

InteliATS^{NT} STD

SW version 2.5

Automatic Transfer Switch Controller

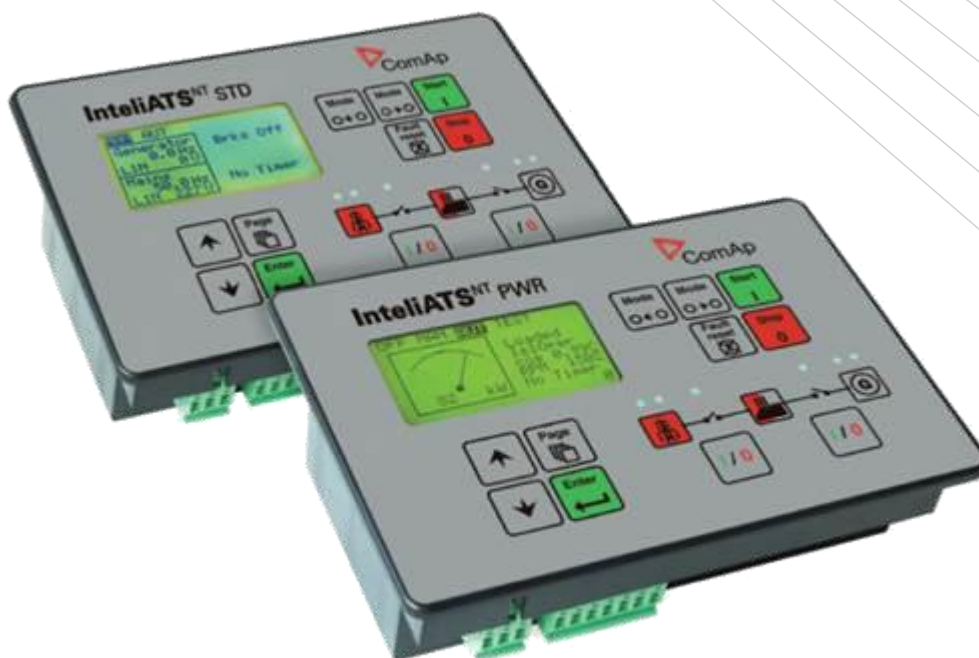


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Document information

DOCUMENT HISTORY

REVISION NUMBER	RELATED SW. VERSION	DATE
1	1.0	22.02.2009
2	1.1	24.03.2009
3	1.2	09.01.2010
4	2.0	09.06.2010
5	2.4	30.04.2015
6	2.5	08.02.2016
7	2.5	12.01.2017
8	2.5	19.9.2019

Clarification of notation

HINT:

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

NOTE:

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

CAUTION!

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

WARNING!

This type of paragraph indicates things, procedures, adjustments etc. which need high level of attention, otherwise can cause personal injury or death.

Text

PAGE

Break Return

Generator protections

REMOTE START/STOP

(Capital letters in the frame) buttons on the front panel

(Italic) set points

(Bold) Set point group

(Capital letters) binary inputs and outputs

Conformity Declaration



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

General Guidelines

What is in this manual?

This manual describes the InteliATS^{NT} STD (IA-NT-STD) software, which is designed for automatic transfer switch applications and provides general information on how to install and operate the InteliATS^{NT} controller.

This manual is dedicated for

- Automatic transfer switch panel builders
- Operators of remote gen-sets (started remotely from InteliATS^{NT})
- For everybody who is concerned with installation, operation and maintenance of the gen-set

InteliATS controller SW and HW versions compatibility

Software InteliATS^{NT} is compatible with the InteliATS^{NT} hardware v. 1.3 and higher.

There are two modifications of the InteliATS^{NT} HW - STD and PWR and two modifications of the InteliATS^{NT} SW – STD and PWR which together with the appropriate archive file (IA-NT-STD-HW_1.3-X.X.AIL for STD HW 1.3, IA-NT-STD-X.X.AIL for STD HW > 1.3 and IA-NT-PWR-X.X.AIL) form the InteliATS^{NT} PWR or STD controller.

Beside that the InteliATS^{NT} software is compatible with IL-NT AMF HW 1.3 and higher too, which is used when a low temperature ATS application is needed. In this case the InteliATS^{NT} SW must be combined (purchased) with the IL-NT AMF 25 LT HW to obtain the low temperature ATS controller.

NOTE:

Because of large variety of InteliATS^{NT} parameters settings, it is not possible to describe any combination. Some of InteliATS^{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.

CAUTION!

SW and HW must be compatible (e.g. IA-NT firmware and IA-NT HW) 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, download correct software.

NOTE:

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

WARNING!

Remote control - InteliATS^{NT} controller can be remotely controlled. In case of the work on the controlled devices check, that nobody can perform remote operation. To be sure disconnect

- remote control via RS232 line
- input REM TRANSFER
- input REMOTE AUT
- input REMOTE TEST

or disconnect output Rem START/STOP and outputs GCB CLOSE/OPEN and MCB CLOSE/OPEN

WARNING!

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

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

Switch InteliATS^{NT} to MAN or OFF Mode or disconnect the Binary outputs Rem Start/Stop and GCB Close/Open to avoid unexpected automatic start of gen-set and GCB closing.

WARNING!

Dangerous voltage

In no case touch the terminals for voltage and measurement!

Always connect grounding terminals!

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

Description

Description of the controller system

InteliATS^{NT} is a comprehensive Automatic Transfer Switch controller designed to monitor the incoming AC mains supply (1 or 3 phases) for under & over voltage, under & over frequency and voltage unbalance. In the case of any mains supply disproportion it will send a remote start command to the gen-set and make change over for both generator and mains contactors. The gen-set requires a remote start type control unit (e.g. the ComAp InteliLite^{NT} MRS 10 controller), at least a key-start box with an external input for the start/stop signal.

The controller uses Open Delayed Transition. This transition is a standard type of changeover provided by the most common AMF or ATS controllers supplied by the other vendors. Controllers perform load transfer between both power sources with break (blackout). Delayed Transition means there is a delay between the source breaker opening and the target breaker closing.

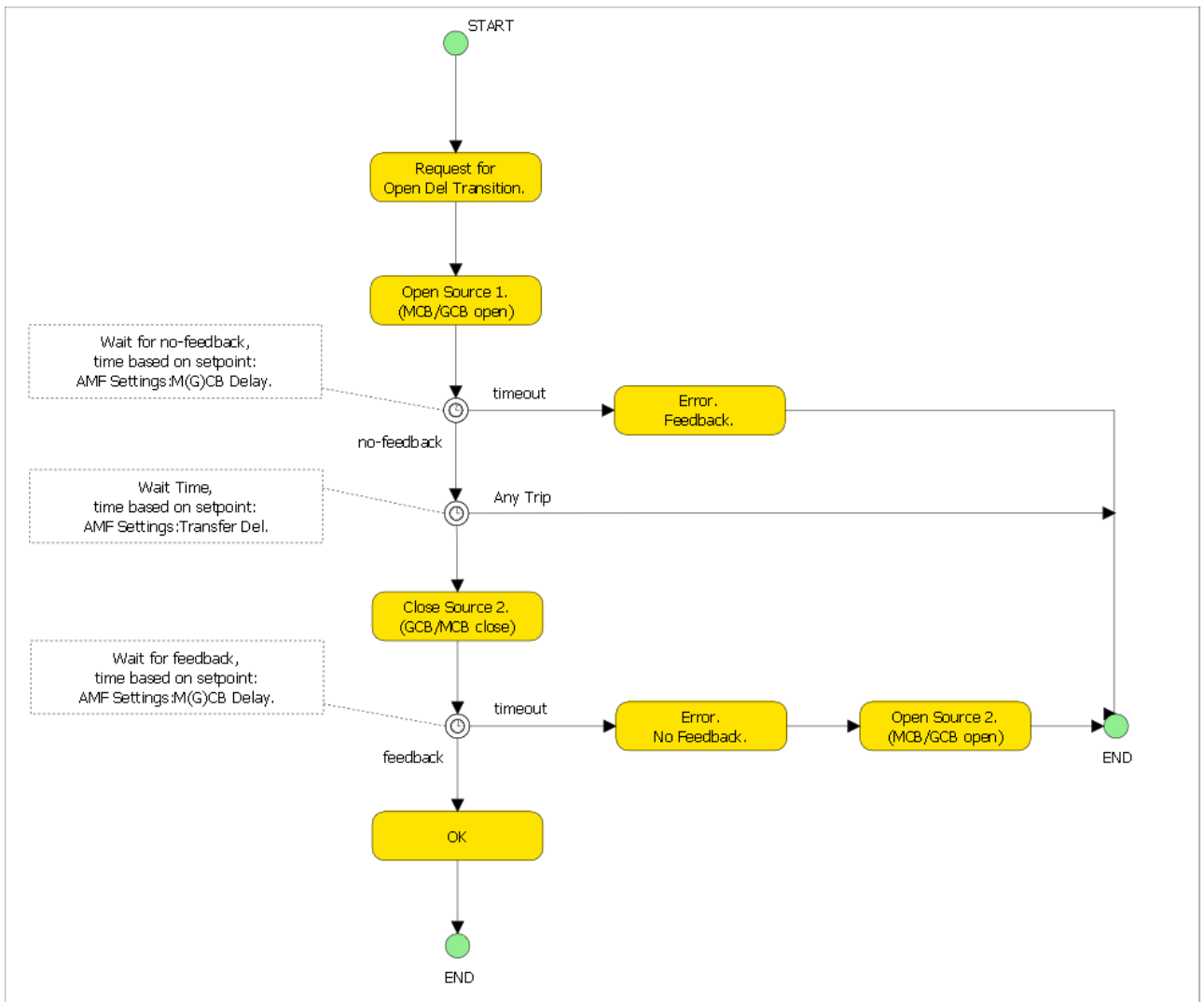
Two or three position ATS switch or two independent breakers/contactors can be used as a switching mechanism.

InteliATS^{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 & ATS Breaker..

The key features are:

- Easy-to-use operation and installation. Factory default configuration covers most of applications
- Different customer changes are possible thanks to the configurability
- Excellent remote communication capabilities
- High reliability

Open Delay Transition functional diagram.



HINT:

This transition can perform fastest possible changeover if **Transfer Del** is set to zero value. Overall blackout time then equals to 20 ms + breaker reaction time.

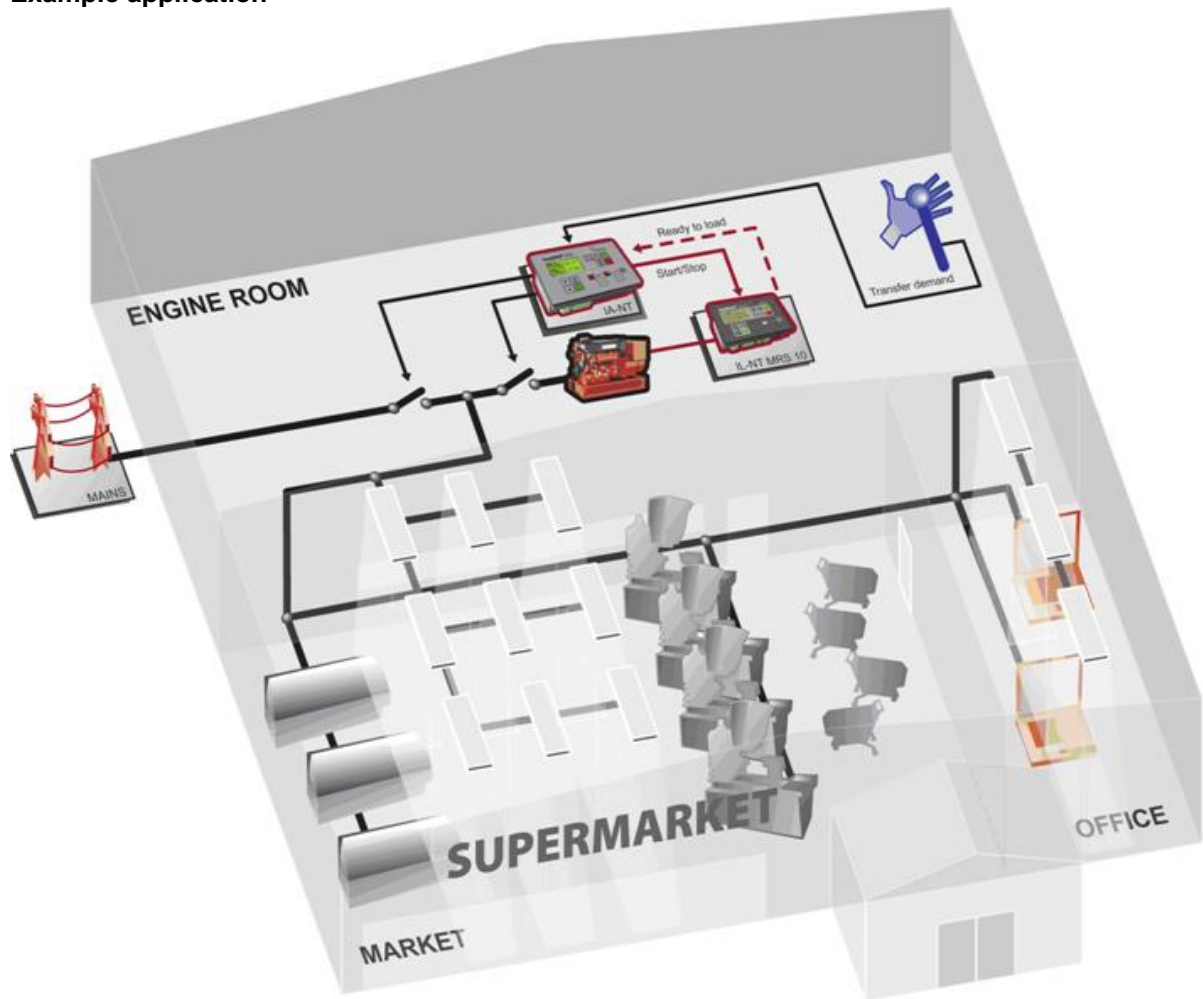
HINT:

Use longer delay time to avoid problems with motor starters. (Motor starts prefer to see break of a few seconds so they can initialize properly).

HINT:

To avoid issues with contactor mechanical interlocks use delay 0.75s or longer (mech. interlock on contactors takes some time to clear). If you try to close one contactor before interlock has cleared it can jam and you end up without supply to load).

Example application



Configurability

One of the key features of the controller is high level of adaptability of the system to the needs of every particular application. The way, how to achieve this, is the configuration.

NOTE:

Use **LiteEdit** PC software to read configuration from the controller or disk, view it, modify it and write the configuration to controller or disk.

The firmware contains a number of binary inputs and outputs needed for all necessary functions available in the firmware. But not all functions are required at the same time on different gen-sets and also the controller hardware does not have so many input and output terminals. One of the main tasks of the configuration is mapping of "logical" firmware inputs and outputs to the "physical" hardware inputs and outputs.

Configuration parts:

1. Mapping of [logical binary inputs \(functions\)](#) or assigning [alarms](#) to physical binary input terminals
2. Mapping of [logical binary outputs \(functions\)](#) to physical binary output terminals
3. Changing language of the controller texts

The controller is delivered with a **default configuration, which should fit to most standard applications**. This default configuration can be changed only using PC and LiteEdit software. See LiteEdit documentation for details.

NOTE:

You need one of communication modules to connect the controller to a PC with LiteEdit. There is a special easy removable service module for cases, where there is no communication module permanently attached.

Once the configuration is modified, it can be stored in a file for later usage with another controller or for backup purposes. The file is called **archive** and has file extension ".ail". An archive contains full image of the controller at the moment of saving (if the controller is online to the PC) except firmware, i.e. besides configuration there are also current adjustment of all setpoints, all measured values, a copy of history log and a copy of alarm list.

The archive can be simply used for **cloning** of controllers, which means preparing controllers with identical configuration and settings.

What is in the package?

Accessories	Description	Optional / Obligatory
IA-NT STD	InteliATS ^{NT} central unit, STD version	Obligatory
IL-NT-RS232	RS232 communication card	Optional
IL-NT-RS232-485	RS232 and RS485 communication card	Optional
IL-NT-S-USB	Service USB communication card	Optional
IL-NT-AOUT8	Gauge driver plug-in card	Optional
IL-NT-BIO8	Configurable I/O plug-in card	Optional
*IL-NT RD	Remote display software	Optional
InternetBridge-NT	External communication module	Optional

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

NOTE:

For detailed information about extension modules used with IA-NT controllers, please see the [IL-NT, IC-NT, IA-NT, ID-Lite-Accessory Modules manual](#).

IL-NT RS232 Communication module

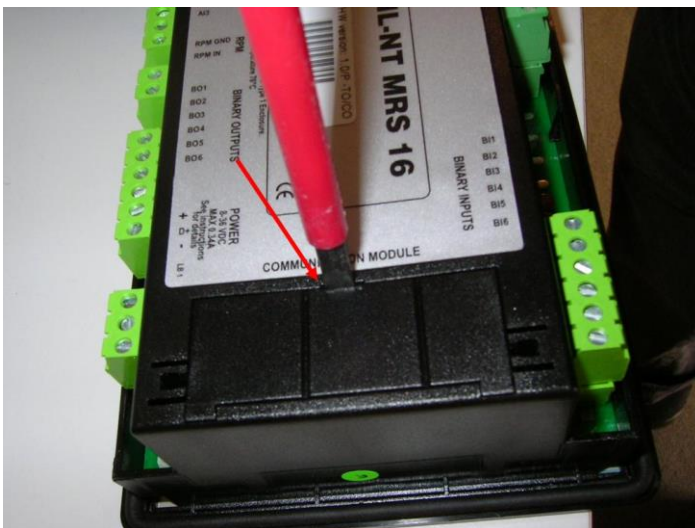
IL-NT RS232 is optional plug-in card to enable IntelliATS^{NT} for RS232 communication. This is required for computer or Modbus connecting. Card inserts into expansion slot back on the controller. To insert the module, you must open the cover first (use screwdriver to open) and then insert the module into slot. Once you have 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 then remove module manually.

How to install RS 232 communication module:

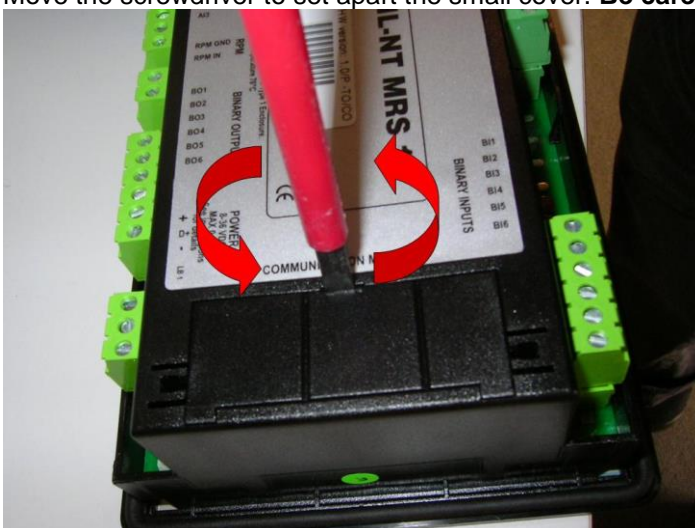
NOTE:

The following procedure is analogic also for other communication modules.

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

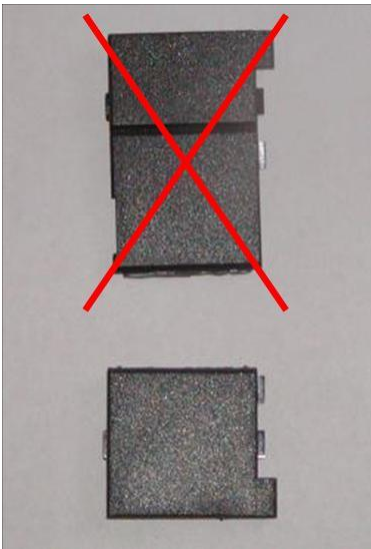
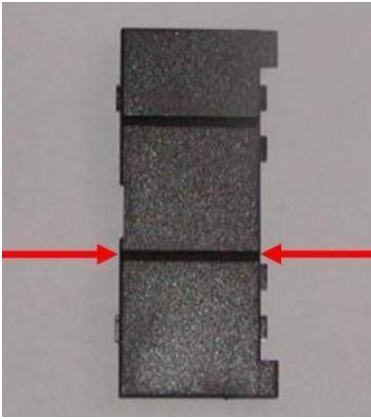


2. Move the screwdriver to set apart the small cover. **Be careful!**



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.

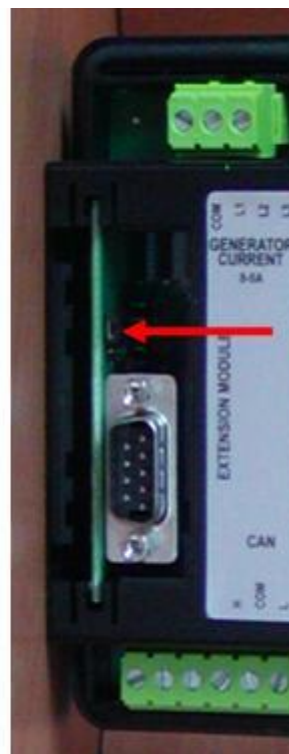
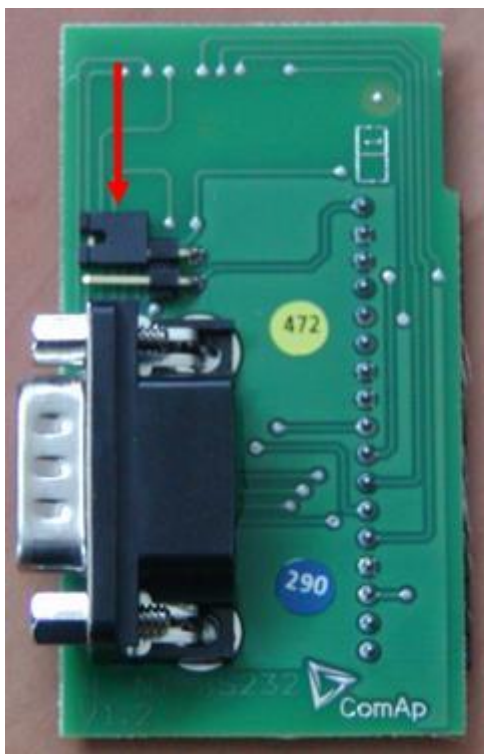


6. Plug RS 232 communication module into the slot of the controller.
7. Put back the small cover.



NOTE:

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.

NOTE:

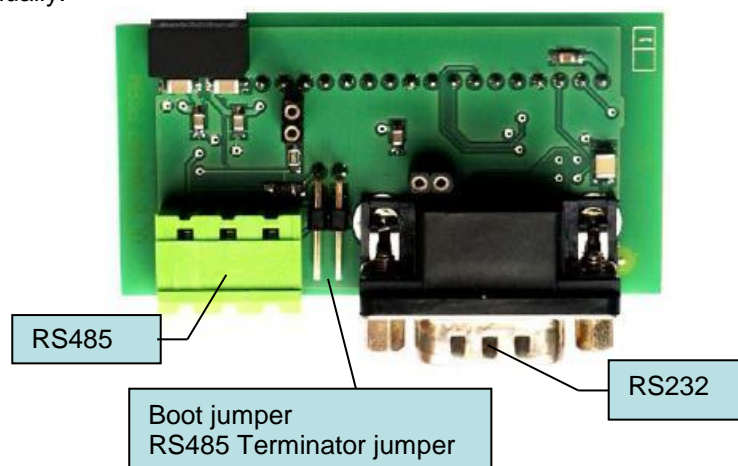
Boot jumper programming – In case of interrupted programming or other software failure is possible to use the boot jumper programming to restore controller to working order. Connect controller to PC, run LiteEdit and wait until connection bar at bottom turns red. Then run programming process via menu Controller -> Programming and cloning – Programming. Select correct firmware and confirm dialog. Then follow instructions in LiteEdit.

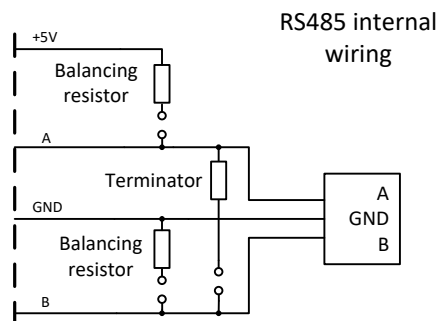
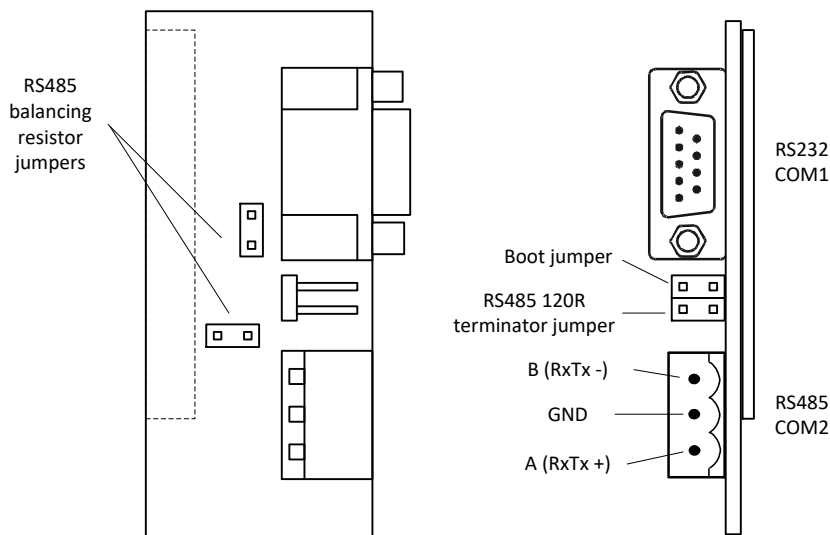
Or follow video guide “**Boot Jumper Programming**“ at <http://www.comap.cz/support/training/training-videos/>.

IL-NT RS232-485 Communication module

IL-NT RS232-485 is optional plug-in card to enable InteliATS^{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 then remove module manually.





NOTE:

- Balancing resistors shall be both closed at only one device in whole RS485 network.

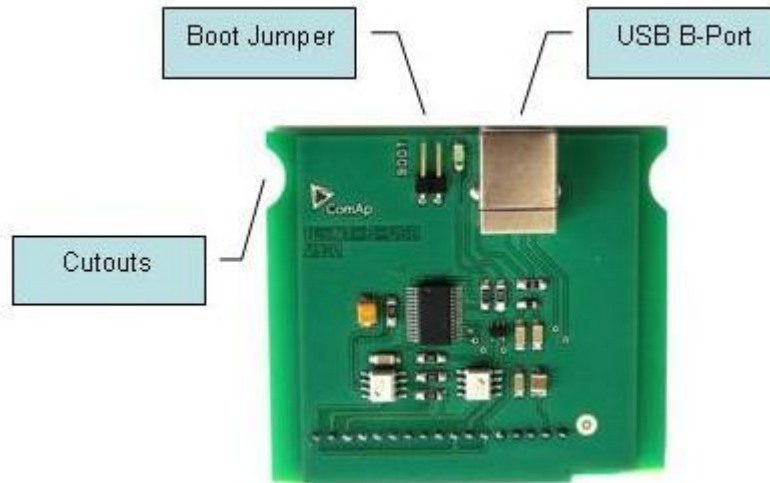
- Boot jumper programming – In case of interrupted programming or other software failure is possible to use the boot jumper programming to restore controller to working order. Connect controller to PC, run LiteEdit and wait until connection bar at bottom turns red. Then run programming process via menu Controller -> Programming and cloning – Programming. Select correct firmware and confirm dialog. Then follow instructions in LiteEdit.

Or follow video guide “**Boot Jumper Programming**” at <http://www.comap.cz/support/training/training-videos/>.

IL-NT S-USB Service USB communication module

IL-NT S-USB is optional plug-in card to enable InteliATS^{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.



NOTE:

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

Boot jumper programming – In case of interrupted programming or other software failure is possible to use the boot jumper programming to restore controller to working order. Connect controller to PC, run LiteEdit and wait until connection bar at bottom turns red. Then run programming process via menu Controller -> Programming and cloning – Programming. Select correct firmware and confirm dialog. Then follow instructions in LiteEdit.

Or follow video guide “[Boot Jumper Programming](http://www.comap.cz/support/training/training-videos/)” at <http://www.comap.cz/support/training/training-videos/>.

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 IA-NT controllers uses standard IA-NT controller with IL-NT 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 IA-NT.

NOTE:

Please see the “[IL-NT-RD Remote display software](#)” chapter for more details.

IL-NT AOUT8 Gauge driver module

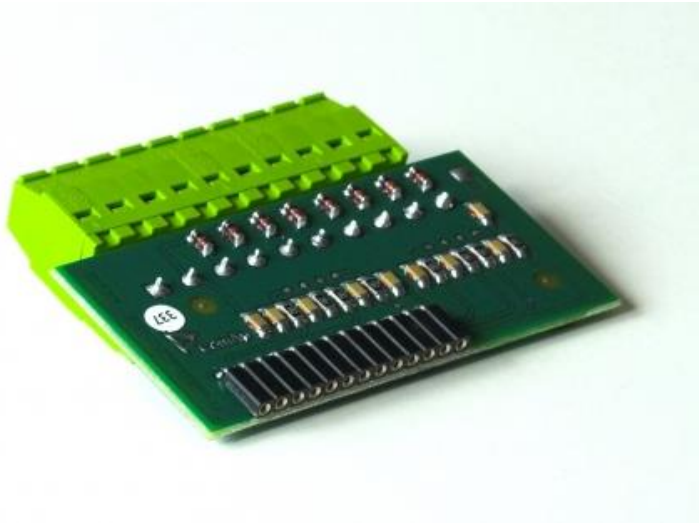
IL-NT AOUT8 is optional plug-in card. Through this card controller can drive up to 8 VDO style industrial/automotive gauges. Noncompensated gauges like 0-10V or 0-20mA are not supported. Gauge type and value are configured in LiteEdit software. Any analog value from controller may be shown in that way.

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 then remove module manually.

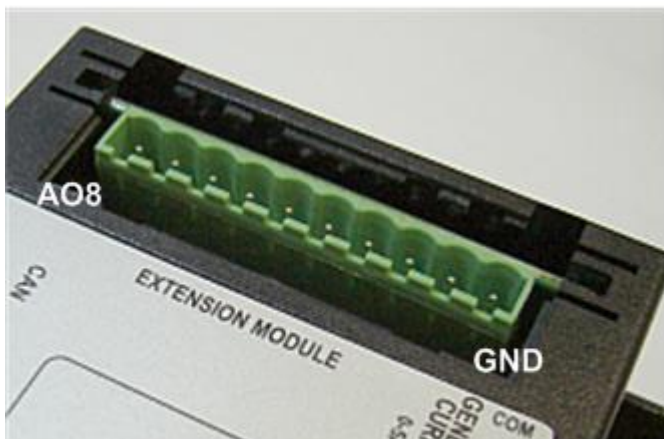
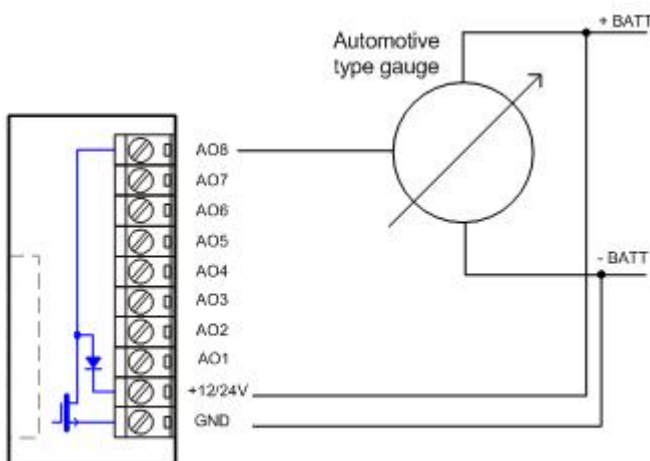
Installing IL-NT AOUT8 module is similar to installing RS 232 module. The difference is that module fits to “extension module” slot and after installing IL-NT AOUT8 you do not put back the small cover.

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

IL-NT AOUT8 module:



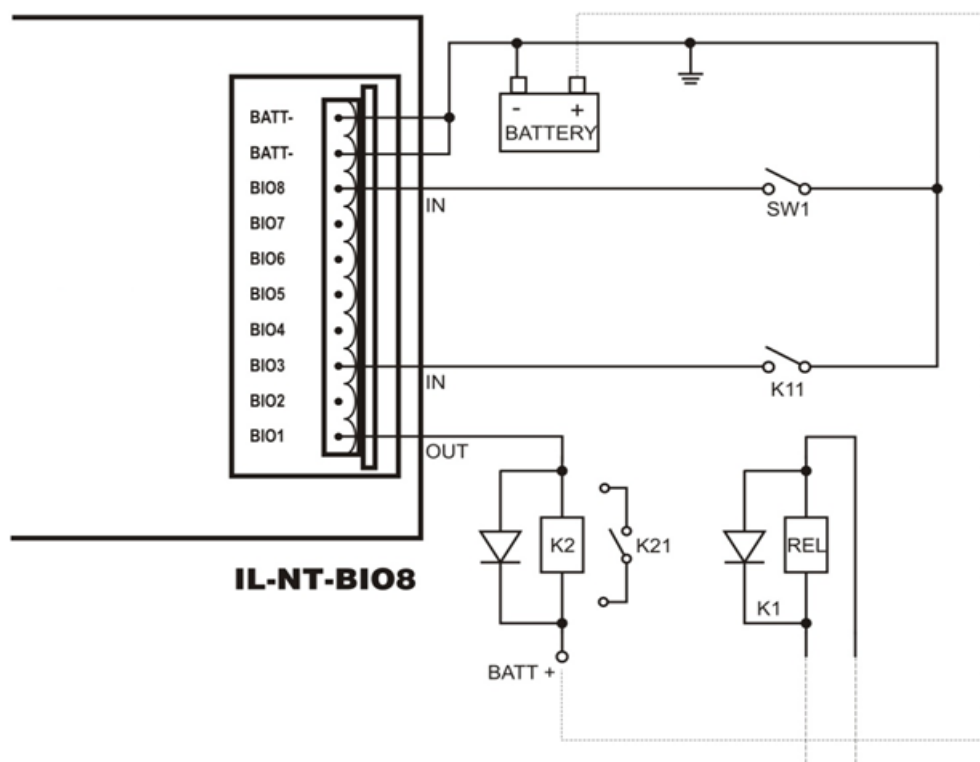
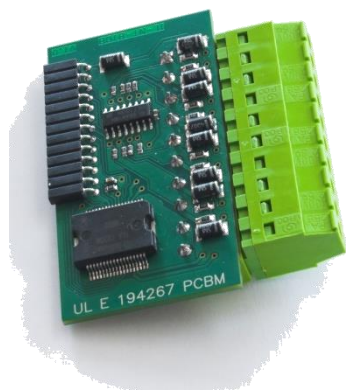
Typical wiring:



IL-NT BIO8 Hybrid binary input/output module

IL-NT BIO8 is optional plug-in card. Through this card controller can accommodate up to 8 binary inputs or outputs. In LiteEdit PC configuration tool (version 4.4 and higher) it is possible to easily choose if particular I/O will be binary input or output.

Installing IL-NT BIO8 module is similar to installing RS 232 module. The difference is that module fits to "Extension module" slot and after installing IL-NT BIO8 you do not put back the small cover.



Programming of IA-NT controller

Programming is possible only in OFF mode when the engine is not running.

NOTE:

For more information on programming, see LiteEdit Reference Guide.

CAUTION!

Check the statistic values after firmware upgrade. Readjust the values if necessary.

User Interface

There is an interchangeable User Interface on controller. It allows two different modes of displaying controller menu.

The first mode called USER is dedicated for users who prefer easy function and need only monitor actual values, see alarms or change language settings.

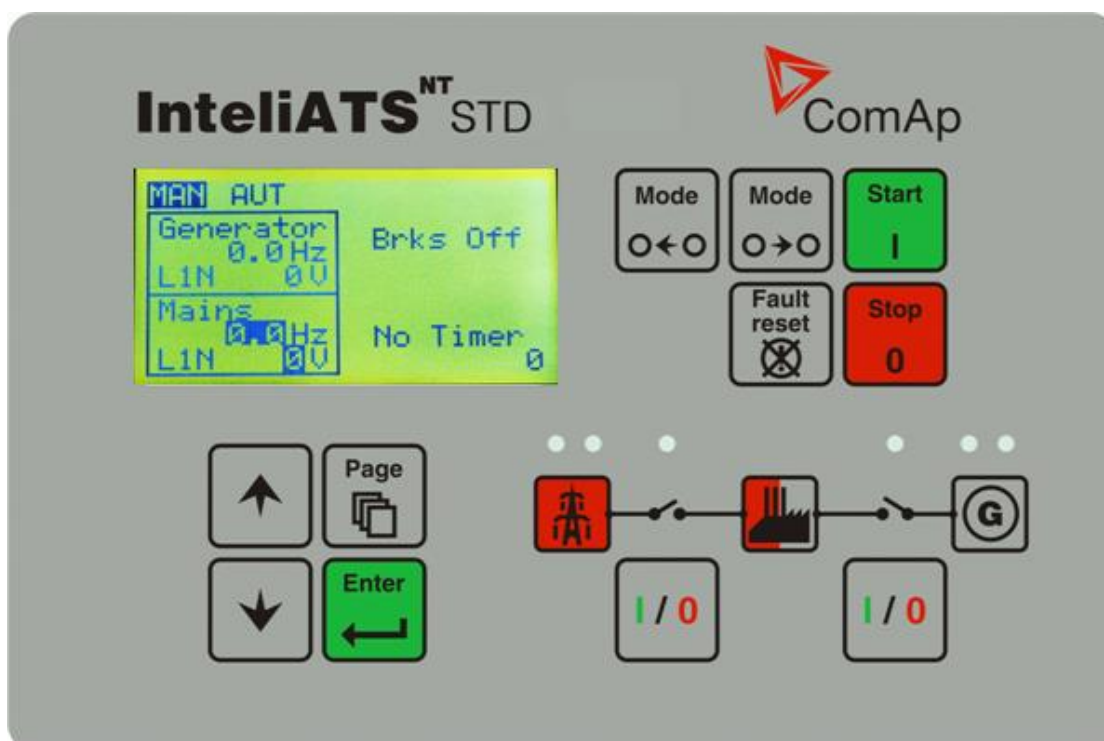
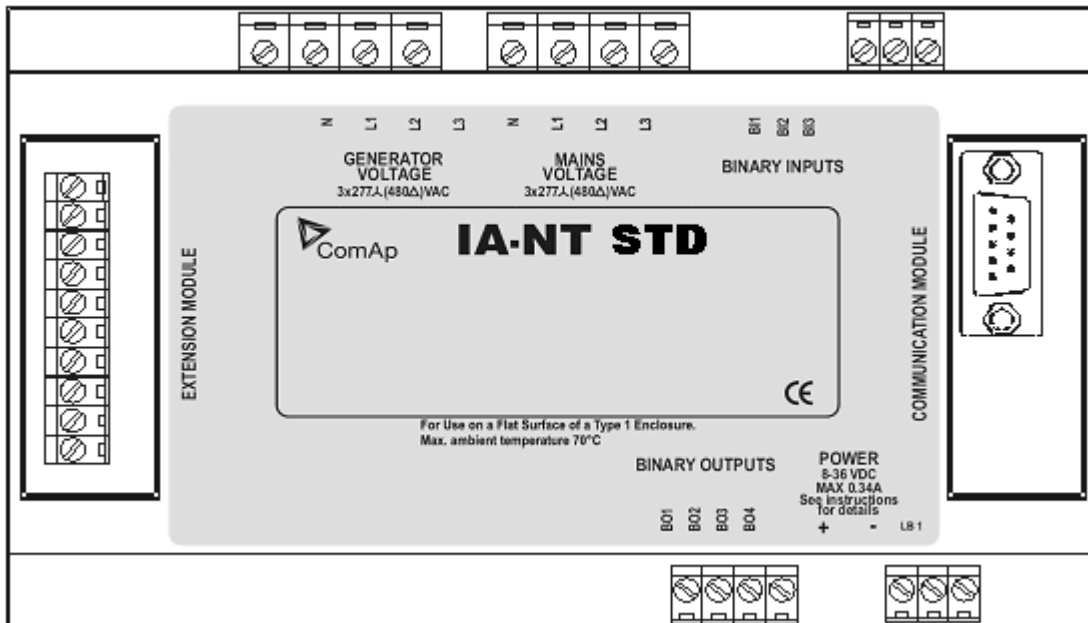
Second mode is called ENGINEER and it is dedicated for advanced users, who desire to change the settings of controller, monitor all values and check the history of events.

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

Please see latest IA-NT Operators Guide for detailed description.

Terminals

IA-NT STD terminals and face



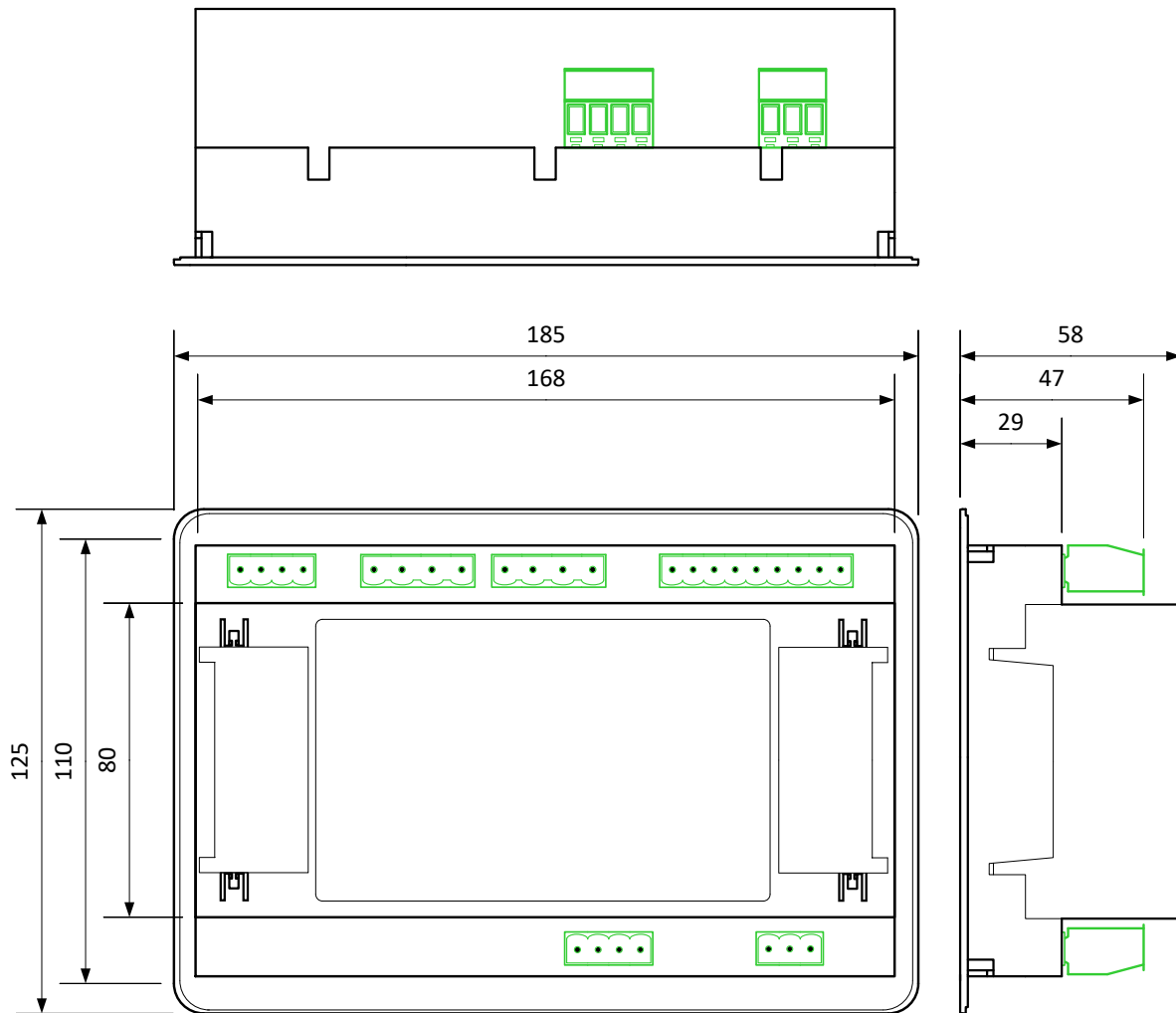
Installation

Mounting

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



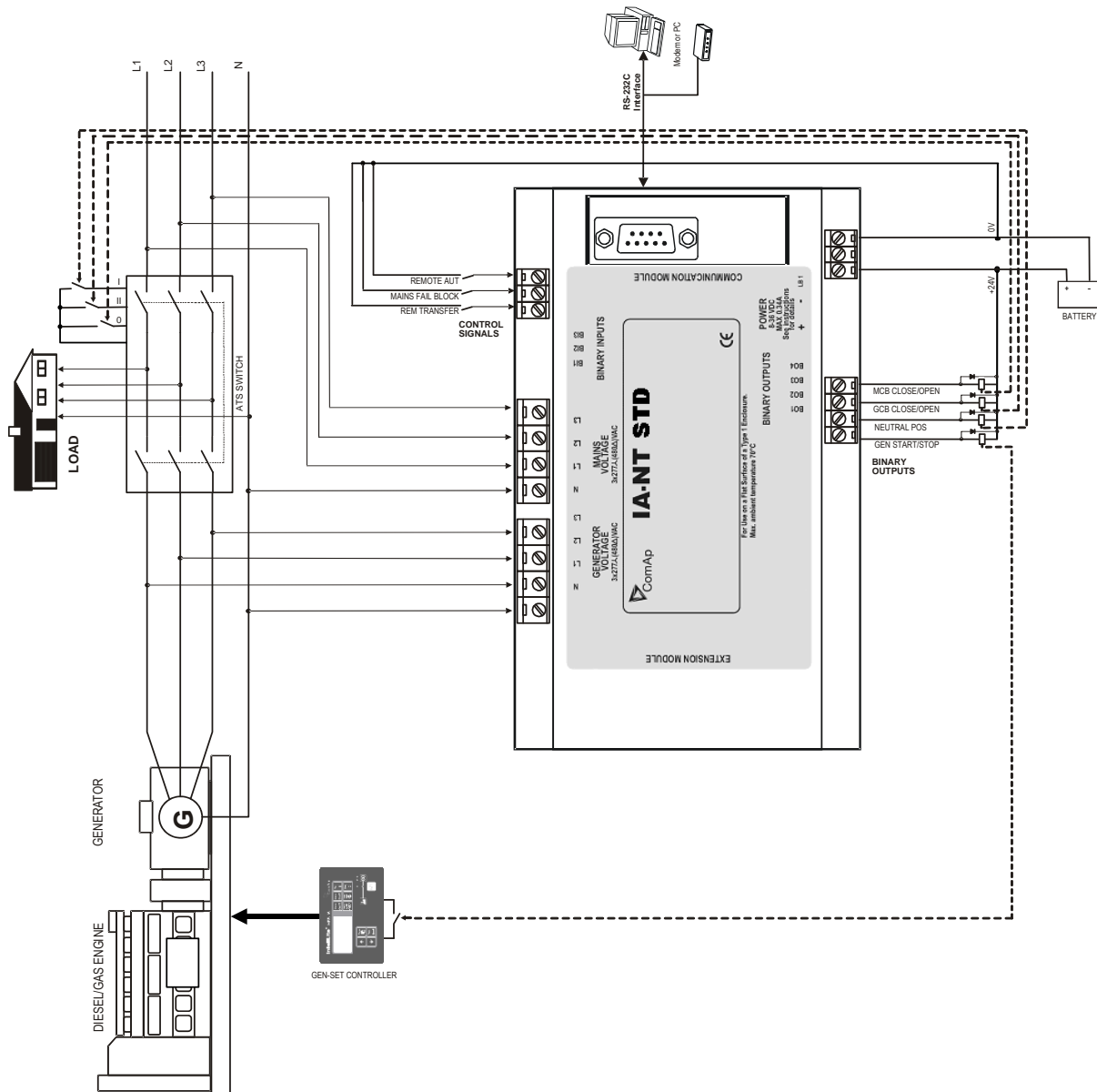
Dimensions



HINT:
Recommended mounting cutout size is 175 x 115 mm.

Recommended Wiring

IA-NT STD – Wiring Diagram

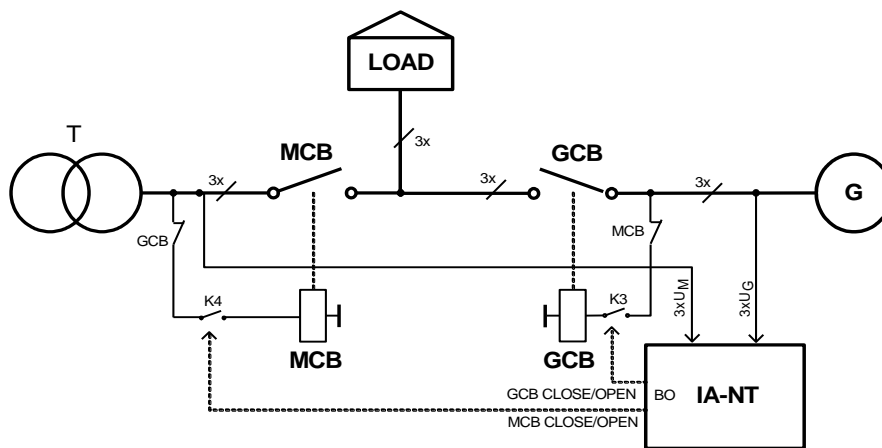


NOTE:
Stripping length of wires: 6-10mm.

Applications

The most typical application for the ATS controllers is Auto Mains Failure (AMF) application, where the controller watches for the mains power supply fault and then starts a load transfer process. Next possible application is manually controlled load transfer between two power supply sources (mains x generator).

AMF using two separate breakers (MCB and GCB)



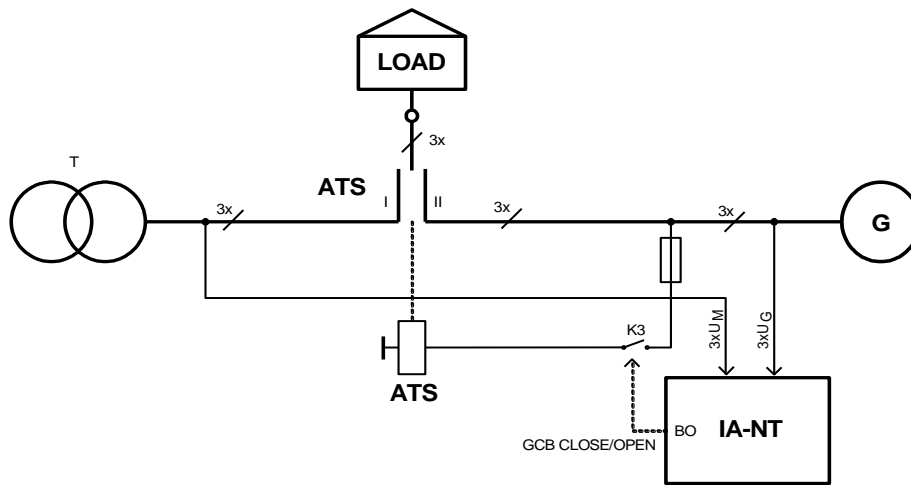
Specification

- Automatic remote gen-set start when the mains fails (AUT mode)
- GCB & MCB control
- Break transfer on mains failure
- Break return on mains return (Load reclosing)
- Test mode (set running and waiting for mains failure)

Hardware requirements

1x IA-NT STD

AMF using two-position ATS



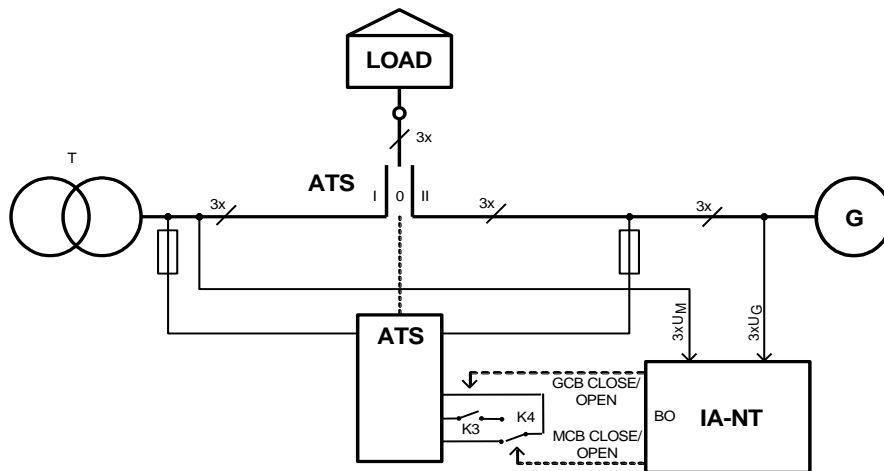
Specification

- Automatic remote gen-set start when the mains fails (AUT mode)
- Two-position ATS
- Break transfer on mains failure
- Break return on mains return (Load reclosing)
- Test mode (set running and waiting for mains failure)

Hardware requirements

1x IA-NT STD

AMF using three-position ATS



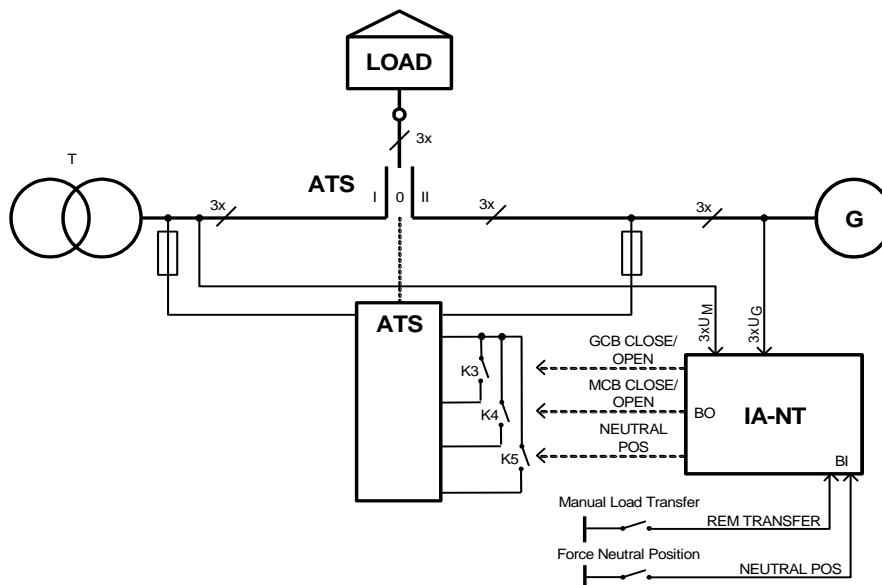
Specification

- Automatic remote gen-set start when the mains fails (AUT mode)
- Three-position ATS control, pass through neutral position
- Break transfer on mains failure
- Break return on mains return (Load reclosing)
- Test mode (set running and waiting for mains failure)

Hardware requirements

1x IA-NT STD

AMF + manual transfer & neutral control using three-position ATS



Specification

- Automatic remote gen-set start when the mains fails (AUT mode)
- Three-position ATS control, pass through neutral position
- Manual request for load transfer (AUT mode)
- Request for switching to neutral position – the highest priority, overrides MCB & GCB state, forces switch to neutral position. After deactivating return to previous state (MCB or GCB)

Hardware requirements

1x IA-NT STD

Getting Started

How to install

General

To ensure proper function:

- Wiring for binary inputs and analog inputs must not be run with power cables.
- Binary inputs should use shielded cables, especially when length >3m.

CAUTION!

This device is dedicated for environment conditions type A. Usage of this device in environment conditions type B can cause electromagnetic disturbance. In this case it can be demand to make adequate steps to reduce this electromagnetic disturbance.

Power supply

To ensure proper function:

- Use min. power supply cable of 1.5mm²

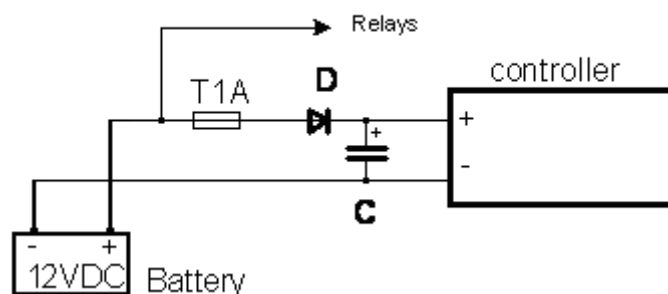
Maximum continuous DC power supply voltage is 36VDC. The InteliATS^{NT}'s power supply terminals are protected against large pulse power disturbances. When there is a potential risk of the controller being subjected to conditions outside its capabilities, an outside protection devise should be used.

NOTE:

The InteliATS^{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 InteliATS^{NT} includes internal capacitors that allow the controller to continue operation if the battery voltage dips 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:

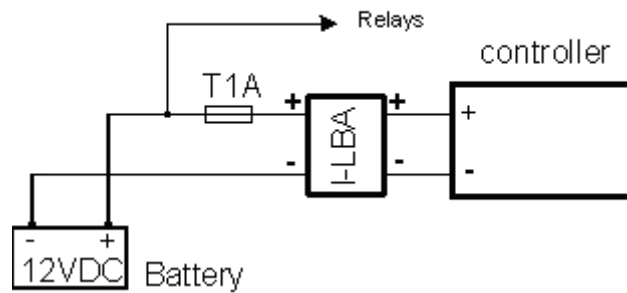


The capacitor size depends on required time. It shall be approximately thousands of microfarads. The capacitor size should be 5 000 microfarad to withstand 150ms voltage dip under following conditions: Voltage before dip is 12V, after 150ms the voltage recovers to min. allowed voltage, i.e. 8V

NOTE:

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 are 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.

NOTE:

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

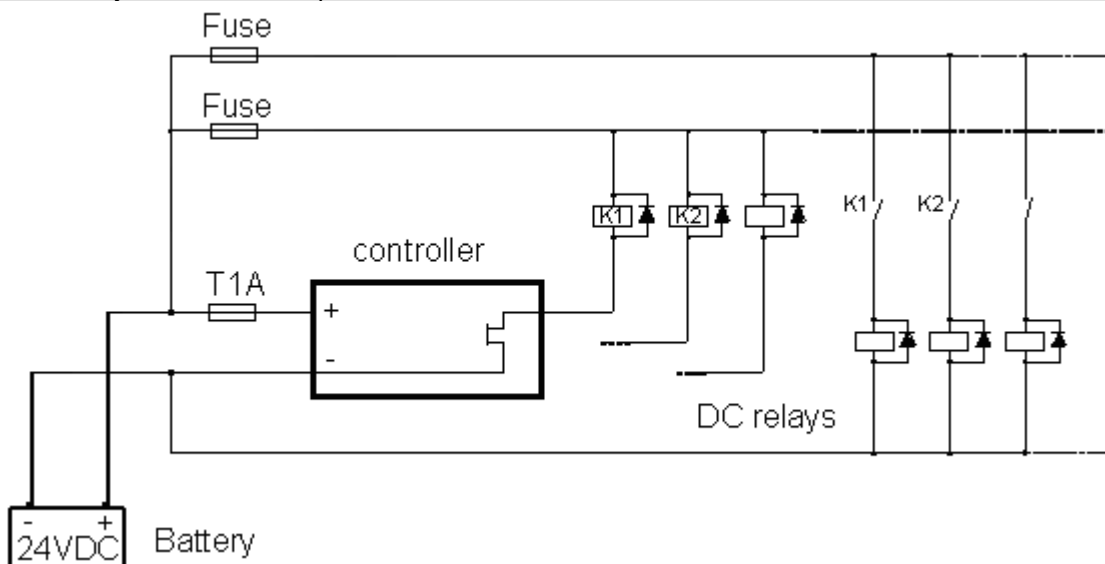
A one-amp fuse should be connected in-line with the battery positive terminal to the controller and modules.

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

NOTE:

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



Grounding

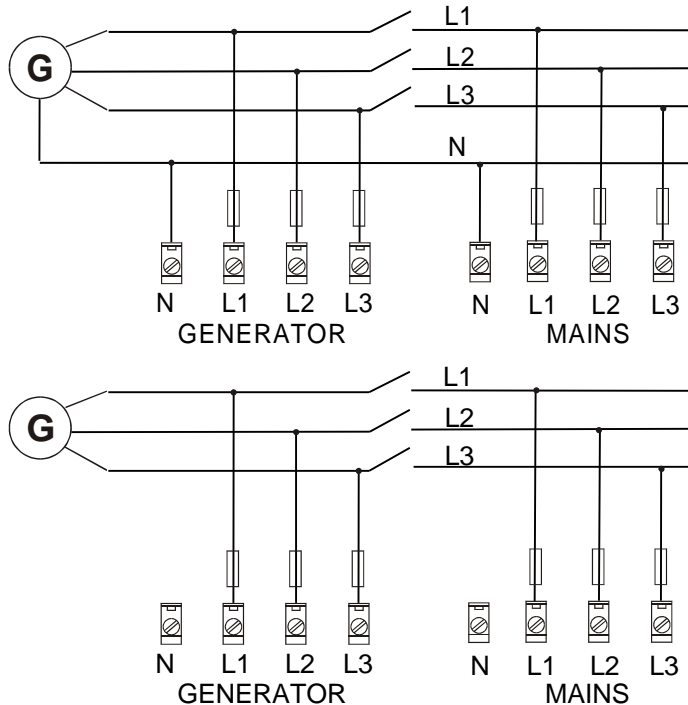
To ensure proper function:

- 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

Three phase applications

Voltage measurement

Use 1A fuse on voltage measurement inputs.



NOTE:

No separation transformers for three wires voltage connection (without N) are needed. Switchboard lighting strikes protection according standard regulation is expected!!!

Single phase applications

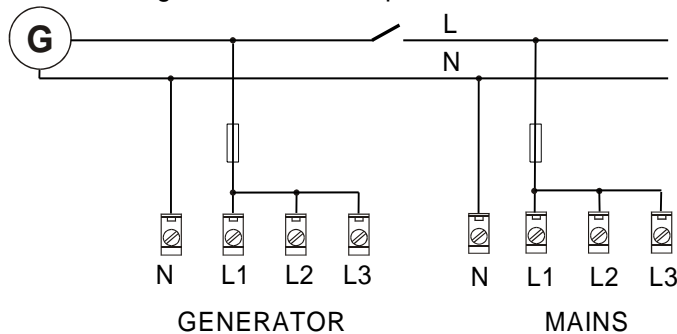
There is not a separate archive file for single-phase applications. Use standard ail archives.

Recommended wirings

Generator (and mains) single-phase voltage has to be connected to all three-voltage terminals L1, L2 and L3.

Voltage measurement

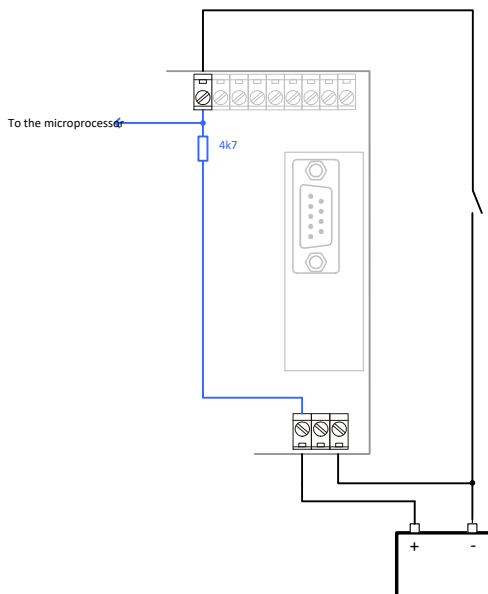
Use 1A fuse on voltage measurement inputs.



NOTE:

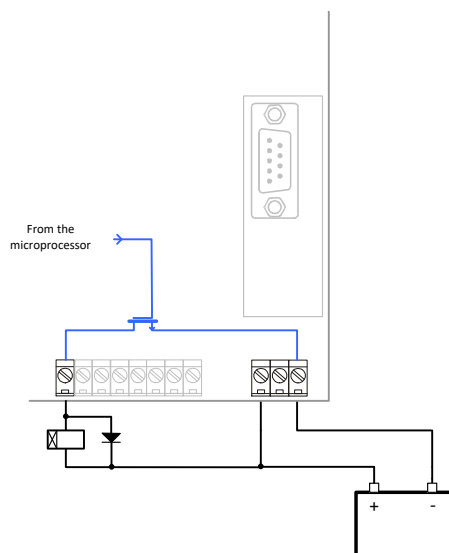
Switchboard lighting strikes protection according standard regulation is expected!!!

Binary inputs



NOTE:
Maximal length of wire connected to any binary input is 30 meters.

Binary outputs



NOTE:
Maximal length of wire connected to any binary output is 30 meters.

Inputs and Outputs

For Inputs/Outputs overview table see chapter Technical Data.

NOTE:

Any Binary input or output can be configured to any IA-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.

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	
	Trip	

Control

Use this setting to configure the desired function from the list below.



Binary inputs IA-NT - default

BI1 GCB Feedback

BI2 MCB Feedback

BI3 GenReadyToLoad


BI4 MainsFailBlock*

*InteliATS STD HW version 1.3 provides 3 binary inputs, higher versions provide 4 binary inputs

Binary inputs – list

Rem Start/Stop

External request for engine run. AUT mode only.



The image shows a software interface with a label 'Name' above a dropdown menu. The dropdown menu is open, showing the text 'Rem start/stop' and a small downward-pointing arrow on the right side of the menu box.

NOTE:

If the binary input *Rem Start/Stop* is active and mains failure occurs, the MCB breaker opens, and after **AMF Settings: Trans Del** delay the GCB breaker is closed. Once the mains is OK, the **AMF Settings: MainsReturnDel** delay elapses and the GCB breaker is opened. Then after **AMF Settings: Trans Del** delay is MCB breaker closed. Gen-set remains running as long as *Rem Start/Stop* is active. See [AMF time chart](#) for more details.

Rem Transfer

External request for an immediate transfer from mains to generator without waiting for the **AMF Settings: EmergStart Del** has elapsed. In the case the transfer not succeeded the system will stay in neutral position. The *MainsFailBlock* input performs its work normally.

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.

MainsFailBlock

If the input is closed, the automatic start of the gen-set at Mains failure is blocked. In case of running gen-set the GCB is opened, gen-set goes to Cooling procedure and stops.

GenReadyToLoad

Indicates whether the gen-set is ready to undertake load. Conditions for successful gen-set start and readiness to undertake load can be evaluated from the voltage and the frequency of the generator or from the state of *GenReadyToLoad* input or from both sources. The conditions have to be fulfilled during time defined by **Basic Settings: Max Start Del** setpoint (which can be even unlimited). More info can be found in the description of setpoints *Max Start Del* and *GenerProtect* or in chapter *Source evaluation*.

NOTE:

When this binary input isn't configured, the setpoint *GenerProtect* is adjust to value ENABLED and this value can't be changed.

Supposed Neutral Pos

In MAN mode this input switches a three position ATS switch to its neutral position – it activates the binary output *NeutralPosition* and switches the MCB and GCB off.

GCB Feedback

Use this input for indication, whether the generator circuit breaker is open or closed. Unconfigure this binary input when you don't want use feedback – the feedback function will be disabled.

MCB Feedback

This input indicates whether MCB is closed or opened. Unconfigure this binary input when you don't want use feedback – the feedback function will be disabled.

Emergency Stop

If the input is opened, Trip is immediately activated. Stop signal for the gen-set is sent and the GCB is opened.

MainsHealthy

Indicates whether the mains is ready to undertake load. Conditions for undertake load can be evaluated from the voltage and the frequency of the mains or from the state of *MainsHealthy* input or from both sources. More info can be found in the description of setpoints *MainsProtect* or in chapter *Source evaluation*.

NOTE:

When this binary input isn't configured, the setpoint *MainsProtect* is adjusted to value ENABLED and this value can't be changed.

Total Stop

If the input is opened, Trip is immediately activated. Stop signal for gen-set is sent and the GCB and MCB are opened.

MCB Disable

The input is used to disable issuing the MCB closing command.

- If the input is active and the MCB is opened, the MCB will not be closed until the input is deactivated.
- If the input is active and the MCB is closed, the MCB will be opened.
- If the input is active, MCB Disable alarm is activated.

GCB Disable

The input is used to disable issuing the MCB closing command.

- If the input is active and the MCB is opened, the MCB will not be closed until the input is deactivated.
- If the input is active and the MCB is closed, the MCB will be opened.
- If the input is active, MCB Disable alarm is activated.

Binary outputs IA-NT - default

BO1 GenStart/Stop

BO2 Alarm

BO3 GCB Close/Open

BO4 MCB Close/Open

Binary outputs - list

Not Used

Output has no function.

GenStart/Stop

The closed relay sends remote start signal to the gen-set. Generator protections are blocked when the output is inactive and the GCB is blocked too. Output can be inverted (CLOSE-OFF) using **Basic Settings**: *GenStart Logic* setpoint.

Prestart

The output closes when the gen-set start is requested and opens after the **AMF Settings**: *Prestart Time* has elapsed. Afterwards the *GenStart/Stop* output is activated as a start signal for the remote gen-set.

PreTransfer

Is activated during the Prestart phase when the Mains Fail had occurred and the gen-set start is the result of this event. See the **AMF Settings: Prestart Time** setpoint for more info.

Alarm

The output closes if :

- any alarm comes up or

The output opens if

- **FAULT RESET** is pressed

The output closes again if a new fault comes up.

GCB Close/Open

The output controls the generator circuit breaker.

NOTE:

Supposed time to close (reaction time) of GCB is depend of breaker type and related to setpoint GCB Delay.

MCB Close/Open

The output controls the mains circuit breaker.

NOTE:

Supposed time to close (reaction time) of MCB is depend of breaker type and related to setpoint GCB Delay.

Ready To AMF

This output is activated when the controller is in AUT mode and no Trip alarm is active or unconfirmed. It remains active when the engine is running.

AL Mains Fail

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

Not In AUT

Output activates when the controller is not in AUT mode.

Neutral Pos

Switches ATS switch to its neutral position.

Falut Reset

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




Ctrl HeartBeat

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

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.

NOTE:

There is only 1 level of a password.

ChangePassword

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

NOTE:

At first the password has to be entered before the new password can be changed.

Basic Settings

ControllerName

User defined name, used for IntelⁱNT identification at remote phone or mobile connection. *ControllerName* is max 14 characters long and have to be entered using LiteEdit software.

Nominal Freq [Hz]

Nominal generator frequency (usually 50 or 60 Hz)

Step: 1 Hz

Range: 45 – 65 Hz

GenerProtect [ENABLED/DISABLED]

Setpoint enable or disable evaluating of generator voltage and frequency values.

ENABLED: Values are used for evaluating of state of source and for protections.

DISABLED: Values are not used for evaluating of state of source and for protections. If terminal for measurement are connected to controller, values are just shown on measuring screen. More info can be found in chapter *Source evaluation* or in description of binary input *GenReadyToLoad*.

NOTE:

When binary input *GenReadyToLoad* isn't configured, the setpoint *GenerProtect* is adjust to value ENABLED and this value can't be changed.

MainsProtect [ENABLED/DISABLED]

Setpoint enable or disable evaluating of mains voltage and frequency values.

ENABLED: Values are used for evaluating of state of source and for protections.

DISABLED: Values are not used for evaluating of state of source and for protections. If terminal for measurement are connected to controller, values are just shown on measuring screen. More info can be found in chapter *Source evaluation* or in description of binary input *MainsReadyToLoad*.

NOTE:

When binary input *MainsHealthy* isn't configured, the setpoint *MainsProtect* is adjust to value ENABLED and this value can't be changed.

Prestart Time [s]

Time of closing of the *Prestart* and/or *Pretransfer* output prior to the engine start. Set to zero if you want to leave the output *Prestart/Pretransfer* open.

Step: 1 s
Range: 0 – 600 s

Cooling Time [s]

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

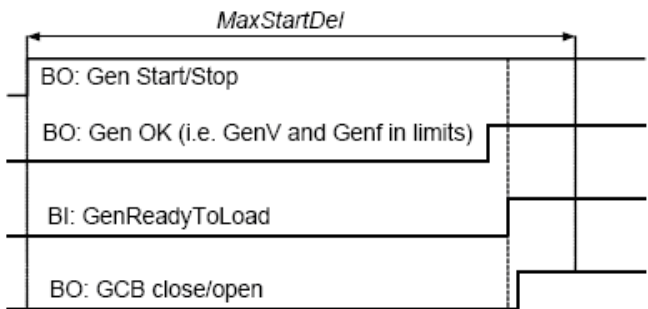
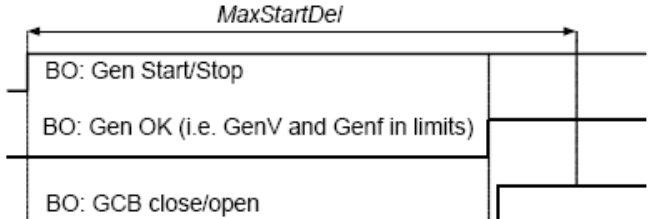
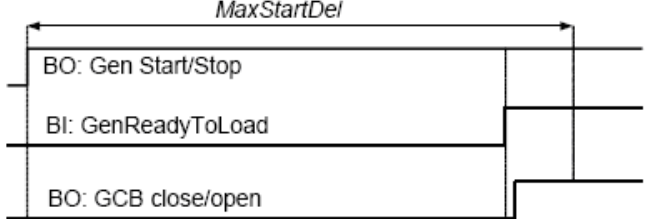
Step: 1 s
Range: 0 – 3600 s

MaxStartDel [s]

This timeout starts after closing binary output GEN START/STOP. When generator does not reach defined limits **Basic Settings: Nominal Freq**) within *MaxStartDel*, *Trp Start Fail* alarm occurs and the gen-set will shut down. See the table below for a description of the engine start evaluation. If *MaxStartDel* is longer than 600 s it means there is NO TIMEOUT.

Step: 1 s
Range: 0 – 600 s, 601 s = NO TIMEOUT

Engine start evaluation diagram:

BI: GenReadytoLoad	The BO: GCB close/open closes itself AND Gen Start Fail does not occur when:
Configured	Gen V and Gen f are in limits AND BI: GenReadytoLoad is closed until <i>MaxStartDel</i> is to be elapsed 
Not configured	Gen V and Gen f are in limits until <i>MaxStartDel</i> is to be elapsed 
Configured	BI: GenReadytoLoad is closed until <i>MaxStartDel</i> is to be elapsed 

Min Stab Time [s]

Minimum time interval between defined generator voltage is reached to GCB is closed.

If **BI: GenReadyToLoad** is configured, timer is not used.

Step: 1 s

Range: 0 – 300 s

Stop Time [s]

Period given by the value of the Stop Time setpoint tells the controller how long should it wait for the engine to change to the stop state (stop state means GenReadyToLoad signal is deactivated or generator voltages disappeared). If the engine is still running after the stop time expires the Trp Stop Fail alarm is announced. Stop Fail starts counting always when the controller sends Stop command to the engine (Start/Stop output is deactivated).

Step: 1 s

Range: 0 – 3601 sec Value 3601 means the controller doesn't care for the engine is stopped (Trp Stop Fail is never announced).

GenStart Logic [CLOSE-ON/CLOSE-OFF]

The set point influences the behavior of the output *Gen Start/Stop*.

CLOSE-ON: Gen-set should start when the output *Gen Start/Stop* is closed.

CLOSE-OFF: Gen-set should start when the output *Gen Start/Stop* is opened.

Batt Undervolt [V]

Warning threshold for low battery voltage.

Step: 0,1 V

Range: 8V – 40 (Battery >Volts)

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

Generator winding connection.

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

GCB Delay [s]

By means of this setpoint system gets information about breaker/contactor switching time. This value is needed for exact sync moment/ time prediction.

Step: 0.01 s

Range: 0.01 – 60.00 s

Default: 1 s

MCB Delay [s]

By means of this setpoint system gets information about breaker/contactor switching time. This value is needed for exact sync moment/ time prediction.

Step: 0.01 s

Range: 0.01 – 60.00 s

Default: 1 s

HINT:

Value of breaker switching time **MUST** contain all the parts of breaker delay (i.e. breaker switching time plus switching time of relay used for breaker control).

The more exact value is given, the more exact is the sync result.

Test Period [d]

After the given value of Test Period setpoint expires, the engine is started and is running as long as the value of Test Duration setpoint. Test Period starts counting always when the engine is stopped.

Range: 0 – 240 days

Test Duration [min]

Time interval, when engine is running after expiring the Test Period setpoint.

Range: 0 – 240 minutes

NOTE:

This function does not work till both setpoints (Test Period and Test Duration) are set to non-zero values.

AMF Settings

EmergStart Del [s]

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

Step: 1 s

Range: 0 – 6000 s

MainsReturnDel [s]

Delay after the mains return to the GCB opening.

Step: 1 s

Range: 1 – 3600 s

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

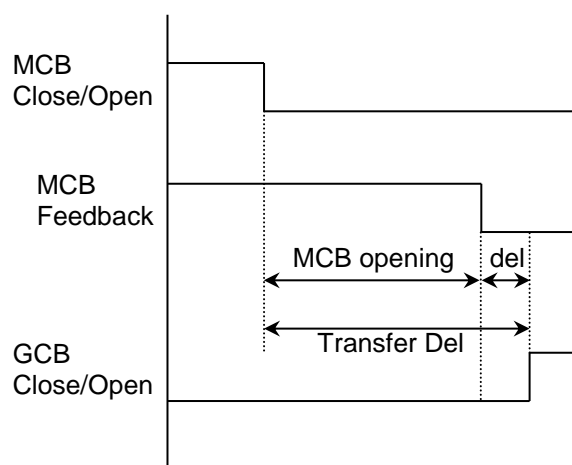
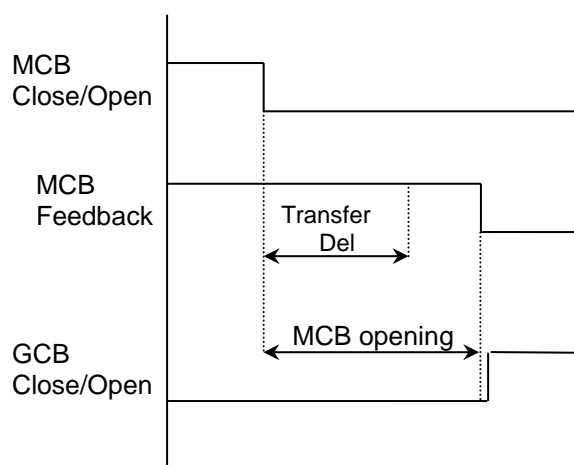
Step: 0.1 s

Range: 0 – 600.0 s

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

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

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



Mains >V [V]

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

Step: 1 V
 Range: (Mains <V) – 300V

NOTE:
 This parameter is also used for generator protection.

Mains <V [V]

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

Step: 1 V
 Range: 50V – (Mains >V)

HINT:
 Over- and undervoltage protection is evaluated according to [Basic Settings: Connection Type](#) 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).

HINT:
 To evaluate Mains > V and Mains < V the controller has implemented additional hysteresis.

NOTE:
 This parameter is also used for generator protection.

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%

NOTE:
 This parameter is also used for generator protection.

Mains <Freq [%]

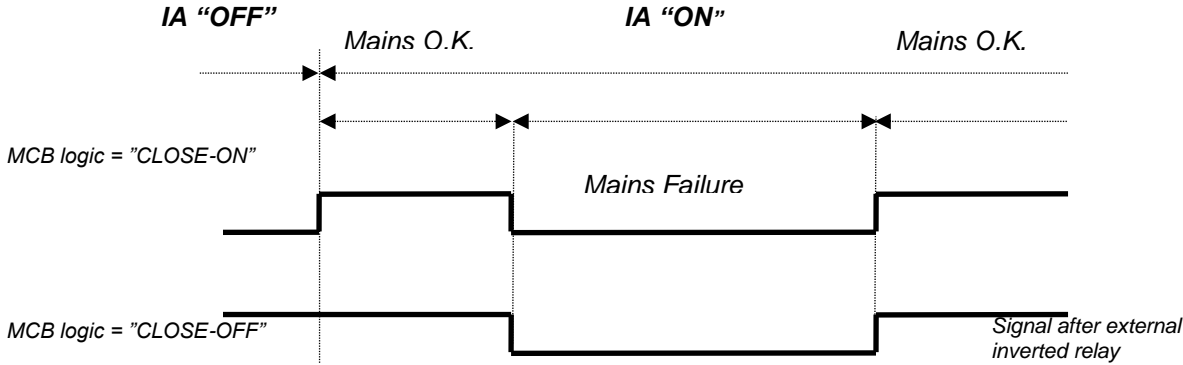
Threshold for mains underfrequency. All three phases are checked. Minimum out of three is used.

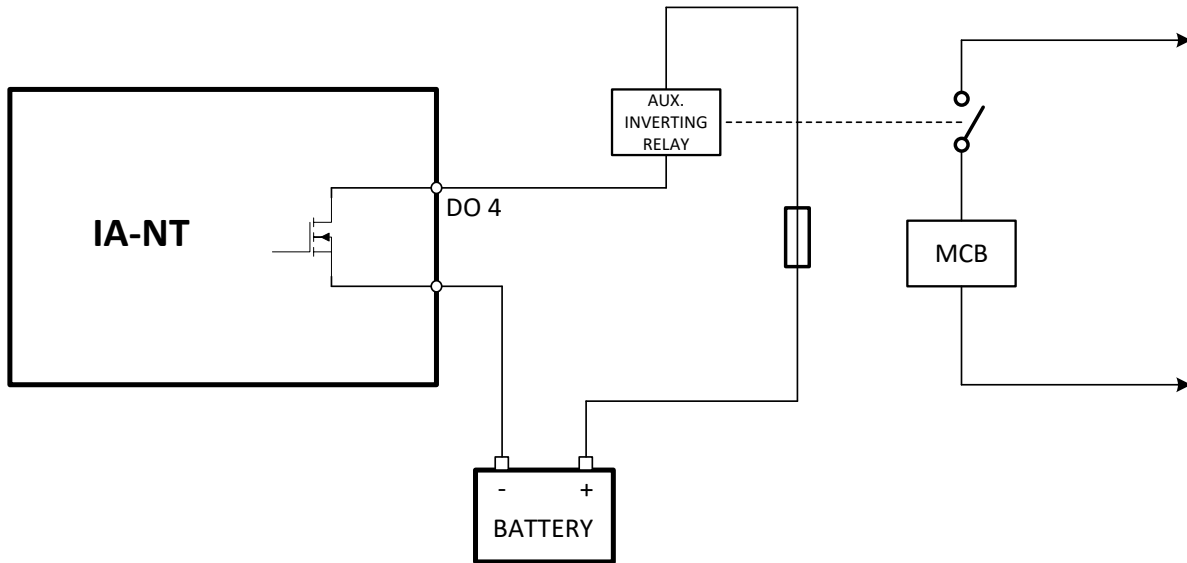
Step: 0.1% of Nominal frequency
 Range: 50% – 150.0(Mains >Freq)%

NOTE:
 This parameter is also used for generator protection.

MCB Logic [CLOSE-ON / CLOSE-OFF]

The set point affects 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.





NOTE:

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

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.

NOTE:

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

Function Description

Operating modes

Selection of the operating mode is done through *Mode* buttons on the front panel or by changing of the [Controller mode](#) setpoint (from the front panel or remotely).

NOTE:

If this setpoint is configured as password-protected, correct password must be entered prior attempting to change the mode.

There are following binary inputs that can be used to force one respective operating mode independently on the mode setpoint selection:

- [Remote AUT](#)

If the respective input is active the controller will change mode to the respective position according to the active input. If more inputs are active the mode will be changed according to priorities of the inputs. The priorities matches the order in the list above. If all inputs are deactivated the mode will return to the original position given by the setpoint.

MAN

The engine can be started and stopped manually using START and STOP buttons (or external buttons wired to appropriate binary inputs) in MAN mode. This will activate/deactivate [GenStart/Stop](#) binary output which polarity depends on [GenStart Logic](#) setpoint. When the engine is running, GCB can be closed to a dead bus. Also MCB can be closed and opened manually using the MCB button, regardless the mains is present or not. No autostart is performed. No reaction to the input [Rem Start/Stop](#).

NOTE:

The engine can run without load unlimited time. The controller does not automatically stop the running gen-set in MAN Mode and does not start the gen-set when power cut comes.

NOTE:

The breakers are internally locked to close two voltages against each. The controller will automatically recognize if the breaker can be closed, it means it is never possible to close both breakers together

NOTE:

If some voltage arises on generator bus (e.g. gen-set was started externally - not via IA-NT), generator LED blinks and [Stop], [MCB], [GCB] buttons are inactive. To bring them into operation [Start] button has to be pressed - it will synchronize IA-NT with gen-set state.

CAUTION!

The MCB can be opened manually in MAN mode. Accidental opening the MCB will cause the object (load) will remain without power!!!

AUT

The engine is started and stopped either by the binary input [Rem Start/Stop](#) or by the AMF mechanism or by the manual transfer request via [Rem Transfer](#) binary input. Buttons MCB, GCB, START, STOP including the appropriate binary inputs for external buttons are not active. The full start sequence up to the moment when the engine is loaded is automatic as well as unloading and stop sequence.

The controller behavior when gen-set is stopped and restarted again whilst the mains failure constantly persists:

- If the problem on the gen-set side appears, all faults messages are auto-quit and no next operation is blocked
- Gen-set Start/Stop signal stays active

- Controller waits for gen-set parameters are OK (means GenReadyToLoad signal is activated or generator voltages are in allowed limits) and then GCB is reclosed

AMF sequence (simplified)

State	Condition of the transition	Action	Next state
Mains operation	Mains failed ¹	MCB CLOSE/OPEN off <i>EmergStart Del</i> timer started	Mains failure
Mains failure	<i>Mains voltage and frequency OK</i>	MCB CLOSE/OPEN on	Mains operation
	<i>EmergStart Del</i> elapsed	Engine start sequence performed, then 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 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 asymmetry (preset delay must elapse)

² If during start-up sequence mains returns, then MCB is reclosed and start-up sequence is interrupted.

³ If mains fails during stop procedure (cooling) again, stop sequence is interrupted, MCB opened and GCB reclosed.

See also chapters: [Circuit breakers timing](#) and [AMF time chart](#).

WARNING!

If a red alarm is present and the gen-set is in AUT mode, it can start by self after all red alarms becomes inactive and are acknowledged!!!

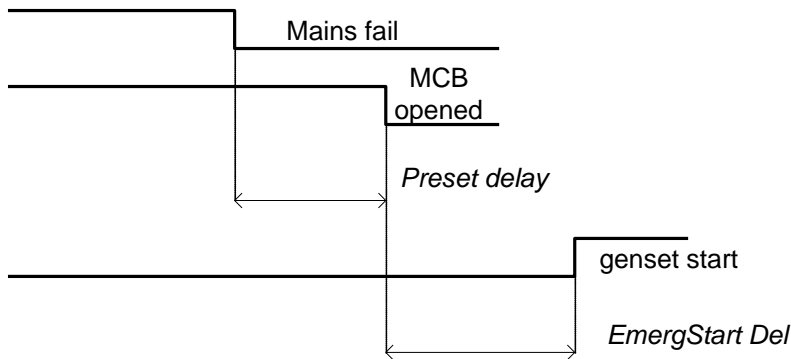
Circuit breakers timing

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

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

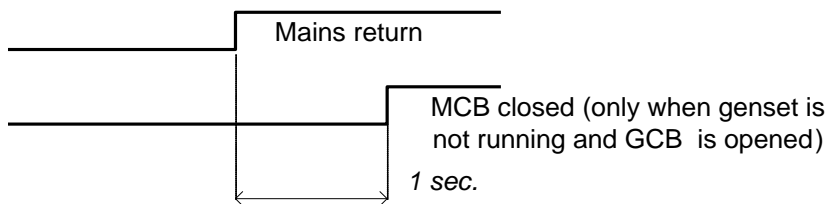
NOTE:

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



Relation between Mains return and MCB

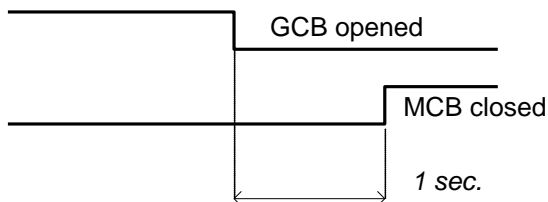
MAN Mode, GCB and MCB are opened



Relation between GCB and MCB

Conditions: AUTO Mode, Mains =off, MCB = opened, GCB = closed, gen-set loaded.

Mains returns: GCB opens (*MainsReturnDel*), MCB closes (*1 sec*)



Source evaluation

Source evaluation is same for generator and mains. Setpoints and binary inputs connected with source evaluation are:

- GenProtect setpoint (for generator)
- MainsProtect setpoint (for generator)
- GenReadyToLoad binary input (for mains)
- MainsHealthy binary input (for mains)

State of source can be evaluated in these ways:

- Binary input only
- Measured values only
- Binary input and measured values

Binary input only

In this case the binary input GenReadyToLoad or MainsHealthy has to be configured. After configuration of binary input, related setpoint GenProtect or MainsProtect should be adjust to DISABLED. After that the source will be evaluated only from binary inputs.

Measured values only

In this case the binary input GenReadyToLoad or MainsHealthy can't be configured. Related setpoint GenProtect or MainsProtect is adjust to valeu ENABLED and its value can't be changed. Source is evaluated only from measured values (voltage and frequency).

Binary input and measured values

In this case the binary input GenReadyToLoad or MainsHealthy has to be configured After configuration of binary input, related setpoint GenProtect or MainsProtect should be adjust to ENABLED. After that the source will be evaluated from both sources. To evaluate that source is health the values of voltage and frequency have to be in limits and also related binary input has to be in logical one.

Alarm Management

Following alarms are available:

- Warning
- Trip
- Mains failure

Warning (WRN)

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

Possible warnings:

See [List of possible events](#)

Trip (TRP)

When the trip alarm comes up, InteliATS^{NT} opens outputs GCB CLOSE/OPEN, GENSTART/STOP 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 (AMF)** setpoints (levels and delays) adjusting. When the mains failure comes up, mains circuit breaker is opened.

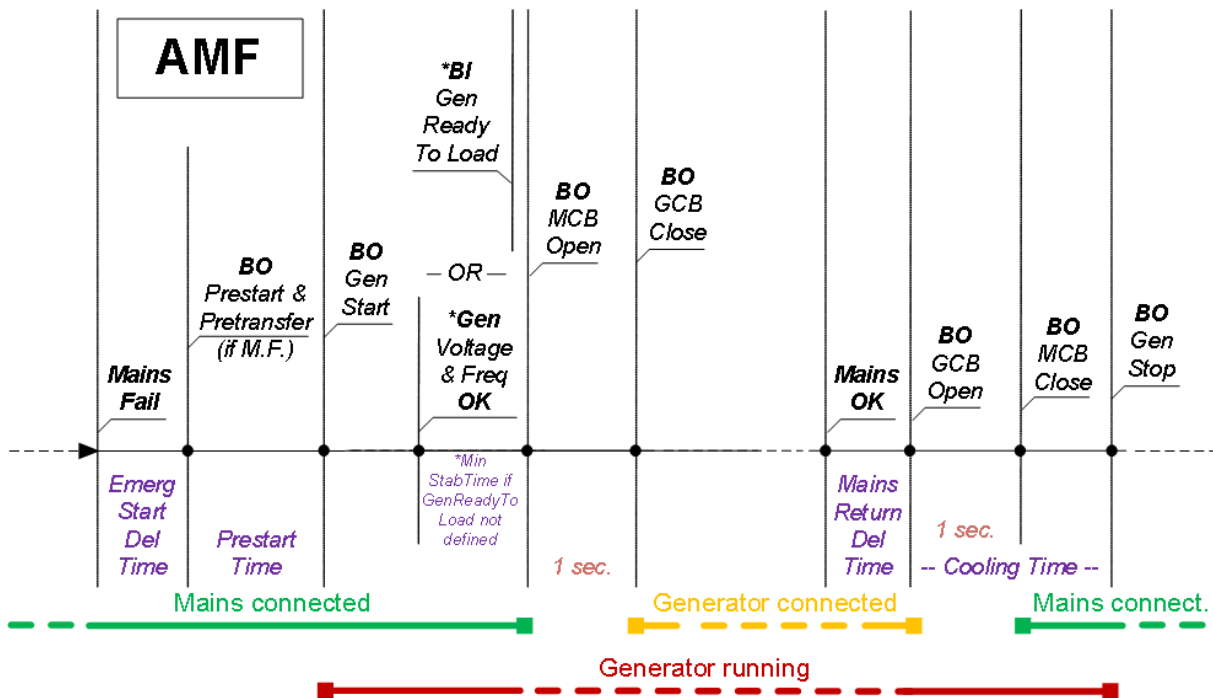
Possible mains failure reasons:

See [List of possible events](#)

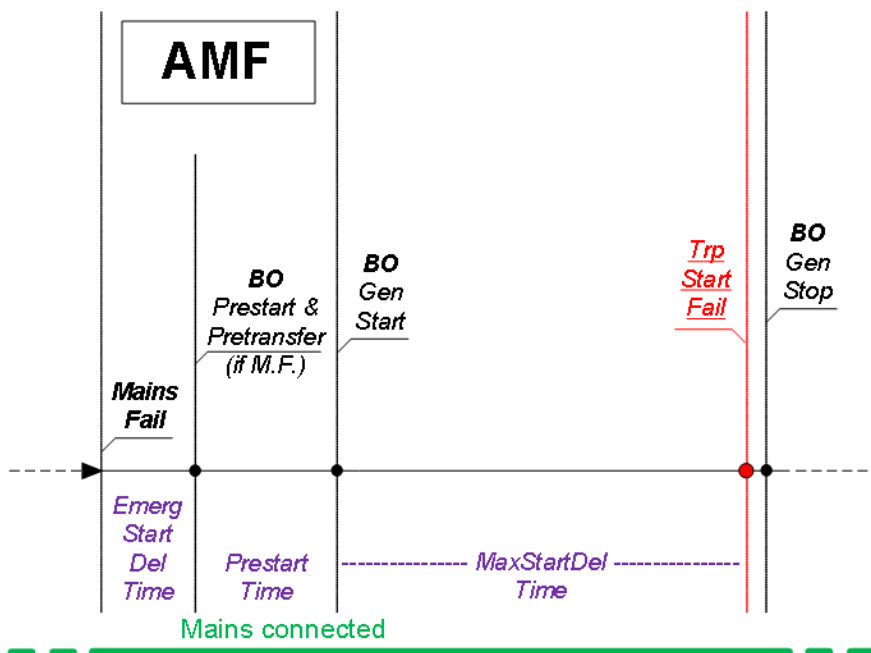
NOTE:

Mains failure is not written to alarm list!

AMF time chart – genset OK



AMF time chart – genset not started properly



Hint:

* Please see the **Basic Settings: MaxStartDel** setpoint description for more details.

Voltage phase sequence detection

InteliATS^{NT} controller detects phase sequence on both generator and mains/bus voltage terminals. These protections are important after controller installation to avoid wrong voltage phases connection. Following alarms can be detected:

Wrong phase sequence

There is fix defined phase sequence in InteliATS^{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

Gen-set Operation States

Electric state machine

MainsOper	Mains is present, MCB closed
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
Wrn Batt Volt	WRN	YES	Battery voltage is out of limits given by <i>Battery <Volts</i> setpoints.
Binary input	Configurable	YES	Configurable Warning/Trip alarms on the inputs of IA-NT.
IL-NT-BIO8	Configurable	YES	Configurable Warning/Trp alarms on the inputs of IL-NT-BIO8.
Trp BatteryFlat	TRP	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.
Trp Start Fail	TRP	YES	Gen-set start failed.
Wrn Stop Fail	WRN	YES	Gen-set stop failed. The alarm appears if the STOP command fails and the START command was issued before.
Trp Gen Lx >V Trp Gen Lx <V (where x=1,2,3)	TRP TRP	YES	The generator voltage is out of limits given by <i>Gen <V Trp</i> and <i>Gen >V Trp</i> setpoints.
Trp Gen V Unbal	TRP	YES	The generator voltage is unbalanced more than the value of <i>Volt Unbal Trp</i> setpoint.
Trp Gen >, <Freq	TRP	YES	The generator frequency is out of limits given by <i>Gen >Freq Trp</i> and <i>Gen <Freq Trp</i> setpoints.
Gen CCW Rot	WRN	NO	Genset voltage phases are not wired correctly. MCB closing is prohibited by controller.
Mains Lx >V Mains Lx <V (where x=1,2,3)	MF	YES	The mains voltage is out of limits given by <i>Mains <V</i> and <i>Mains >V</i> setpoints.
Mains V Unbal	MF	YES	The mains voltage is unbalanced more than the value of <i>Mains VUnbal</i> setpoint.
Mains >, <Freq	MF	YES	The mains frequency is out of limits given by <i>Mains >Freq</i> and <i>Mains <Freq</i> setpoints.

Events specification	Protection type	Information on binary output available (See list of Binary outputs)	Description
Mains CCW Rot	WRN	NO	Mains voltage phases are not wired correctly. MCB closing is prohibited by controller.
EmergencyStop	TRP	NO	If the input <i>Emergency Stop</i> is opened Trip is immediately activated.
Total Stop	TRP	NO	If the input <i>Total Stop</i> is opened Trip is immediately activated.
Trp GeRd Fail	TRP	NO	Signal BI GenReadyToLoad lost
ParamFail	NONE	NO	Wrong checksum of parameters. Happens typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters and write at least one new parameter.
xCB Disabled	WRN	NO	LBI MCB or GCB is activated.

NOTE:

Events Trp Gen Lx <V, Trp Gen <Freq, Trp Gen V Unbal are confirmed automatically. Fault Reset it's not necessary to activate after the cause of the event disappeared.

Init Screens

InteliATS^{NT} controller holds information about serial number, uploaded firmware version and others. These information are displayed on so called "Init Screens". It is possible to call this screen from any measurement screen by pressing **ENTER** and **PAGE** buttons concurrently and then only **PAGE** button separately.

Init screens consist of:

Customer Logo screen

This is a first screen which is dedicated for information 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 by LiteEdit PC software.

Firmware Init screen

This screen consists information about type of controller, controller manufacturer ComAp, uploaded firmware branch, used application and version of firmware.

Language screen

InteliATS^{NT} controller offers configurable language support. On this screen is possible to switch between languages configured in controller.

User Interface screen

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

USER interface is meant 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 which are available. This mode is default.

This screen also consists information about controller's Serial number and Password decode number which can be useful in case of lost password to controller. For this situations please contact your distributor for help and these two numbers will be needed to recover the password.

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.

Remote Control and Data Logging

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)

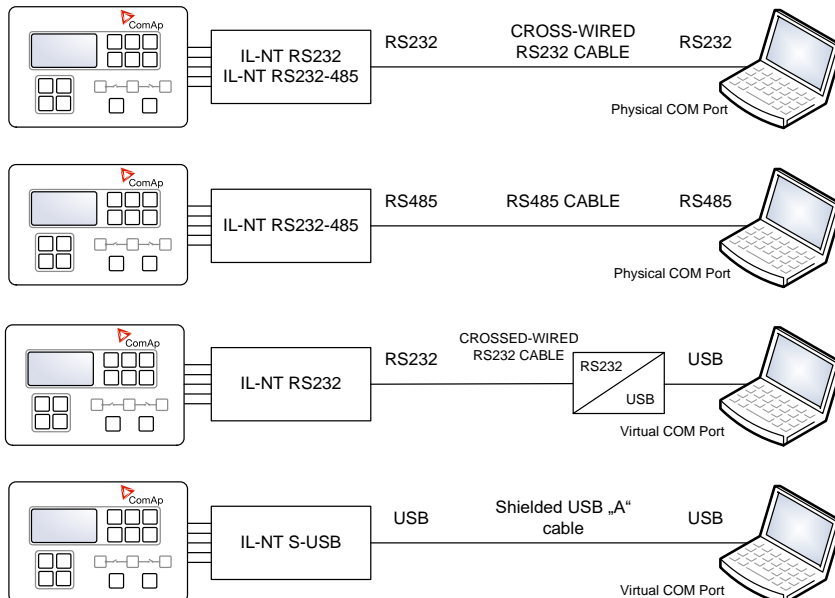
LiteEdit enables:

- 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

Direct cable connection

An external communication module is necessary to enable direct cable connection to a PC. The module is plugged into the slot located on the rear side of the controller. Find more information about [installation of the modules](#) in a separate chapter.

A 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 interface used) must be set to DIRECT position for this kind of connection.



DIRECT CABLE CONNECTION TYPES

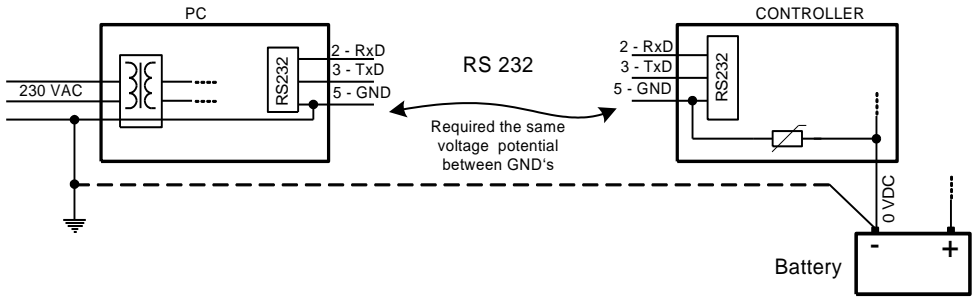
The following modules are available for direct connection to a PC:

1. [IL-NT RS232](#)
2. [IL-NT RS232-485](#)
3. [IL-NT S-USB](#) (USB easily removable service module)

The RS232 or USB interface uses COM1 port of the controller. The RS485 uses COM2.

NOTE:
Use a cross-wired serial communication cable with DB9 female connectors and signals Rx, Tx, GND for a 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).



IL-NT-RD Remote display software

This chapter describes Remote display software IL-NT-RD, which is designed as an remote signaling and control software for InteliATS^{NT}, InteliLite^{NT} and InteliDrive 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 InteliATS^{NT}, InteliLite^{NT} or InteliDrive 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 diodes and display.

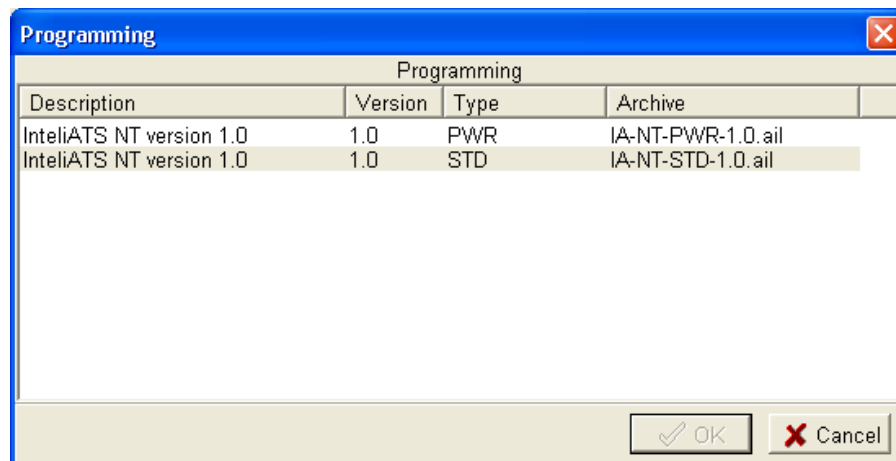
Another combinations of HW types and models from Master controller and remote display are not supported nor tested!

IL-NT-RD Software installation

The IL-NT-RD remote display firmware is installed in the same way as any other IA-NT firmware using LiteEdit software. Please see LiteEdit Reference guide for details about upgrading firmware. IL-NT-RD contains 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.
- At 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 program 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 values after firmware upgrade. Readjust the values if necessary.

IL-NT-RD Wiring

IL-NT-RD can be connected to InteliATS^{NT}, InteliLite^{NT} or InteliDrive 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, e.g. 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 controller 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. Than 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:

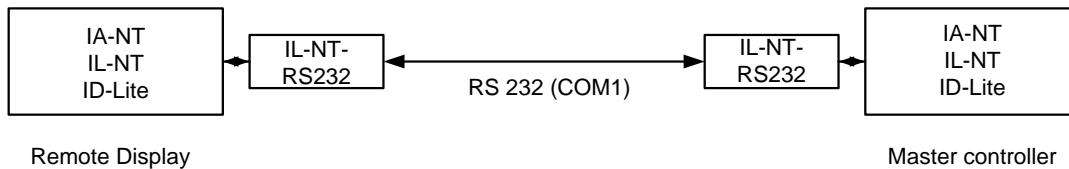
1. Not supported type of controller connected (E.g. IGS-NT, ID-DCU, IC-NT, IGS-CU, etc.)
2. Not supported firmware in master controller
3. Configuration table error in master controller
4. Wrong settings of setpoint COMx Mode in master controller
5. Wrong connection, wiring, communication fail

Direct RS232 connection

HW module: IL-NT-RS232

Master controller settings: ControllerAddr = 1..32
COM1 Mode = DIRECT

Up to 2 meters: Recommended to use our standard AT-LINK cable.



Remote Display

Master controller

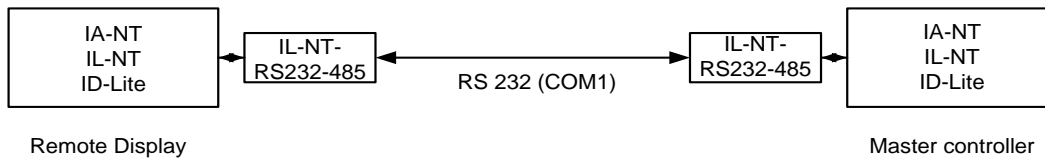
Up to 10 meters: Recommended to use standard Null-modem cable for local connection between controller and remote display, although the three wires (TxD, RxD, GND) RS 232 connection is enough for direct communication:

IA-NT/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

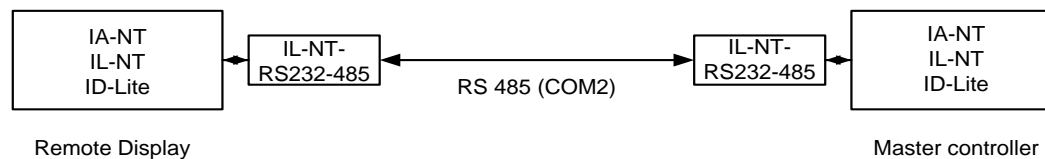
Up to 1000 meters (only with RS485):



Remote Display

Master controller

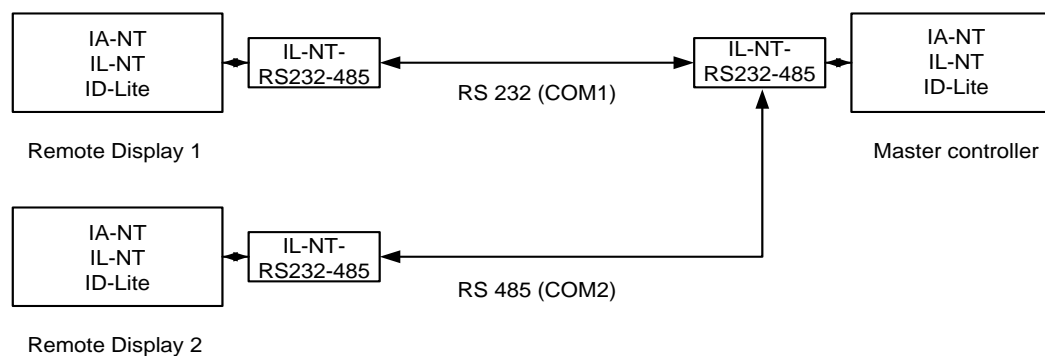
OR



Remote Display

Master controller

OR



Remote Display 1

Master controller

Remote Display 2

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 IntelliATS^{NT}, 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 show 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 1.0 is compatible with masters SW:

- All IntelliATS^{NT} standard software from ver. 1.0
- All IntelliLite^{NT} standard software from ver. 1.1
- All ID-Lite standard software from ver. 1.0
- Chosen IntelliATS^{NT}, IntelliLite^{NT} and ID-Lite customer branches

Some of the future IntelliATS^{NT}, IntelliLite^{NT}, ID-Lite versions may require upgrade of the IL-NT-RD software.

Technical Data

Inputs/Outputs overview

Model	BIN	BOUT	Gen. Voltage	Mains Voltage
IA-NT STD	4 (3**)	4	Y	Y

NOTE:

* With optional plug-in module

** Hardware version 1.3 provides 3 inputs only

Y – Available

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

NOTE:

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 IA-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 61000-6-3:2006, EN 61000-6-3:2006 EN 61000-6-1:2005, EN 61000-6-2:1999
Vibration	2 – 25 Hz, ± 1.6 mm 25 – 100 Hz, $a = 4$ g
Shocks	$a = 500$ m/s ²
EMC environment conditions classification according to standard 60947-6-1: Type A (industrial equipment)	

Dimensions and weight

Dimensions	180x120x55mm
Weight	450g

Mains and generator

Nominal frequency	50–60Hz
Frequency measurement tolerance	0.2Hz
Measuring voltage range	0 – 277 VAC phase to neutral 0 – 480 VAC phase to phase
Maximal measured voltage	340 VAC phase to neutral 600 VAC phase to phase
Input resistance	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)
Maximal impulse voltage (Uimp)	4 kV

Binary inputs and outputs

Binary inputs

Not electrically separated	
Number of inputs	4 (3 for HW 1.3)
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

Not electrically separated	
Number of outputs	4
Maximum current	0.5 A
Maximum switching voltage	36 VDC

IL-NT RS232 interface (optional card)

Plugs into IA-NT controller COMMUNICATION MODULE port.

Maximal distance	10m
Maximum Speed modem, 9.6 kBd digital modem	Up to 57.6 kBd (DIRECT), 38.4kBd Analog

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

NOTE:

For details on all IA-NT extension and communication modules see IL-NT, IC-NT, IA-NT, ID-Lite-Accessory Modules manual.

IL-NT RS232-485 interface (optional card)

Plugs into IA-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

IL-NT S-USB interface (optional card)

Plugs into IA-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

Use only shielded A-B USB cables up to 5m length.

Recommend USB cable:
USB-LINK CABLE 1.8M – ComAp A-B USB cable.

IL-NT AOUT8 interface (optional card)

Plugs into IA-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 BIO8 extension module (optional card)

Technical details:

IL-NT BIO8 plugs into the controller's EXTENSION MODULE port.
8 dedicated pins of the plug-in card's terminal can be configured as binary inputs or outputs.

Binary inputs

Number of inputs	8
Input resistance	4.7 kΩ
Input range	0–36 VDC
Voltage level for close contact indication (Logical 1)	< 0.8 VDC
Voltage level for open contact indication (Logical 0)	> 2 VDC
Max voltage level for open contact indication	8–36 VDC

Binary open collector outputs

Number of outputs	8
Maximum current per pin	0.5 A
Maximum switching common current	2 A
Maximum switching voltage	36 VDC

HINT:

Binary inputs are not galvanically isolated.