Note that certain conditions must be valid otherwise GCB closing is blocked.</p>
8		<p>MCB button. Works in MAN and TEST modes only. Press this button to open or close the MCB manually.</p> <p>CAUTION! You can disconnect the load from the mains supply with this button! Be sure you know well what you are about to do!</p>

GEN-SET OPERATION INDICATORS

POSITION	INDICATOR DESCRIPTION
9	Gen-set failure. Red LED starts flashing when gen-set failure occurs. After FAULT RESET button is pressed, goes to steady light (if an alarm is still active) or is off (if no alarm is active).
10	Gen-set voltage OK. Green LED is on if the generator voltage is present and within limits.
11	GCB ON. Green LED is on, if GCB is closed. It is driven by GCB feedback signal.
12	MCB ON. Green LED is on, if MCB is closed. It is driven by MCB feedback signal.
13	Mains voltage OK. Green LED is on, if mains is present and within limits.
14	Mains failure. Red LED starts blinking when the mains failure is detected and after the gen-set has started it lights permanently until the mains failure disappears.

DISPLAY AND CONTROL BUTTONS

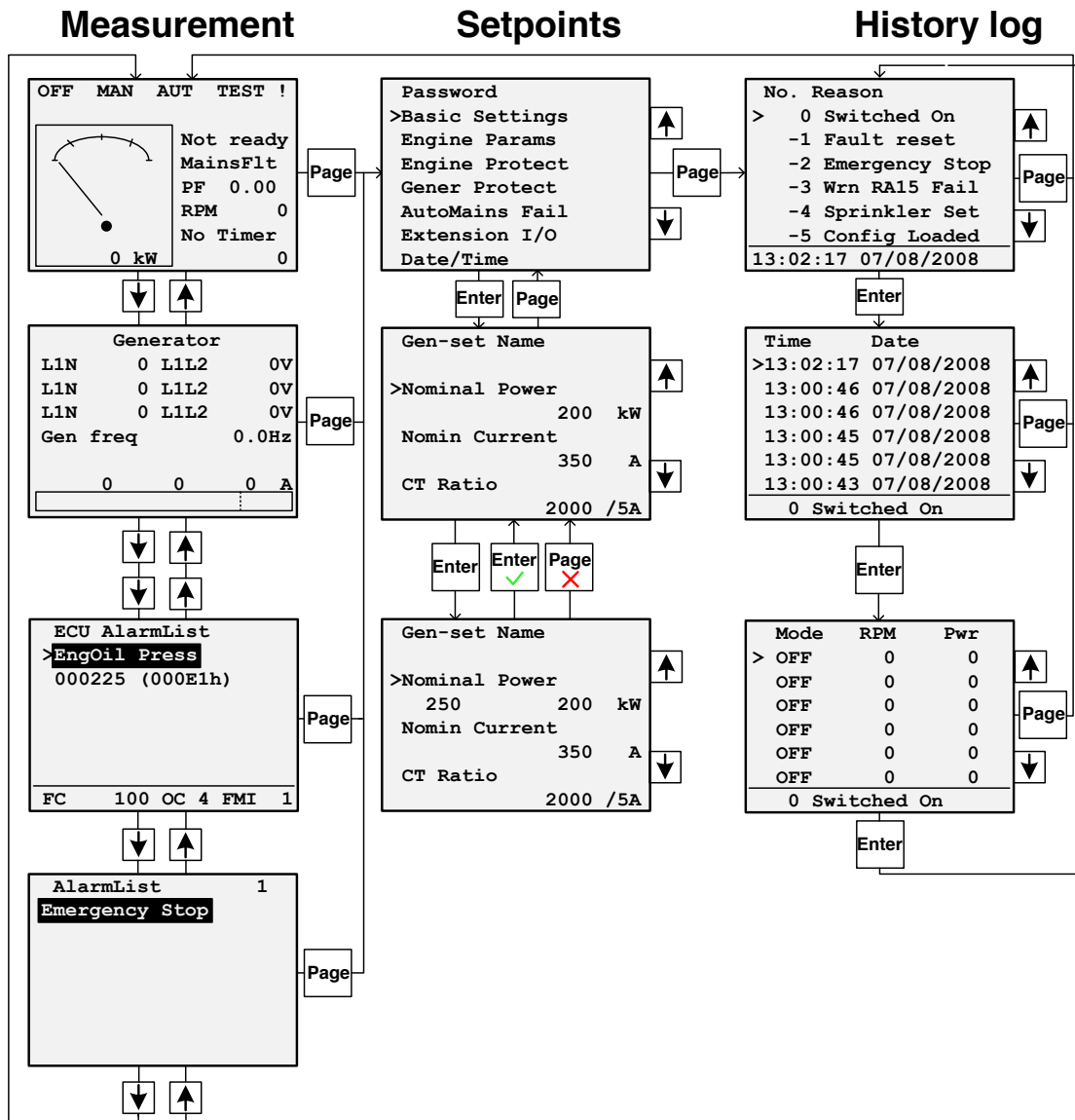
POSITION	BUTTON	DESCRIPTION
15		Graphic B/W display, 128x64 pixels
16		PAGE button. Use this button to switch over display pages. See Display Screens and Pages Structure chapter below this table for more details.
17		UP button. Use this button to move up or increase a value.

18		DOWN button. Use this button to move down or decrease a value.
19		ENTER button. Use this button to finish editing a setpoint or moving right in the history page.

Display Screens and Pages Structure

The displayed information is structured into "pages" and "screens". Use PAGE button to switch over the pages.

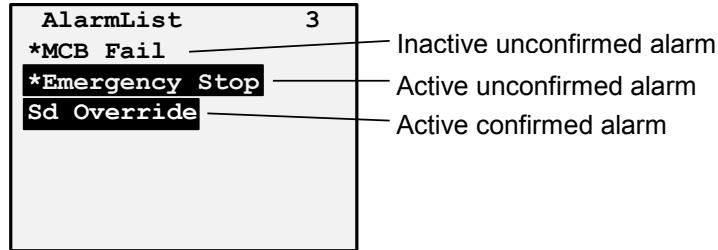
1. The page *Measurement* consists of screens which display measured values like voltages, current, oil pressure etc., computed values like i.e. gen-set power, statistic data and the alarm list on the last screen.
2. The page *Setpoints* contains all setpoints organized to groups and also a special group for entering password.
3. The page *History log* shows the history log in the order that the last record is displayed first.



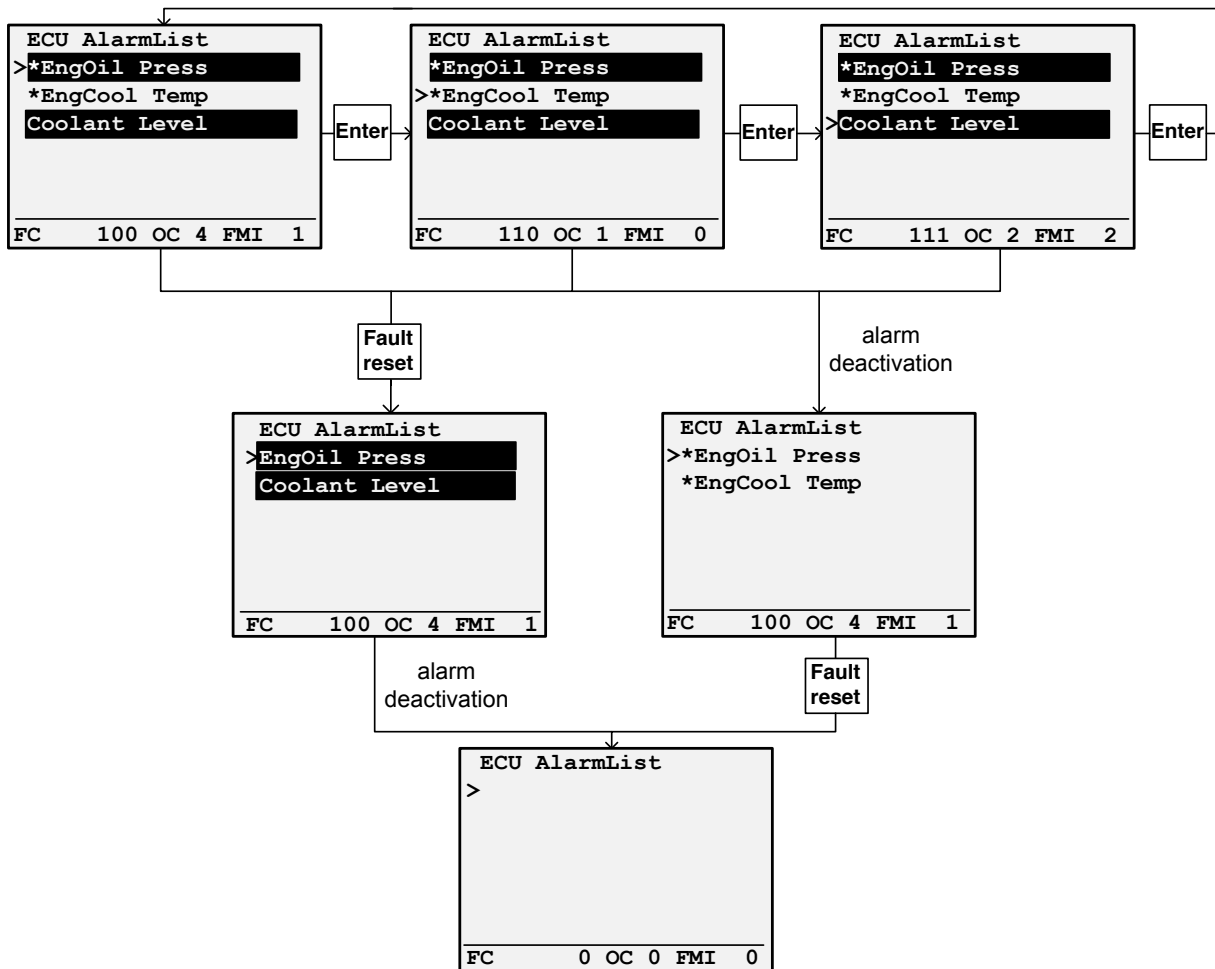
NOTE:

History and **Setpoints** pages are available only when you choose **Engineer** interface (not User). See **Controller Information Screen** subchapter below.

Alarms



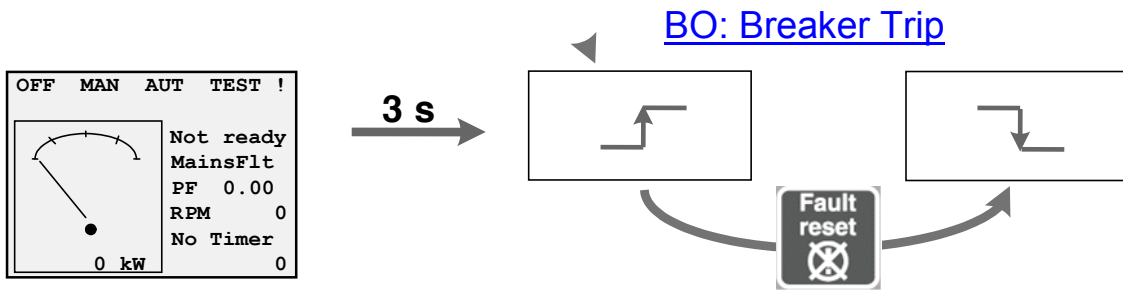
Browsing ECU Alarms



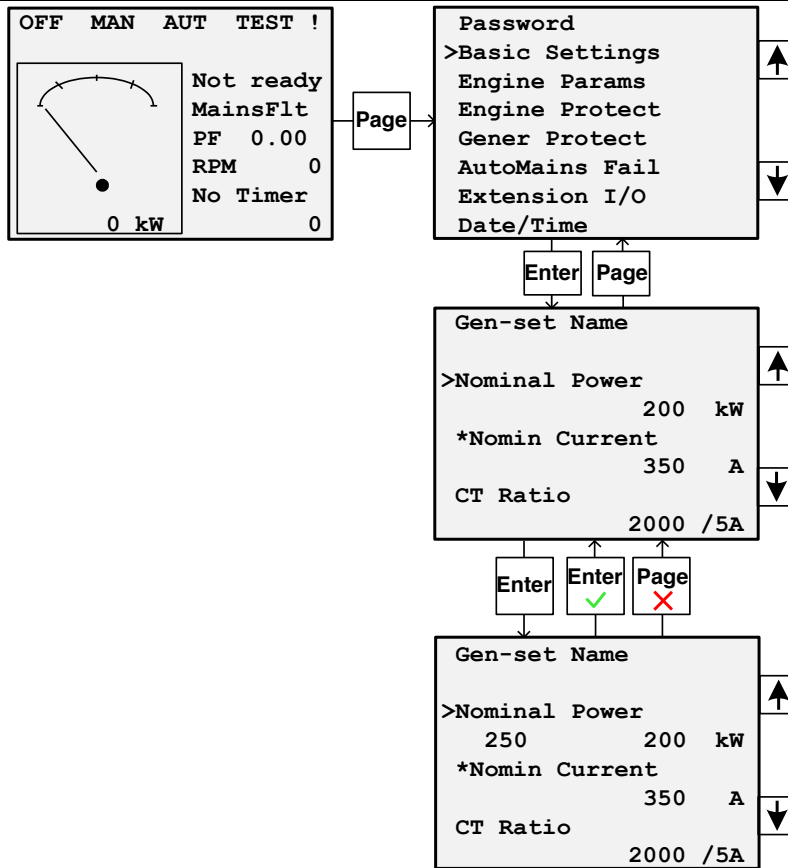
NOTE:
ECU AlarmList page is available only when ECU is configured.

Earth Fault Protection Test

InteliLite^{NT} AMF26-P, SW & Fault reset — January 2016

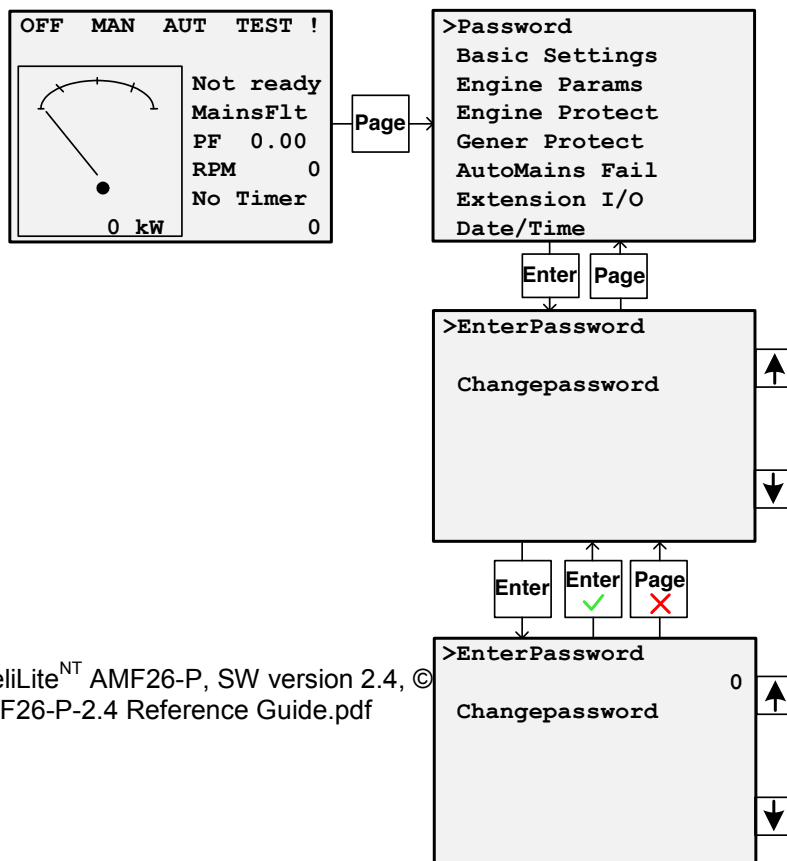


Setpoint Change



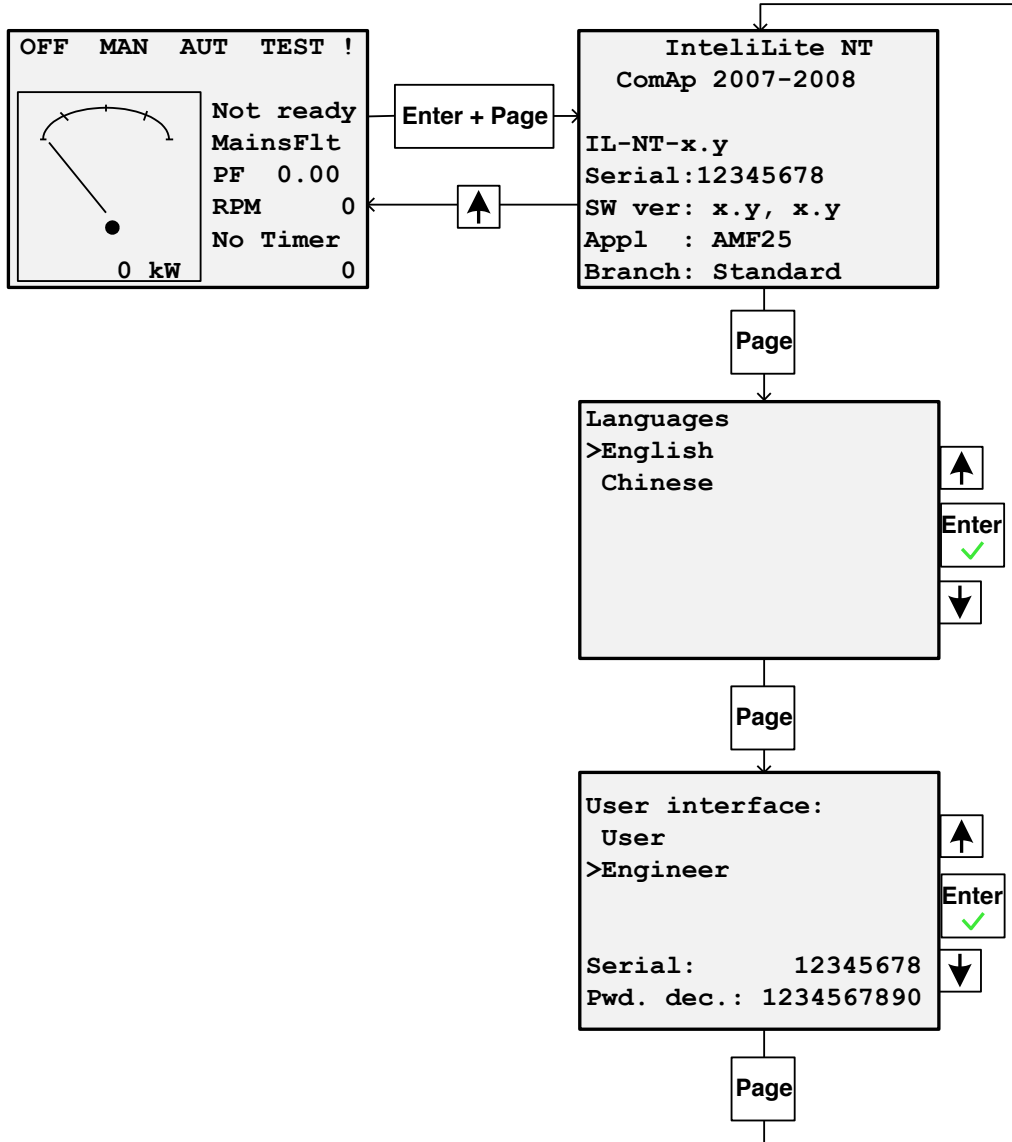
NOTE:
Cannot change setpoint?
Setpoints marked with an asterisk are password protected. Enter password as described in the chapter *Entering the Password* below.

Entering the Password

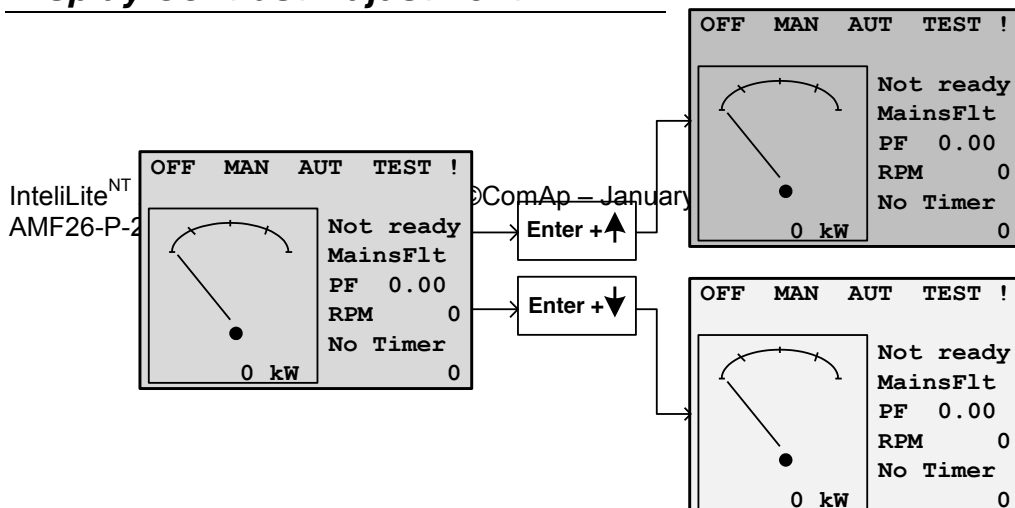


NOTE:
Lost password? Display the information screen containing the serial number and password decode number as described in the chapter below and send them to your local distributor.

Controller Information Screen



Display Contrast Adjustment



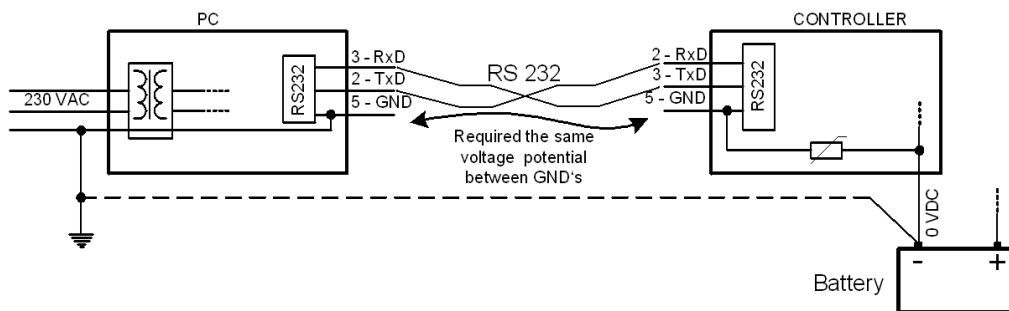
Remote Control and Data Logging

Direct connection to the PC

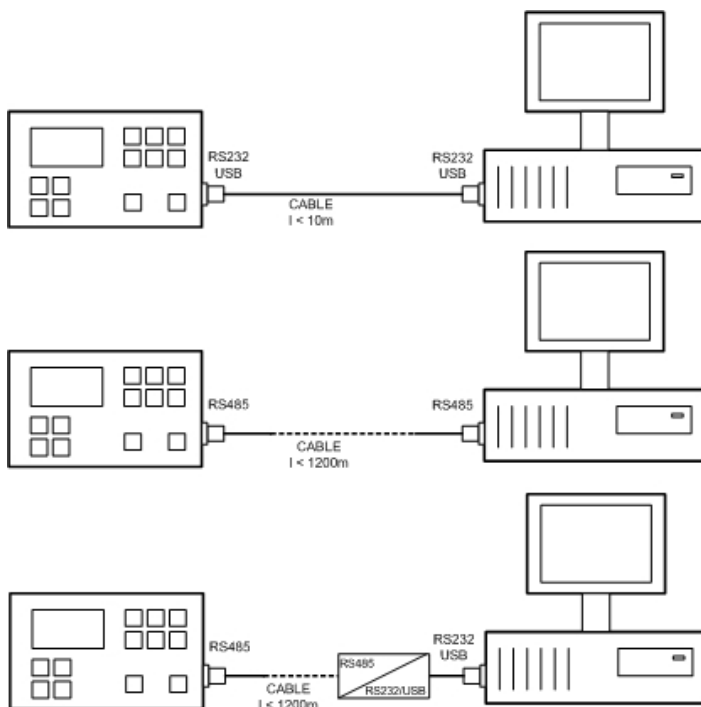
IL-NT can be connected directly with PC via optional IL-NT RS232 interface. Use the recommended ComAp AT-LINK CABLE 1.8M or cross-wired serial communication cable with DB9 female connectors and signals Rx, Tx, GND for RS232 connection.

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 reversible fuse in controller burns out. The simple solution is to assure, that the PC supply 240/20V is ground free (GND terminal is not connected).



RS232, USB or RS485 interface can be used for direct cable connection to a PC. The setpoint [COM1 Mode](#) or [COM2 Mode](#) (according to the used interface) must be set to DIRECT position for this kind of connection.



Following modules are available for direct connection to PC:

- IL-NT-232
- IL-NT-RS232-485
- IL-NT-S-USB (easy removable USB service module)

The RS232 or USB interface uses COM1 port of the controller. The RS485 uses COM2.

PC software - LiteEdit

On the PC (for direct or modem connection) has to be installed the ComAp's software package LiteEdit. (based on Windows 95 or newer platform)

LiteEdit enables:

- read the quantities
- adjust all set points
- control the engine
- configure the controller
- select software configuration
- modify alarm inputs and outputs
- modify password, commands protections
- direct, modem or Internet communication

Modbus protocol

The selection of the function of iL serial port is done via the setpoint *COMx Mode* in *Basic settings*

- 57600 bps, 8 data bits, 1 stop bit, no parity
- Transfer mode RTU
- Function 3 (Read Multiply Registers)
- Function 6 (Write Single Register)
- Function 16 (Write Multiply Registers)
- The response to an incoming message is sent with minimum 4,096 ms delay after message reception

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/>.

Communication object vs. Register

All the data intended for communication has its representation as communication objects in the controller. The communication object is represented by the n-byte array in the controller memory and identified by the unique 16-bit communication object number. The register, according to Modbus communication protocol, represents a two-byte data and in communication functions is referenced by 16-bit register address. Further in the description of communication functions **the communication object number will always be used as a register address** and length of the communication object will be expressed by number of registers. **Just one communication object can be read or written by one communication function.**

Hint:

To obtain communication object numbers it is possible to download the actual controller description on-line from controller or from (ail) archive and use "export data" function from LiteEdit software.

Communication object list (exported from default IL-NT-AMF26-P archive)

Setpoints of AMF26-P:

Name	Firmware ver.	Application	Date	App. ver.	Ser. num.	Filename
GEN1	IL-NT-AMF26-P- 2.0 R:2.6.2010	AMF26	7.6.2010	2,0	12345678	IL-NT-AMF26- AMF26-P- 2.0.AIL

InteliLite^{NT} AMF26-P, SW version 2.4, ©ComAp – January 2016
AMF26-P-2.4 Reference Guide.pdf

Group	Name	Value	Dimension	Password	Com. obj.	Low limit	High limit	Data type
Basic Settings	Gen-set Name	GEN1		No	8637			Short string
Basic Settings	Nominal Power	33	kW	Yes	8276	1	5000	Unsigned 16
Basic Settings	Nomin Current	60	A	Yes	8275	1	10000	Unsigned 16
Basic Settings	CT Ratio	100	/5A	Yes	8274	1	5000	Unsigned 16
Basic Settings	EF CT Ratio	500	/1A	Yes	8566	1	2000	Unsigned 16
Basic Settings	PT Ratio	1,0	/1	Yes	9579	0,1	500,0	Unsigned 16
Basic Settings	Vm PT Ratio	1,0	V/V	Yes	9580	0,1	500,0	Unsigned 16
Basic Settings	NomVolts Ph-N	231	V	Yes	8277	80	20000	Unsigned 16
Basic Settings	NomVolts Ph-Ph	400	V	Yes	11657	138	35000	Unsigned 16
Basic Settings	Nominal Freq	50	Hz	Yes	8278	45	65	Unsigned 16
Basic Settings	Gear Teeth	0		Yes	8252	0	500	Unsigned 16
Basic Settings	Nominal RPM	1500	RPM	Yes	8253	100	4000	Unsigned 16
Basic Settings	ControllerMode	OFF		No	8315			String list
Basic Settings	Reset To MAN	DISABLED		Yes	9983			String list
Basic Settings	ControllerAddr	1		Yes	24537	1	32	Unsigned 8
Basic Settings	COM1 Mode	DIRECT		Yes	24522			String list
Basic Settings	COM2 Mode	DIRECT		Yes	24451			String list
Basic Settings	ModemIniString			Yes	24436			Long string
Basic Settings	ModbusComSpeed	9600	bps	Yes	24477			String list
Basic Settings	ConnectionType	3Ph4Wire		Yes	11628			String list
Basic Settings	CT Location	GenSet		Yes	11625			String list
Basic Settings	Number Of CTs	3CTs		Yes	11629			String list
Basic Settings	CB Feedbacks	DISABLED		Yes	11771			String list
Engine Params	Starting RPM	30	%	Yes	8254	5	50	Unsigned 8
Engine Params	Starting Oil P	4,5	Bar	Yes	9681	0,0	10,0	Integer 16
Engine Params	Prestart Time	0	s	Yes	8394	0	600	Unsigned 16
Engine Params	MaxCrank Time	5	s	Yes	8256	1	60	Unsigned 8
Engine Params	CrnkFail Pause	5	s	Yes	8257	5	60	Unsigned 8
Engine Params	Crank Attempts	4		Yes	8255	1	10	Unsigned 8
Engine Params	Idle Time	5	s	Yes	9097	0	600	Unsigned 16
Engine Params	Min Stab Time	2	s	Yes	8259	1	5	Unsigned 16
Engine Params	Max Stab Time	5	s	Yes	8313	2	300	Unsigned 16
Engine Params	Cooling Speed	NOMINAL		Yes	10046			String list
Engine Params	Cooling Time	120	s	Yes	8258	0	3600	Unsigned 16
Engine Params	Stop Time	60	s	Yes	9815	0	240	Unsigned 16
Engine Params	Fuel Solenoid	DIESEL		Yes	9100			String list

Engine Params	D+ Function	ENABLED	Yes	9683			String list
Engine Params	ECU FreqSelect	DEFAULT	Yes	10266			String list
Engine Params	ECU SpeedAdj	50 %	Yes	9948	0	100	Unsigned 16
Engine Params	Fuel Pump ON	30 %	No	10100	-100	80	Integer 16
Engine Params	Fuel Pump OFF	80 %	No	10101	30	10000	Integer 16
Engine Params	Preheating ON	30 °C	No	11622	0	40	Unsigned 8
Engine Params	Preheating OFF	40 °C	No	11623	30	100	Unsigned 8
Engine Params	EMR2Preheating	DISABLED	Yes	11795			String list
Engine Params	Dummy Ld 1 On	9,0 A	No	11772	1,0	1000,0	Unsigned 16
Engine Params	Dummy Ld 1 Off	19,0 A	No	11773	1,0	1000,0	Unsigned 16
Engine Params	Dummy Ld 2 On	30,0 A	No	11774	1,0	1000,0	Unsigned 16
Engine Params	Dummy Ld 2 Off	42,0 A	No	11775	1,0	1000,0	Unsigned 16
Engine Params	Dummy Load	GCB	No	11776			String list
Engine Protect	ProtectHoldOff	5 s	Yes	8262	0	300	Unsigned 16
Engine Protect	Horn Timeout	10 s	No	8264	0	600	Unsigned 16
Engine Protect	Overspeed Sd	115 %	Yes	8263	50	150	Unsigned 16
Engine Protect	AI1 Wrn	1,5 Bar	No	8369	-10,0	1000,0	Integer 16
Engine Protect	AI1 Sd	1,0 Bar	Yes	8370	-10,0	1000,0	Integer 16
Engine Protect	AI1 Del	3 s	Yes	8365	0	900	Unsigned 16
Engine Protect	AI2 Wrn	110 °C	No	8375	-100	10000	Integer 16
Engine Protect	AI2 Sd	115 °C	Yes	8376	-100	10000	Integer 16
Engine Protect	AI2 Del	5 s	Yes	8371	0	900	Unsigned 16
Engine Protect	AI3 Wrn	10 %	No	8381	-100	10000	Integer 16
Engine Protect	AI3 Sd	5 %	No	8382	-100	10000	Integer 16
Engine Protect	AI3 Del	120 s	No	8377	0	900	Unsigned 16
Engine Protect	BI6 Delay	0,0 s	No	10131	0,0	3600,0	Unsigned 16
Engine Protect	BI7 Delay	0,0 s	No	10132	0,0	3600,0	Unsigned 16
Engine Protect	Batt Overvolt	14,5 V	Yes	9587	10,5	40,0	Integer 16
Engine Protect	Batt Undervolt	10,5 V	Yes	8387	8,0	40,0	Integer 16
Engine Protect	Batt Volt Del	5 s	Yes	8383	0	600	Unsigned 16
Engine Protect	Maintenance	9999 h	No	9648	0	10000	Unsigned 16
Gener Protect	Overload BOC	105 %	Yes	8280	0	200	Unsigned 16
Gener Protect	Overload Del	10,0 s	Yes	8281	0,0	600,0	Unsigned 16
Gener Protect	GShortCrct Sd	300 %	Yes	8282	100	500	Unsigned 16
Gener Protect	GShortCrct Del	0,00 s	Yes	9991	0,00	10,00	Unsigned 16
Gener Protect	Amps IDMT Del	4,0 s	Yes	8283	1,0	60,0	Unsigned 16
Gener Protect	Amps Unbal Sd	50 %	Yes	8284	1	200	Unsigned 16
Gener Protect	Amps Unbal Del	5,0 s	Yes	8285	0,0	600,0	Unsigned 16

Gener Protect	EF Protection	ENABLED	Yes	11631			String list
Gener Protect	EarthFault Sd	0,30 A	No	11632	0,03	5,00	Unsigned 16
Gener Protect	EarthFault Del	0,10 s	No	11633	0,03	5,00	Unsigned 16
Gener Protect	Gen >V Sd	110 %	Yes	8291	80	200	Unsigned 16
Gener Protect	Gen <V BOC	80 %	Yes	8293	0	110	Unsigned 16
Gener Protect	Gen V Del	3,0 s	Yes	8292	0,0	600,0	Unsigned 16
Gener Protect	Volt Unbal Sd	10 %	Yes	8288	1	200	Unsigned 16
Gener Protect	Volt Unbal Del	3,0 s	Yes	8289	0,0	600,0	Unsigned 16
Gener Protect	Gen >Freq Sd	110,0 %	Yes	8296	90,0	200,0	Unsigned 16
Gener Protect	Gen <Freq BOC	90,0 %	Yes	8298	0,0	110,0	Unsigned 16
Gener Protect	Gen Freq Del	3,0 s	Yes	8297	0,0	600,0	Unsigned 16
AMF Settings	RetFromIsland	AUTO	Yes	9590			String list
AMF Settings	EmergStart Del	2 s	Yes	8301	0	6000	Unsigned 16
AMF Settings	MainsReturnDel	60 s	Yes	8302	1	3600	Unsigned 16
AMF Settings	MFB MReturnDel	60 s	Yes	12078	1	3600	Unsigned 16
AMF Settings	Transfer Del	1,0 s	Yes	8303	0,0	600,0	Unsigned 16
AMF Settings	MCB Close Del	1,0 s	Yes	8389	0,0	60,0	Unsigned 16
AMF Settings	MShortCrct	875,0 A	Yes	11626	1,0	1000,0	Unsigned 16
AMF Settings	MShortCrct Del	0,00 s	Yes	11627	0,00	10,00	Unsigned 16
AMF Settings	Mains >V	110 %	Yes	8305	80	150	Unsigned 16
AMF Settings	Mains <V	80 %	Yes	8307	50	110	Unsigned 16
AMF Settings	Mains V Del	2,0 s	Yes	8306	0,0	600,0	Unsigned 16
AMF Settings	Mains V Unbal	10 %	Yes	8446	1	150	Unsigned 16
AMF Settings	Mains VUnb Del	2,0 s	Yes	8447	0,0	60,0	Unsigned 16
AMF Settings	Mains >Freq	110,0 %	Yes	8310	90,0	150,0	Unsigned 16
AMF Settings	Mains <Freq	90,0 %	Yes	8312	50,0	110,0	Unsigned 16
AMF Settings	Mains Freq Del	0,5 s	Yes	8311	0,0	60,0	Unsigned 16
AMF Settings	MCB Logic	CLOSE-OFF	Yes	8444			String list
AMF Settings	ReturnFromTEST	MANUAL	Yes	8618			String list
AMF Settings	MCB Opens On	MAINSFAIL	Yes	9850			String list
Extension I/O	IOM AI1 Wrn	0 U4	No	8762	-100	10000	Integer 16
Extension I/O	IOM AI1 Sd	0 U4	No	8766	-100	10000	Integer 16
Extension I/O	IOM AI1 Del	5 s	No	8770	0	900	Unsigned 16
Extension I/O	IOM AI2 Wrn	0 U5	No	8763	-100	10000	Integer 16
Extension I/O	IOM AI2 Sd	0 U5	No	8767	-100	10000	Integer 16
Extension I/O	IOM AI2 Del	5 s	No	8771	0	900	Unsigned 16
Extension I/O	IOM AI3 Wrn	0 U6	No	8764	-100	10000	Integer 16
Extension I/O	IOM AI3 Sd	0 U6	No	8768	-100	10000	Integer 16

Extension I/O	IOM AI3 Del	5 s	No	8772	0	900	Unsigned 16
Extension I/O	IOM AI4 Wrn	0 U7	No	8765	-100	10000	Integer 16
Extension I/O	IOM AI4 Sd	0 U7	No	8769	-100	10000	Integer 16
Extension I/O	IOM AI4 Del	5 s	No	8773	0	900	Unsigned 16
Extension I/O	IOM AI1 Calibr	0 U4	No	8793	-1000	1000	Integer 16
Extension I/O	IOM AI2 Calibr	0 U5	No	8794	-1000	1000	Integer 16
Extension I/O	IOM AI3 Calibr	0 U6	No	8795	-1000	1000	Integer 16
Extension I/O	IOM AI4 Calibr	0 U7	No	8796	-1000	1000	Integer 16
Date/Time	Time Stamp Per	60 min	No	8979	0	240	Unsigned 8
Date/Time	SummerTimeMod	DISABLED	No	8727			String list
Date/Time	Time	0:00:00	No	24554			Time
Date/Time	Date	1.1.2006	No	24553			Date
Date/Time	Timer1Function	No Func	No	11660			String list
Date/Time	Timer1 Repeat	NONE	No	10045			String list
Date/Time	Timer1 ON Time	5:00:00	No	10042			Time
Date/Time	Timer1Duration	5 min	No	10044	1	1440	Unsigned 16
Date/Time	Timer2Function	No Func	No	11661			String list
Date/Time	Timer2 Repeat	NONE	No	10202			String list
Date/Time	Timer2 ON Time	5:00:00	No	10199			Time
Date/Time	Timer2Duration	5 min	No	10201	1	1440	Unsigned 16
Date/Time	Timer3Function	No Func	No	12166			String list
Date/Time	Timer3 Repeat	NONE	No	12169			String list
Date/Time	Timer3 ON Time	5:00:00	No	12167			Time
Date/Time	Timer3Duration	5 min	No	12170	1	1440	Unsigned 16
Sensors Spec	AI1Calibration	0,0 Bar	No	8431	-100,0	100,0	Integer 16
Sensors Spec	AI2Calibration	0 °C	No	8407	-1000	1000	Integer 16
Sensors Spec	AI3Calibration	0 %	No	8467	-1000	1000	Integer 16
SMS/E-Mail	Yel Alarm Msg	OFF	No	8482			String list
SMS/E-Mail	Red Alarm Msg	OFF	No	8484			String list
SMS/E-Mail	TelNo/Addr Ch1		No	9597			Long string
SMS/E-Mail	TelNo/Addr Ch2		No	9598			Long string
SMS/E-Mail	Report Period	24 h	No	12079	0	1000	Unsigned 16
Man Operations	EF Prot Test	OFF	No	11630			String list
Man Operations	RestoreDefault	OFF	Yes	11624			String list
Alternate Cfg	Config Switch	Manual	Yes	12045			String list
Alternate Cfg	NominalPower1	39 kW	Yes	12046	1	5000	Unsigned 16

Alternate Cfg	Nomin Current1	140 A	Yes	12049	1	10000	Unsigned 16
Alternate Cfg	NomVoltsPh-N 1	120 V	Yes	12052	80	20000	Unsigned 16
Alternate Cfg	NomVoltsPh-Ph1	208 V	Yes	12055	138	35000	Unsigned 16
Alternate Cfg	Connect Type 1	3Ph4Wire	Yes	12058			String list
Alternate Cfg	NominalPower2	37 kW	Yes	12047	1	5000	Unsigned 16
Alternate Cfg	Nomin Current2	58 A	Yes	12050	1	10000	Unsigned 16
Alternate Cfg	NomVoltsPh-N 2	277 V	Yes	12053	80	20000	Unsigned 16
Alternate Cfg	NomVoltsPh-Ph2	480 V	Yes	12056	138	35000	Unsigned 16
Alternate Cfg	Connect Type 2	3Ph4Wire	Yes	12059			String list
Alternate Cfg	NominalPower3	26 kW	Yes	12048	1	5000	Unsigned 16
Alternate Cfg	Nomin Current3	108 A	Yes	12051	1	10000	Unsigned 16
Alternate Cfg	NomVoltsPh-N 3	120 V	Yes	12054	80	20000	Unsigned 16
Alternate Cfg	NomVoltsPh-Ph3	240 V	Yes	12057	138	35000	Unsigned 16
Alternate Cfg	Connect Type 3	Split Ph	Yes	12060			String list

Values of AMF26-P:

Name	Firmware ver.	Application	Date	App. ver.	Ser. num.
GEN1	IL-NT-AMF26-P-2.0 R:2.6.2010	AMF26	7.6.2010	2,0	12345678
Group	Name	Value	Dimension	Com. obj.	Data type
Engine	RPM	1500	RPM	8209	Unsigned 16
Engine	ECU State	[010]		10034	Binary 8
Engine	Fuel Rate ECU	0,0	L/h	9860	Unsigned 16
Engine	Cool Temp ECU	22	°C	9855	Integer 16
Engine	IntakeTemp ECU	20	°C	9878	Integer 16
Engine	Oil Press ECU	0,0	Bar	10354	Integer 16
Engine	BoostPress ECU	0,0	Bar	9877	Unsigned 8
Engine	Oil Temp ECU	22	°C	9857	Integer 16
Generator	Gen kW	150,0	kW	8202	Integer 16
Generator	Gen kW L1	50,0	kW	8524	Integer 16
Generator	Gen kW L2	50,0	kW	8525	Integer 16
Generator	Gen kW L3	50,0	kW	8526	Integer 16
Generator	Gen kVAr	15,0	kVAr	8203	Integer 16
Generator	Gen kVAr L1	5,0	kVAr	8527	Integer 16
Generator	Gen kVAr L2	5,0	kVAr	8528	Integer 16
Generator	Gen kVAr L3	5,0	kVAr	8529	Integer 16
Generator	Gen Output	153,0	kVA	8565	Integer 16
Generator	Gen kVA L1	51,0	kVA	8530	Integer 16

Generator	Gen kVA L2	51,0 kVA	8531	Integer 16
Generator	Gen kVA L3	51,0 kVA	8532	Integer 16
Generator	Gen PF	1,00	8204	Integer 8
Generator	Gen Load Char	R	8395	Char
Generator	Gen PF L1	1,00	8533	Integer 8
Generator	Gen Ld Char L1	R	8626	Char
Generator	Gen PF L2	1,00	8534	Integer 8
Generator	Gen Ld Char L2	R	8627	Char
Generator	Gen PF L3	1,00	8535	Integer 8
Generator	Gen Ld Char L3	R	8628	Char
Generator	Gen Freq	50,0 Hz	8210	Unsigned 16
Generator	Gen V L1-N	230 V	8192	Unsigned 16
Generator	Gen V L2-N	230 V	8193	Unsigned 16
Generator	Gen V L3-N	230 V	8194	Unsigned 16
Generator	Gen V L1-L2	398 V	9628	Unsigned 16
Generator	Gen V L2-L3	398 V	9629	Unsigned 16
Generator	Gen V L3-L1	398 V	9630	Unsigned 16
Generator	Earth Fault	0,00 A	8208	Unsigned 16
Load	Load Amps L1	41,0 A	8198	Unsigned 16
Load	Load Amps L2	41,0 A	8199	Unsigned 16
Load	Load Amps L3	41,0 A	8200	Unsigned 16
Mains	Mains V L1-N	231 V	8195	Unsigned 16
Mains	Mains V L2-N	230 V	8196	Unsigned 16
Mains	Mains V L3-N	230 V	8197	Unsigned 16
Mains	Mains V L1-L2	398 V	9631	Unsigned 16
Mains	Mains V L2-L3	398 V	9632	Unsigned 16
Mains	Mains V L3-L1	398 V	9633	Unsigned 16
Mains	Mains Freq	50,0 Hz	8211	Unsigned 16
Controller I/O	Battery Volts	24,3 V	8213	Integer 16
Controller I/O	D+	5,7 V	10603	Integer 16
Controller I/O	Oil Pressure	15,6 Bar	8227	Integer 16
Controller I/O	Engine Temp	50 °C	8228	Integer 16
Controller I/O	Fuel Level	99 %	8229	Integer 16
Controller I/O	Bin Inputs	[1111001]	8235	Binary 16
Controller I/O	Bin Outputs	[1111000]	8239	Binary 16
Controller I/O	GSM SignalLvl	0 %	11895	Unsigned 16
Extension I/O	IOM AI1	10 U4	8978	Integer 16

Extension I/O	IOM AI2	20	U5	8759	Integer 16
Extension I/O	IOM AI3	30	U6	8760	Integer 16
Extension I/O	IOM AI4	40	U7	8761	Integer 16
Extension I/O	IOM Bin Inp	[01000110]		8602	Binary 16
Extension I/O	IOM Bin Out	[11011001]		8604	Binary 16
Extension I/O	RA Bin Out	[100010010000000]		9849	Binary 16
Extension I/O	EFCPM Bin Inp	[xxxxxxx]		11635	Binary 8
Statistics	Energy kWh	0,0		8205	Integer 32
Statistics	Energy kVArh	0,0		8539	Integer 32
Statistics	Run Hours	0,0	h	8206	Integer 32
Statistics	Num Starts	0		8207	Unsigned 16
Statistics	RunHrsOverride	0,0	h	8536	Integer 32
Statistics	Num Overrides	0		9700	Unsigned 32
Statistics	Maintenance	9999	h	9648	Unsigned 16
Statistics	Num E-Stops	0		11195	Unsigned 32
Statistics	Shutdowns	0		11196	Unsigned 32
IL Info	Engine State	#####		8330	Unsigned 16
IL Info	Breaker State	#####		8455	Unsigned 16
IL Info	Timer Text	#####		8954	Unsigned 16
IL Info	Timer Value	0	s	8955	Unsigned 16
IL Info	FW Version	0,0		8393	Unsigned 8
IL Info	Application	22		8480	Unsigned 8
IL Info	FW Branch	17		8707	Unsigned 8
IL Info	PasswordDecode	#####		9090	Unsigned 32
Date/Time	Time	#####		24554	Time
Date/Time	Date	#####		24553	Date

Remote Communication

Hint:

Refer to IntelliCommunication guide for all additional information.

Internet connection

IL-NT controllers can be monitored from LiteEdit over the Internet using Internet Bridge (IB-Lite), plugged into the controller communication slot.

It is also possible to use IG-IB (connected to controller RS232 port) if needed.

SMS Message Control

You can control and setup the Genset using SMS messages from your mobile phone.

Please see also additional information about SMS messages in [Report Period](#) description.

SMS message format

SMS message format:

- Start with # character, followed *controller address*, followed colon character and *access code*,
- Commands are comma separated,
- Commands are not case sensitive,
- Maximum message length is limited up to 160 characters,
- Controller or I-LB answers only message with valid Access code,
- Answer exceeds 160 characters is separated to more messages.

SMS message header

Every SMS must start with header in format:

```
#address:access command1, command2
```

where *address* is controller address 1 to 32
access is valid access code set-up by PC SW (up to 15 characters length),
 # character indicates beginning of message,
 : character separates *controller address* and *access code*

Hint:

For direct communication to one controller is possible skip address setting.

SMS message commands

1. *Controller address*

Controller address is unique controller identification number located in setpoint group **Basic Settings** : *Contr addr [1 to 32]*.

Syntax: **#xx**
 xx ... controller address [1 to 32]
 Example: #5
 Message is addressed to controller with address 5.

2. *Access code*

InteliGen / InteliSys Access code is 15 characters length string. Access code is separated from controller address by column.

Syntax: #5 : X
X ... controller access code up to 15 characters length

Example: #5 : accesscode
Message is addressed to controller with address 5 and its access code is set to value 'accesscode'.

3. *Read value or setpoint*

Command for reading of selected value or setpoint. Return value is in appropriate numerical or string format.

Syntax: r XXXX (or rXXXX)
r ... command
XXXX... value or setpoint code

Example: #5 : accesscode r 8252
Reading of setpoint 8252 (8252 = Gear teeth)

Hint:

Access code can't contain space character. Access code can be changed in InteliMonitor only.

4. *Adjust setpoint*

Command for adjusting of selected setpoint. Answer message contains only confirmation of successful adjusting or appropriate error.

Syntax: w XXXX YYYY (or wXXXX YYYY)
w ... command
XXXX... setpoint code
YYYY... value of setpoint in appropriate format

Example: #5 : accesscode w 8252 144
Adjusting of setpoint 8252 to value 144 (8252 = Gear teeth).

Return code: ok ... adjusting setpoint was correct
w_err ... adjusting setpoint was not successful
er_pass ... adjusting setpoint required that valid password was entered
er_old ... command for adjusting was read out from SMS during GSM modem initialization – in this case command will not be served.

5. *Enter password*

Password setting command. Password has to be set before adjusting of protected setpoint or calling protected gen-set control command. Setting password command is not necessary before every adjusting. Password is a number in range 0 to 65535 and is valid for all rest of SMS.

Syntax: p PPPP (or pPPPP)
p ... command
PPPP... password

Example: #5 : accesscode p 1234, w 8252 144
Setting password before adjusting protected setpoint.

Return code: ok ... setting password was successful
er_pass ... setting password is not valid

6. *Gen-set control*

SMS command for invoking gen-set control command as Start, Stop, Fault reset etc.

Syntax: **c Y** (or **cY**)
c ... command
Y ... type of operation

Y	Type of operation	Y	Type of operation
1	Start	7	MCB ON
2	Stop	8	MCB OFF
3	Horn Reset	9	GCB ON/OFF
4	Fault Reset	10	MCB ON/OFF
5	GCB ON	11	Next Mode
6	GCB OFF	12	Previous Mode

Example: #5:accesscode p 1234, c1

This SMS command invokes genset Start. Password setting is needed in case of password protection was configured for genset commands.

Return code: ok ... genset command was accepted
er_pass ... valid password was not set before executing the command
c? ... unknown genset command
c_er ... gen-set command execution is not allowed in actual state (e.g. attempt to start the genset in OFF mode).
er_old ... command was read out from SMS during GSM modem initialization – in this case command will not be served.

7. *Read Alarm list*

Read actual Alarm list.

Syntax: **a**
a ... command

Example: #5:accesscode a
Request of actual Alarm list.

Return code: AL=(items of alarm list) ... comma separated items of Alarm list. Exclamation mark in front of Alarm list item indicates inverse record (still active alarm).

Note: 1. Answer message contains at most eight items of Alarm list.
2. Alarm list is not separated to more messages.

8. *Time delay*

Insert time delay before serving next part of SMS command.

Syntax: **d T**
d ... command

T ... time delay in sec (in range 1 to 600)
Example: #5:accesscode **d 10**
 Request 10 sec delay before serving next SMS command.

Return code: **d_ok** ... time delay was successful performed
d_over ... requested time delay is out of range (1 to 600 sec)

Note: *Any other SMS messages are not served during time delay!*

9. Remote switches (IG/IS-NT only)
 Set or reset RemoteControl1-8 output.

Syntax: **s 1/0**
s ... command
1/0 ... set/reset

Example: #5:accesscode p0, **s1 1**
 Enters password p0 and sets *RemoteControl1* output.

Return code: **p_OK,s_OK**

10. ExtValues (IG/IS-NT only)
 Enters value to ExtValue.

Syntax: **e xxx**
e ... command
xxx ... value

Example: #5:accesscode p0, **e1 50**
 Enters password p0 and sets *ExtValue1* = 50.

Return code: **p_OK,e_OK**

11. Help (IG/IS-NT only)
 Request for list of supported SMS command.

Syntax: **?**

Example: #5:accesscode **?**

Return code: **?=(p <user:>passwd,r comm_obj,w com_obj val,c cmd_num,d sec,a,sx y,ex y,?).....**
 list of supported SMS commands

Note: *Return code is not separated to more message.*

12. Answer message

Answer message start with # character followed by Gen-set name. Colon separates this header form return codes of SMS commands. Answer message is generated during serving of received message and is sent in case that 160 characters or end of received message are achieved. Answer message is sent to the originator phone number. Tree dots at the end of message indicate separation and next following message.

Example: #5:accesscode r8252,w8252 100,r8252
 answer message

#Gen-setname: 144,ok,100

13. Examples of SMS commands

Here is following several examples of SMS messages addresses to controller *IG/IS-NT* with address 5, named '*Gen-set name*'. Access code in this controller is set to '*accesscode*' and password is '*1234*'. In examples are used setpoints and values 8276 – Nomin.power, 10123 – RPM, 8315 – Controller Mode, 8235 – binary inputs, 8296 – Gen > f.

Example 1 – reading value

SMS: #5:accesscode r8276 *read value 8276*
Answer: #Gen-set name:100

Example 2 – adjusting setpoint

SMS: #5:accesscode p 1234, r8276,w8276 *read value 8276,*
110,r8276 *write 110,*
read value 8276
Answer: #Gen-set name:ok,100,ok,110 *Password was accepted,*
read value of 8276 is 100,
writing to 8276 was ok,
new value of 8276 is 110

If wrong password sent: #Gen-set *Password was not accepted,*
name:p_er,100, w_pass, 100 *read value of 8276 is 100*
writing to 8276 was not successful
read value of 8276 is still 100

Example 3 – Gen-set control and delay time

SMS: #5:accesscode r8276,c1,d30,r10123 *read value 8276,*
invoke gen-set command START,
delay 30 sec,
read value 10123
Answer: #Gen-set name:110,ok,d_ok,1499 *read value of 8276 is 110,*
Gen-set command START was
accepted,
confirm delay command,
read value of 10123 is 1499

Example 4 – adjusting special setpoint

SMS: #5:accesscode r8315,w8315 0,r8315 *read value 8315,*
write 0 (index of stringlist type),
read value 8315
Answer: #Gen-set name:MAN,ok,OFF *read value of 8315 as string,*
writing was ok,
read new value of 8315 as string

Hint:

Setpoints Stringlist type (e.g. Controller Mode) is read as string and adjusted as index of string item in string list. e.g. Controller Mode:

Read value [as string]	Write value [as index]
OFF	0
MAN	1
SEM	2
AUT	3
TEST	4

Example 5 – reading and writing other type

SMS: #5:accesscode r8235,w8296 110.2

*read value 8235,
write 110.2 with decimal point
read value of 8235 (binary value),
writing was ok*

Answer: #Gen-set name:OIIIOOIIIO,ok

*Note: 1. Writing of binary setpoint is not supported.
2. Writing of setpoint with decimal point is automatically converted to appropriate number of decimal places.*

Example 6 – reading actual Alarm list

SMS: #5:accesscode a

read actual Alarm list

Answer: #Gen-set name:AL=(!Wrn PrimWater temp, !Wrn SecWater temp, Batt volt)

Actual Alarm list contains three items.

Event messages description

Following events can be received by mobile phone.

- Manual Start
- Manual Stop
- Remote Start
- Remote Stop
- AMF Start
- AMF Stop
- Mains Fail
- Mains Returned
- Load on Mains (when MCB is closed)
- Load on Genset (when GCB is closed)

Message structure for controller with RTC

*Genset Name [10:15:24 06.04.2011]
10:15:15 Mains Fail
10:15:18 AMF Start
10:15:22 Mains Returned
10:15:23 Load on Mains
10:15:24 AMF Stop*

Message structure for controller without RTC

*Genset Name [5896:30]
5896:29 Mains Fail
5896:29 AMF Start
5896:30 Mains Returned
5896:30 Load on Mains
5896:30 AMF Stop*

Hint:

Event message is sent, if there is no other event. within 30s, any additional delay could be caused by local provider.

Recommended ISDN modem

- Askey TAS-200E
- ASUScom TA-220ST
- Develo Microlink ISDN i

Recommended GSM modem

- Siemens M20, TC35, TC35i, ES75, MC39
- Wavecom M1200/WMOD2
- Wavecom – Maestro 20, dual 900/1800MHz.
- Wavecom – Fastrack M1306B, dual 900/1800 MHz (Fastrack M1206B is NOT recommended)
- Wavecom – Fastrack Supreme 10
- FALCOM A2D, dual 900/1800MHz.

GSM Modem setup

Prior to start work with GSM modem run following program for GSM proper setup.

Program writes all the necessary AT commands to configure the GSM modem properly for use with IL-NT.

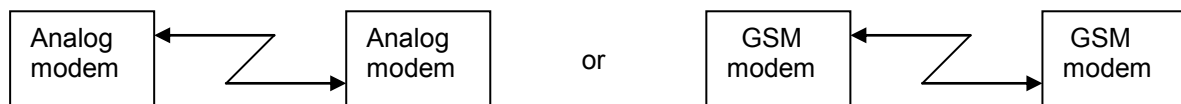
This program runs independent on LiteEdit:

- Start MS Windows-Start-Program files - LiteEdit –Gm_setup.exe.
- Select COM port
- Select iG-CU (=IS-CU) or iG-MU unit
- Press Setup button
- Follow commands in GSM Modem Setup window

Typical real baud rate for GSM data communication is 80 to 90 Bps.

Hint:

It is strongly recommended to use the same type of modem on the both sides (IL and PC) of connection.



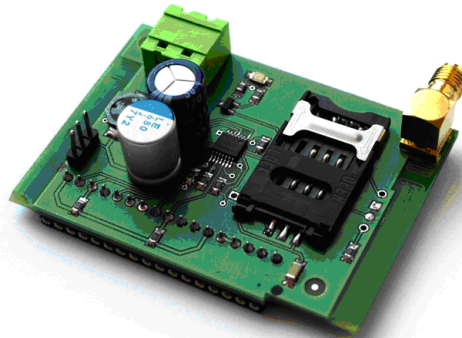
Mobile SIM card setting

- Adjust SIM card in GSM modem following way:
- enable data connection (when required)
- no PIN code

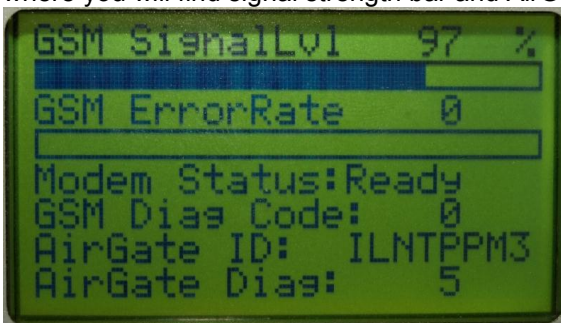
Short guide how to start using IL-NT-GPRS module

CAUTION!

Any manipulation with plug-in module shall be done with disconnected power supply to both controller and module!!! Otherwise there is a risk of demangling the communication module. Power supply shall be switched on also is same time to both module and controller. Fail to follow these instructions (power supply active only in controller or only in module) can lead to module or controller failure!

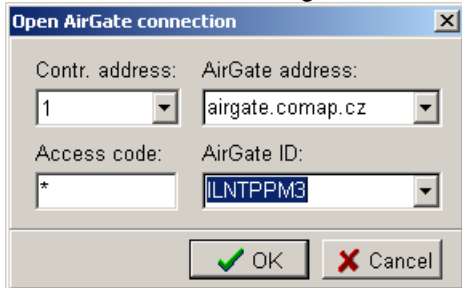


1. You will need one of supported ComAp controllers (IL-NT/IC-NT/ID-Lite), IL-NT-GPRS, antenna, SIM card with GPRS service and optionally IL-NT-RS232 or IL-NT-S-USB module. Firmware supporting IL-NT-GPRS module is IL-NT-WSUP 1.0 or selected customer branches (contact support@comap.cz for details). It is available here: <http://www.comap.cz/products/detail/IL-NT-GPRS/support/software/>
 2. Contact SIM card operator for getting GPRS APN (APN = Access Point Name) name, username and password. Some operator's APNs are listed here: <http://www.quickim.com/support/gprs-settings.html#Australia> or here: <http://www.flexispy.com/Mobile%20APN%20Setting%20to%20use%20GPRS.htm>
- Example:** APN Name = internet.t-mobile.cz, UserName = [blank], Password = [blank].
3. Make sure SIM card does not require PIN code. If it does, it is possible to disable it in any common network unlocked mobile telephone.
 4. Power up the ComAp controller.
 5. Enter correct APN Name, APN UserName and APN UserPass in controller's setpoint group Comms Settings. Set COM1 Mode = DIRECT. Comms settings as every setpoint group are accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by LiteEdit 4.5 and higher.
 6. Switch off ComAp controller.
 7. Place the SIM card into slot on IL-NT-GPRS card, plug in the IL-NT-GPRS card into communication slot on back side of ComAp controller.
 8. Connect the antenna to designated SMA connector.
 9. Connect power supply to IL-NT-GPRS module. It supports 8-36V DC voltage.
 10. Power up the system.
 11. Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to last of measurement screens where you will find signal strength bar and AirGate ID identifier.



Once this AirGate ID is displayed, connection via AirGate was successful. This value will be needed for LiteEdit or WebSupervisor connection. Kindly make a note for future reference.

AirGate Connection dialog in LiteEdit:



Add new gen-set dialog in WebSupervisor:



Should you encounter any troubles with connection, check the faultcodes on the same screen and find detailed description in Diagnostic codes listed lower.

- Open LiteEdit PC software or enter your WebSupervisor account at <http://websupervisor.comap.cz>

Hint: For opening a new WebSupervisor account kindly send e-mail to admin.websupervisor@comap.cz your Name, Login name, E-mail address and Timezone. We will create free account for you. Details at: <http://www.comap.cz/products/detail/WebSupervisor>

Communication is now ready for use.

Hint:

To reduce the data traffic over GPRS network you can set in setpoint group „Comms Settings“ the parameter „AirGate IP“ = 80.95.108.26. This will save significant data amount needed for translation of Airgate server IP address. In case of changing the server IP address this settings has to be updated or returned to default „airgate.comap.cz“.

Hint:

From it's nature the GPRS connection can from time to time drop for a short time due to a number of reasons affecting the cellular network. However the system is designed in the way that controller will automatically reconnect back.

Hint:

It is highly recommended to use numbers in international format and start to fill in phone numbers from the first communication channel.



GSM Diag Code – Diagnostic code for IL-NT-GPRS modem Table of Diagnostic Codes:

Code	Description
0	OK. No error
1	Not possible to hang up
2	IL-NT-GPRS is switched off
3	IL-NT-GPRS is switched on
4	IL-NT-GPRS – error in initialization
5	IL-NT-GPRS – not possible to set the APN
6	IL-NT-GPRS – not possible to connect to GPRS network
7	IL-NT-GPRS – not possible to retrieve IP address
8	IL-NT-GPRS – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network
255	Only running communication is needed to indicate

AirGate Diag – Diagnostic Code for AirGate connection Table of Diagnostic Codes:

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

IL-NT-RD Remote display software

This chapter describes Remote display software IL-NT-RD, which is designed as an remote signalling and control software for IntelliLite-NT and IntelliDrive Lite controllers. **It is the optional software which is possible to upload into controller instead of standard controller's firmware.**

General description

Remote display software works as "remote display and control" for the master IntelliLite-NT or IntelliDrive Lite controller. Genset/Engines can be controlled from remote display as well as from master controller. All remote display screens (Measure, Setpoints and History) displays the same data like master controller. Front panel buttons on both controllers work the same way. All remote display LED's shows the same state as corresponding LED's on master controller.

Warning !

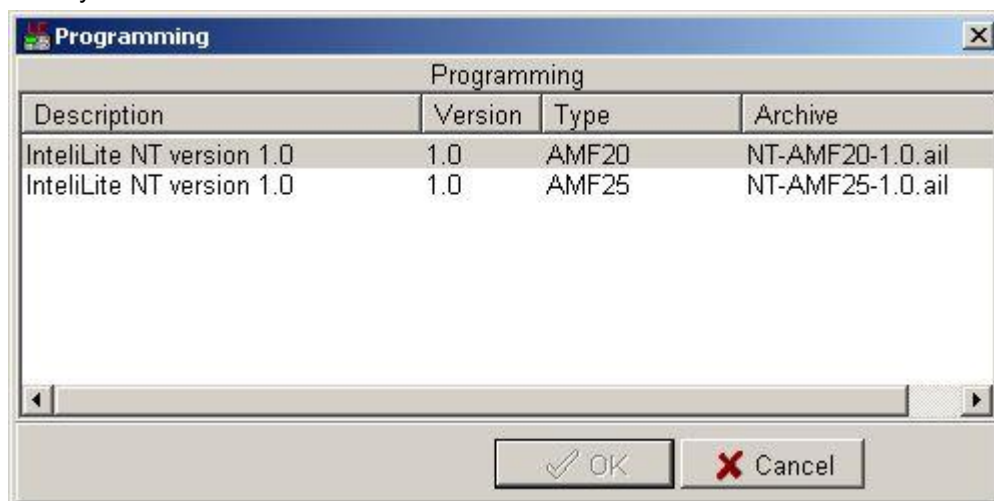
It is highly recommended to use the same type and model of controller for master and remote display. Only in such case is assured the proper function of all buttons, LED diods and display. Another combinations of HW types and models from Master controller and remote display are not supported nor tested!

IL-NT-RD Software installation

The IL-NT-RD remote display firmware is installed in the same way as any other IL-NT firmware using LiteEdit software. Please see LiteEdit Reference guide for details about upgrading firmware. IL-NT-RD consists only firmware, not an archive.

However when there is IL-NT-RD firmware installed in the controller the procedure to install back the original standard firmware is following:

- Open any type of online connection.
- DDE server will try to open the connection, but it will fail and write red error message in the status bar.
- In this moment go to **CONTROLLER -> PROGRAMMING AND CLONING -> PROGRAMMING** and select **proper!** firmware you want program to the controller. Choosing the wrong type of firmware may result in non-functional controller.



- Press "OK" button to programm the firmware to the controller.

- It may be required to switch off power supply of controller, close the boot jumper and switch on controller again. Follow the information windows accordingly.
- After programming is finished (it may be required to power off controller, open the boot jumper and power it on again) open configuration window and perform the configuration process manually. There is no compatibility of the configuration between different firmware versions.
- In some cases the "wrong setpoints" message can occur in the DDE server status line and the controller is blocked showing "Init" state. Use **CONTROLLER -> RESET FROM INIT STATE** menu item to put the controller to normal operation. Be sure you have checked all setpoints before.

CAUTION!

Check the statistic value "Engine hours" after firmware upgrade. Readjust the value if necessary.

IL-NT-RD Wiring

IL-NT-RD can be connected to IntelliLite-NT or IntelliDrive Lite controller via RS232 or RS485 communication line. It is possible to connect only up to two remote displays to one master controller, if they are using different communication COMs. It is not supported to connect two or more remote displays to one communication line, eg. RS485. It is possible to monitor only one master controller from one remote display at the time.

Connection process

Remote display after power on automatically starts to search for any master controller connected. It starts to search on COM1 from master controllers address 1 to 32 and later on COM2 from address 1 to 32. Remote display tries two communication speeds 38400 bps and 56000bps.

During this process is displayed text "Detecting..." on screen and progress bar below counts from 0 to 100%. This process takes approx. 10-15 seconds. Then is 5 seconds pause and process continues again until compatible master controller is found.

Not supported types of controllers, not supported application, or controllers that are not properly communicating are skipped during the search.

Controller type selection

IL-NT-RD automatically detects controller type.

Troubles with connection

There are few reasons why remote display can not connect with master controller:

1. Not supported type of controller connected (Eg. IGS-NT, ID-DCU, IC-NT, IGS-CU, etc.)
2. Not supported firmware in master controller
3. Configuration table error in master controller
4. Wrong settings of setpoint COMx Mode in master controller
5. Wrong connection, wiring, communication fail

Direct RS232 connection

HW module:

IL-NT-RS232

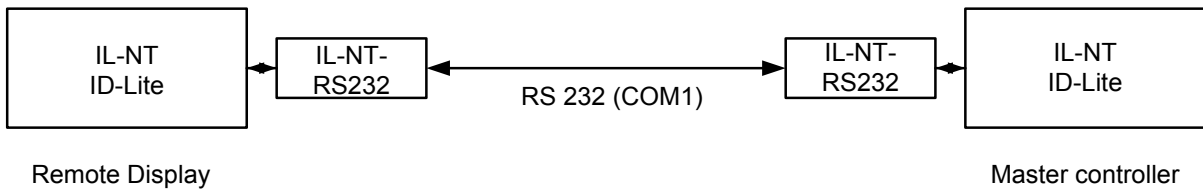
Master controller settings:

ControllerAddr = 1..32

COM1 Mode = DIRECT

Up to 2 meters:

It is recommended to use our standard AT-LINK cable.



Up to 10 meters:

It is recommended to use standard Null-modem cable for local connection between controller and remote display, although the three wires (TxD, RxD, GND) RS 232 connection is enough for direct communication:

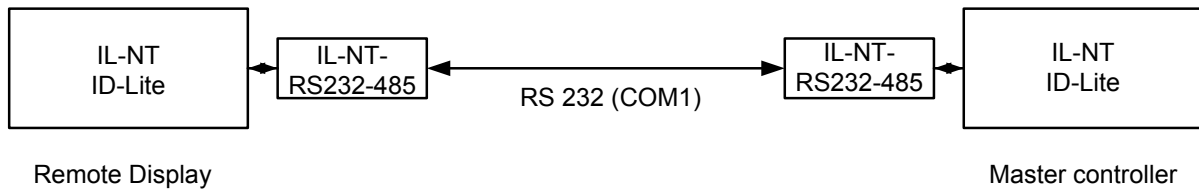
IL-NT/ID-Lite connector D-SUB9 female	IL-NT-RD connector D-SUB9 female
RxD 2	3 TxD
TxD 3	2 RxD
GND 5	5 GND

Remote RS485 and/or direct RS232 connection

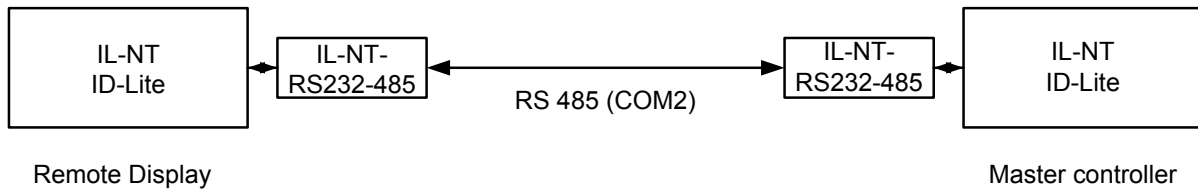
HW module:

IL-NT-RS232-485

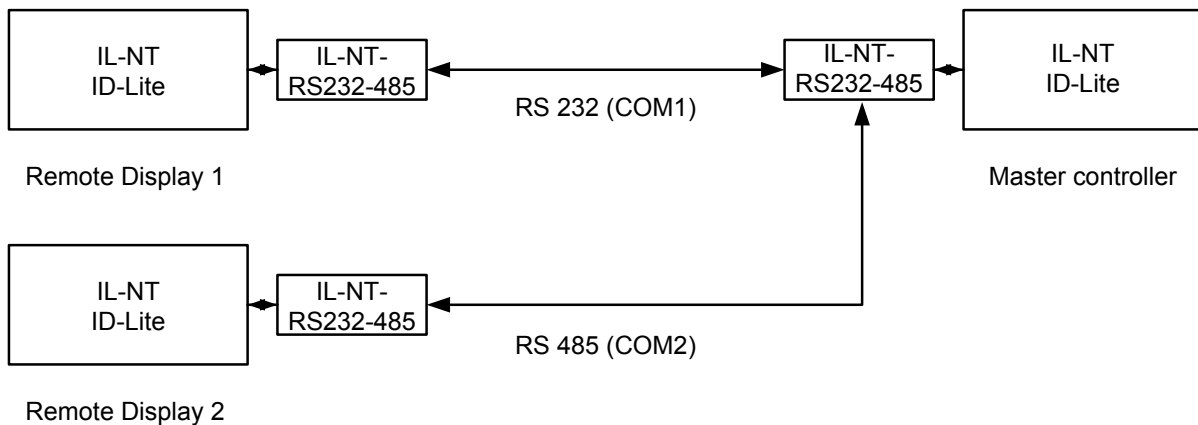
Up to 1000 meters (only with RS485):



OR



OR



Case 1) RS232
Master controller settings:
ControllerAddr = 1..32
COM1 Mode = DIRECT

Case 2) RS485
Master controller settings:
ControllerAddr = 1..32
COM2 Mode = DIRECT

Case 3) RS232 +RS485
Master controller settings:
ControllerAddr = 1..32
COM1 Mode = DIRECT
COM2 Mode = DIRECT

It is possible to make a RS232 direct connection with IL-NT-RS232 module on one side and IL-NT-RS232-485 module on the other side.

Alternative connection using external RS232-RS422/485 converter:

Recommend external converter:

ADVANTECH – ADAM 4520: RS232 to RS422/485 converter, DIN rail, automatic RS485 bus supervision, no external data flow control signals, galvanic isolated, baud rate 38400 or 56000 bps.

Any connected RS 232 to RS 422/485 converter has to be set to passive DSR signal (when DSR connected) after switch on.

Function description

Remote display IL-NT-RD works as remote display and control of the master IntelliLite-NT or IntelliDrive Lite controller. It is supposed and highly recommended that both, remote display and master are using the same HW type and model of controller. Another types and models of master and remote display are not supported nor tested. All remote display's LEDs shows the same state as corresponding LEDs on master controller. Front panel buttons on both controllers work in the same way. Genset/Engine can be controlled from remote display as well as from master controller. User can switch screens, set password, change setpoints and view history records.

All IL-NT-RD screens Init, Measure, Setpoints and History display the same data like in the master controller.

Master device is always able to work without connected Remote display.

Interruption of the serial line between master device and Remote display has no effect to the master controller.

If the serial line between master device and remote display is interrupted, or communication cannot be established, remote display shows it's Init screen and message "Trying" and all LED's are off.

Once remote display finds compatible master it shows "Preparing" and downloads configuration table from master controller.

After the configuration from master is downloaded remote display jump to master controllers Init screen and all LEDs and blinking.

It is possible to switch to remote displays Init screen to check it's version and serial number of used controller and communication status by pressing PAGE button for 3 seconds.

SW compatibility

IL-NT-RD sw. version 1.2 is compatible with IL-NT-AMF26-P-1.0.

Some of the future IL-NT-AMF26-P versions may require upgrade of the IL-NT-RD software.

Maintenance

Backup battery replacement

The internal backup battery should be replaced approx. every 5-7 years. Replace the battery, if the alarm *Low BackupBatt* occurs. Follow these instructions:

1. Disconnect all terminals from the controller and remove the controller from the switchboard.
2. Release the rear cover using a flat screwdriver or another suitable tool.



3. Remove all plug-in modules.
4. The battery is located in a holder on the circuit board. Remove the old battery with a small sharp screwdriver and push with a finger the new battery into the holder. Use only CR1225 lithium battery.



5. Put the rear cover back. Use slight pressure to lock the snaps into the housing. **Pay attention that the cover is in correct position and not upside down!**
6. Plug the modules back into the slots.
7. Power the controller on, adjust date and time and check all setpoints.

Technical Data

Inputs/Outputs overview

Model	BIN	BOUT	AI	COM1	COM2	CAN	RPM	Gen. Voltage	Mains Voltage	Gen. Current
IL-NT-AMF26-P	7+1/7*	7+2/7*	3	Y**	Y**	Y	Y	Y	Y	Y

* With optional IL-NT-EFCPM/IL-NT-EFCPM2 module

** With optional communication plug-in module

Y -Available

N -Not available

Generator protections

ComAp gen-set controllers provide following range of generator protections. For each protection adjustable limit and time delay are available.

Comparison table with ANSI codes:

ANSI code	Protection	IL-NT AMF26P
59	Overvoltage	•
27	Undervoltage	•
47	Voltage Assymetry	•
81H	Overfrequency	•
81L	Underfrequency	•
50+51	Overcurrent	•
46	Current Unbalance	•
32	Overload	•
51N+64	Earth Fault	-
32R	Reverse Power	-
25	Synchronism Check	-
47	Phase Rotation	**
37	Undercurrent	-
55	Power Factor	-
71	Gas (Fuel) Level	•

Note:

- Not available
- Available
- ** Fixed setting

Language support

IL-NT in firmware version 2.3 supports following language code pages

Code page	Language	Windows code
0	West European languages	Windows 1252
134	Chinese	GB 2312
162	Turkish	Windows 1254
128	Japanese	Windows 932
204	Russian	Windows 1251
238	East European languages	Windows 1250

Power supply

Voltage supply	8-36V DC
Consumption	40-430mA depend on supply voltage and temperature
Consumption depends on supply voltage	0,104A at 8VDC 0,080A at 12VDC 0,051A at 24VDC 0,044A at 30VDC 0,040A at 36VDC
Allowed supply voltage drop-out:	100ms from min. 10V, return to min. 8V
Battery voltage measurement tolerance	2 % at 24V

Hint:

For the supply voltage less than 7V the backlight of the display is switched off.
Short-term voltage drops (e.g. during the engine cranking) do not affect the operation at all.

Operating conditions

Operating temperature IL-NT	-20..+70°C
Storage temperature	-30..+80°C
Protection front panel	IP65
Humidity	95% without condensation
Standard conformity	
Low Voltage Directive	EN 61010-1:95 +A1:97
Electromagnetic Compatibility	EN 50081-1:94, EN 50081-2:96 EN 50082-1:99, EN 50082-2:97
Vibration	5 - 25 Hz, $\pm 1,6$ mm 25 - 100 Hz, $a = 4$ g $a = 200$ m/s ²
Shocks	

Dimensions and weight

Dimensions	180x120x55mm
Weight	450g

Mains and generator

Nominal frequency	50-60Hz
Frequency measurement tolerance	0,2Hz

Current inputs

Nominal input current (from CT)	5 A
Load (CT output impedance)	< 0,1 Ω
CT input burden	< 0,2 VA per phase (In=5A)
Max. measured current from CT	10 A
Current measurement tolerance	2% from the Nominal current
Max. peak current from CT	150 A / 1s
Max. continuous current	12 A

Voltage inputs

Measuring voltage range	0 – 277 VAC phase to neutral 0 – 480 VAC phase to phase
Maximal measured voltage	340 VAC phase to neutral

Input resistance	600 VAC phase to phase 0,6 MΩ phase to phase 0,3 MΩ phase to neutral
Voltage measurement tolerance	2 % from the Nominal voltage
Overvoltage class	III / 2 (EN61010)

Binary inputs and outputs

Binary inputs

Number of inputs	7
Input resistance	4,2 kΩ
Input range	0-36 VDC
Switching voltage level for close contact indication	0-2 V
Max voltage level for open contact indication	8-36 V

Binary open collector outputs

Number of outputs	7
Maximum current	0,5 A
Maximum switching voltage	36 VDC

Analog inputs

Not electrically separated	
Number of inputs	3
Resolution	10 bits
Maximal resistance range	2500 Ω
Resistance measurement tolerance	± 2 % ± 2 Ω out of measured value

Speed pick-up input

Type of sensor	magnetic pick-up (connection by shielded cable is recommended)
Minimum input voltage	2 Vpk-pk (from 4 Hz to 4 kHz)
Maximum input voltage	50 Veff
Minimum measured frequency	4 Hz
Maximum measured frequency	10 kHz (min. input voltage 6Vpk-pk)
Frequency measurement tolerance	0,2 %

D+ Function

Max. D+ output current	300 mA
Guaranteed level for signal Charging OK	80% of supply voltage

CAN bus interface

Galvanically separated	
Maximal CAN bus length	200m
Speed	250kBd
Nominal impedance	120Ω
Cable type	twisted pair (shielded)

Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length and 32 iS-COM units connected:

Nominal Velocity of Propagation	min. 75% (max. 4,4 ns/m)
---------------------------------	--------------------------

Wire crosscut min.0,25 mm²
Maximal attenuation (at 1 MHz) 2 dB / 100m

Recommended Industrial Automation & Process Control Cables:

BELDEN (see <http://www.belden.com>):

- 3082A DeviceBus for Allen-Bradley DeviceNet
- 3083A DeviceBus for Allen-Bradley DeviceNet
- 3086A DeviceBus for Honeywell SDS
- 3087A DeviceBus for Honeywell SDS
- 3084A DeviceBus for Allen-Bradley DeviceNet
- 3085A DeviceBus for Allen-Bradley DeviceNet
- 3105A Paired EIA Industrial RS485 cable

LAPP CABLE (see <http://www.lappcable.com>)

- Unitronic BUS DeviceNet Trunk Cable
- Unitronic BUS DeviceNet Drop Cable
- Unitronic BUS CAN
- Unitronic-FD BUS P CAN UL/CSA

IL-NT RS232 interface (optional card)

Plugs into IL-NT controller COMMUNICATION MODULE port.

Maximal distance 10m
Maximum Speed Up to 57,6 kBd (DIRECT), 38,4kBd Analog modem, 9,6 kBd digital modem, 57,6 kBd (MODBUS)

Recommend external converter:

ADVANTECH – ADAM 4520: RS232 to RS422/485 converter, DIN rail, automatic RS485 bus supervision, no external data flow control signals, galvanic isolated.

Recommended internal converter:

ADVANTECH – PCL-745B or PCL745S : Dual port RS422/485 Interface card, automatic RS485 bus supervision, no external data flow control signals, galvanic isolated

Hint:

For details on all IL-NT extension and communication modules see IL-NT, IC-NT-Accessory Modules manual.

With SW version IL-NT 1.2 and older, the communication speeds are 19,2kBd (STD/DIRECT), 19,2kBd Analog modem, 9,6 kBd digital modem, 9,6kBd (MODBUS)

IL-NT RS232-485 interface (optional card)

Plugs into IL-NT controller COMMUNICATION MODULE port.

Maximal distance 10m (RS232), 1200m (RS485)
Maximum Speed Up to 57,6 kBd (DIRECT), 38,4kBd Analog modem, 9,6 kBd digital modem, 57,6 kBd (MODBUS)

Hint:

This module is supported with SW version IL-NT 1.3 and newer.

InteliLite^{NT} AMF26-P, SW version 2.4, ©ComAp – January 2016
AMF26-P-2.4 Reference Guide.pdf

IL-NT S-USB interface (optional card)

Plugs into IL-NT controller COMMUNICATION MODULE port.

Maximal distance	5m
Maximum Speed	Up to 57,6 kBd (DIRECT), 38,4kBd Analog
modem, 9,6 kBd digital modem, 57,6 kBd (MODBUS)	

Use only shielded A-B USB cables up to 5m length.

Recommend USB cable:
USB-LINK CABLE 1.8M – ComAp A-B USB cable.

Hint:

With SW version IL-NT 1.2 and older, the communication speeds are 19,2kBd (STD/DIRECT), 19,2kBd Analog modem, 9,6 kBd digital modem, 9,6kBd (MODBUS)

IL-NT-AOUT8 interface (optional card)

Plugs into IL-NT controller EXTENSION MODULE port.

Number of PWM outputs	8
PWM frequency	250Hz
Maximum current	0,5 A
Maximum switching voltage	36 VDC
Output resistance	1Ω
Resolution	10 bits

IL-NT-EFCPM interface (optional card)

Dimension (WxHxD)	66x37x10 mm (2,6'x1,45'x0,4')
Weight	124g
Interface to controller	Direct mounted
Earth fault current protection input	Not galvanic separated
	Input range up to 8,32 mA
Binary Input	Not galvanic separated
	Input resistance – 4,2kohm
	Input range – 0 VDC to 36 VDC
Binary outputs (open collector)	Not galvanic separated
	Maximum current – 1,0 ADC
	Maximum switching voltage – 36 VDC
	Voltage drop 1 VDC
Storage temperature	- 40°C to + 80°C
Operating temperature	- 40°C to + 70°C

IL-NT-EFCPM2 interface (optional card)

Plugs into IL-NT controller EXTENSION MODULE port. It contains 1 current input dedicated for earth fault current protection and 7 dedicated pins which can be configured as binary inputs or outputs.

Dimension (WxHxD)	66x37x10 mm (2,6'x1,45'x0,4')
Weight	124g
Interface to controller	Direct mounted
Storage temperature	- 40°C to + 80°C
Operating temperature	- 40°C to + 70°C

Earth Fault Current Protection Input

Number of inputs	1
Nominal input current (from CT)	10mA
Input resistance	<11Ω
Max measured current from CT	11mA
Current measurement tolerance	2% from Nominal current
Max peak current from CT	0,15A / 1s
Max continuous current	110 mA

Binary inputs

Number of inputs	7
Input resistance	4,7kΩ
Input range	0-36 VDC
Voltage level for close contact indication (Logical 1)	<1,5 VDC
Voltage level for open contact indication (Logical 0)	>1,5 VDC
Max voltage level for open contact indication	8-36 VDC

Binary outputs (open collectors)

Number of outputs	7
Maximum current per pin	0,5 A
Maximum switching common current	2 A
Maximum switching voltage	36V
Maximum voltage drop	1V

Hint:

All inputs and outputs are not galvanically isolated.

Please see detail about wiring and description at chapter [IL-NT-EFCPM2](#).

IGS-PTM

Voltage supply	8-36V DC
Consumption	0,1A depend on supply voltage
Mechanical dimensions:	40 x 95 x 45 mm , DIN rail (35 mm) mounted
Interface to controller	CAN
Binary inputs and outputs	see IG-IOM
Analog output	see IG-IOM

Analog inputs

Not electrically separated	
Number of inputs	4
Resolution	10 bits
Maximal resistance range	0 – 250 Ω
Maximal voltage range	0 – 100 mV
Maximal current range	0 – 20 mA
Resistance measurement tolerance	1 % ± 2 Ω out of measured value
Voltage measurement tolerance	1,5 % ± 1mV out of measured value
Current measurement tolerance	2,5 % ±0,5mA out of measured value

IGL-RA15

Power supply

Voltage supply	8-36V DC
Consumption	0,35-0,1A (+1A max horn output)

Operating conditions

Operating temperature	-20..+70°C
Storage temperature	-40..+80°C
Protection front panel	IP65

Dimensions and weight

Dimensions	180x120x55mm
Weight	950g

Horn output

Maximum current	1 A
Maximum switching voltage	36 VDC

IG-IB

Voltage supply	8-36V DC
Consumption	0,1A depend on supply voltage
Mechanical dimensions:	95 x 96 x 43 mm , DIN rail (35 mm) mounted
Interface to controller	RS232
Interface to modem	RS232
Interface to Ethernet	RJ45 (10baseT)
Operating temperature	-30..+70°C
Storage temperature	-30..+70°C