InteliATS\textsuperscript{NT®}

Automatic Transfer Switch Controller

IA-NT STD unit

SW version 2.0, June 2010

Reference Guide
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Clarification of notation

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
unproper 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.

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\textsuperscript{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\textsuperscript{NT} controller.

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

InteliATS controller SW and HW versions compatibility

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

There are two modifications of the InteliATS\textsuperscript{NT} HW - STD and PWR and two modifications of the InteliATS\textsuperscript{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\textsuperscript{NT} PWR or STD controller.

Beside that the InteliATS\textsuperscript{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\textsuperscript{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\textsuperscript{NT} parameters settings, it is not possible to describe any combination. Some of InteliATS\textsuperscript{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\textsuperscript{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\textsuperscript{NT} controller terminals:
- Mains voltage measuring and / or
- Binary output for MCB control and / or
Switch InteliATS\textsuperscript{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\textsuperscript{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\textsuperscript{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\textsuperscript{NT} controller can be used also for MAINS-MAINS applications and not only for MAINS-GEN applications. The system recognizes application type according to the Gen Start/Stop and Gen ReadyToLoad logical binary output and input configuration. If both are configured/used (default setting) it tells controller that MAINS-GEN application type is to be used. If not configured, MAINS-MAINS application type takes place. In this case stop-fail protection and generator current protection are not evaluated.

InteliATS\textsuperscript{NT} controllers are equipped with a powerful graphic display showing icons, symbols and bargraphs for intuitive operation, which sets, together with high functionality, new standards in Gen-set controls.

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 with out supply to load).
**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 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?**

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Description</th>
<th>Optional / Obligatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA-N9T STD</td>
<td>InteliATSNT central unit, STD version</td>
<td>Obligatory</td>
</tr>
<tr>
<td>IL-N9T-RS232</td>
<td>RS232 communication card</td>
<td>Optional</td>
</tr>
<tr>
<td>IL-N9T-RS232-485</td>
<td>RS232 and RS485 communication card</td>
<td>Optional</td>
</tr>
<tr>
<td>IL-N9T-S-USB</td>
<td>Service USB communication card</td>
<td>Optional</td>
</tr>
<tr>
<td>*IL-N9T RD</td>
<td>Remote display software</td>
<td>Optional</td>
</tr>
<tr>
<td>IB-Lite</td>
<td>Internet communication bridge</td>
<td>Optional</td>
</tr>
</tbody>
</table>

*Remote display for IA-N9T controllers uses standard IL-N9T controller with Remote display software

**NOTE:**
For detailed information about extension modules used with IA-N9T controllers, please see the IL-N9T, IC-N9T, IA-N9T, ID-Lite-Accessory Modules manual.
IL-NT RS232 Communication module

IL-NT RS232 is optional plug-in card to enable InteliATS<sup>NT</sup> for RS232 communication. This is required for computer 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.
IL-NT RS232-485 Communication module

IL-NT RS232-485 is optional plug-in card to enable InteliATS\textsuperscript{NT} the RS232 and RS485 communication. This is required for computer 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.

![IL-NT RS232-485 Communication module diagram]

IL-NT S-USB Service USB communication module

IL-NT S-USB is optional plug-in card to enable InteliATS\textsuperscript{NT} communication via USB port. This is required for computer 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.

![IL-NT S-USB Service USB communication module diagram]

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

![IL-NT RS232-485 Communication module image]
**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.

**IB-Lite Communication module**

IB-Lite is optional plug-in card to enable InteliATSNT communication via Ethernet/Internet. 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.


**Web server for IB-Lite**

Is an easy secured way of monitoring and controlling the gen-set from any point in world using your web browser. It offers clear overview and control of the state of engine, its settings and history. User friendly.

See IB-Lite-Reference Guide and pictures below for further details.
Scada window:

Measurement window:
**Setpoints window:**

![Setpoints window](image1)

**History window:**

![History window](image2)

**Hint:**
This feature requires IB-Lite optional plug-in module and visible connection of controller to Ethernet.
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 MAN 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 interchangable 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 than 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.
Recommended Wiring

**IA-NT STD – Wiring Diagram**

- **L1**
- **L2**
- **L3**
- **N**
- **DIESEL/GAS ENGINE GENERATOR**
- **RS-232C Interface**
  - Modem or PC
- **II**
  - REM TRANSFER
  - MAINS FAIL BLOCK
- **REM AUT**
- **GCB CLOSE/OPEN**
- **GEN START/STOP**
- **NEUTRAL POS**
- **MCB CLOSE/OPEN**
- **CONTROL SIGNALS**
- **BATTERY**
  - -24V 0V
- **BINARY OUTPUTS**
- **ATS SWITCH**
- **GEN-SET CONTROLLER**
- **LOAD**

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InteliATS<sup>NT</sup> STD, SW version 2.0, ©ComAp – June 2010
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)**

![Diagram showing the connection of MCB and GCB for AMF]

**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

ComAp
**AMF using two-position ATS**

![AMF Diagram](image)

**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**

![Diagram showing AMF + manual transfer & neutral control using three-position ATS](image)

**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
**AMF + no battery operation**

**Specification**

It is possible to operate controller without a battery supplying the controller. For such operation the following conditions have to be fulfilled:

- Controller is supplied from 24V/2.5A AC/DC power supply whose source is switched between Mains and Gen-set via relay (another contacts of the relay for GCB switching) according to the Mains state (OK/Fault). See the schematic diagram for more details
- Normally closed relay contacts have to be used for the gen-set start command. Setpoint “GenStart Logic” has to be set to CLOSE-OFF
- Switching of the 24V AC/DC power supply is blocked when GCB is closed, so the power supply is not switched to Mains if voltage on the mains bus appears – protection against “Flip-flopping” of the power supply when voltage changes arise on Mains.
- It (power supply) will be switched to Mains when GCB is opened.

Then in the case of Mains failure:

- 24V AC/DC power supply source is switched to gen-set
- Voltage supplying controller disappears
- Gen Start relay is deenergized and contacts closed
- Gen-set is started
- Controller is supplied from running gen-set
- Controller is initialized, waits for Gen OK conditions
- MCB is opened, GCB closed and the 24V AC/DC power supply source is locked in gen-set position.

If Mains returns:

- GCB is opened, 24V AC/DC power supply source is unlocked and switched to Mains
- MCB is closed
- Gen-set is stopped

**Hardware requirements**

1x IA-NT STD
1x 24V/2.5A AC/DC power supply
**Controllers in cascade**

**Specification**

Controllers are suitable for “Cascading” applications allowing load to be split into more sections. The following conditions have to be fulfilled:

- Automatic remote gen-set start when the mains fails (AUT mode)
- Cascade controlled by Master
- Consequent changeover on slave controllers
- Simple wiring

**Hardware requirements**

1 x IA-NT PWR
(1 to n) x IA-NT PWR or STD
Cascade, wiring B, Mains Fail timing diagram with configuration description

Cascade, wiring B, Mains Return timing diagram with configuration description
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.

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 InteliATSNT'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 InteliATSNT controller should be grounded properly in order to protect against lighting 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 InteliATSNT includes internal capacitors that allow the controller to continue operation 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

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:
- 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
IL-NT BIO8 extension module connection

[Diagram of IL-NT BIO8 connection]
**Three phase applications**

**Voltage measurement**

![Diagram showing voltage measurement for three-phase applications]

**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 all archives.

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

**Voltage measurement**

![Diagram showing voltage measurement for single-phase applications]

**NOTE:**
Switchboard lighting strikes protection according standard regulation is expected!!!
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.

<table>
<thead>
<tr>
<th>Type</th>
<th>Not used</th>
<th>Alarm</th>
<th>Control</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Not used</th>
<th>Alarm</th>
<th>Control</th>
</tr>
</thead>
</table>

Binary Alarm configuration items

<table>
<thead>
<tr>
<th>Name</th>
<th>14 characters ASCII string</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact type</td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>Normally closed</td>
</tr>
<tr>
<td>NO</td>
<td>Normally opened</td>
</tr>
<tr>
<td>Alarm type</td>
<td></td>
</tr>
<tr>
<td>Warning</td>
<td></td>
</tr>
<tr>
<td>Trip</td>
<td></td>
</tr>
<tr>
<td>Alarm active</td>
<td></td>
</tr>
<tr>
<td>All the time</td>
<td>Valid if checkbox “Engine running only” is not checked</td>
</tr>
<tr>
<td>Engine running only</td>
<td>Valid if checkbox “Engine running only” is checked</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Not used</th>
<th>Alarm</th>
<th>Control</th>
</tr>
</thead>
</table>

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.

<table>
<thead>
<tr>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rem start/stop</td>
</tr>
</tbody>
</table>

**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 – depending on AMF Settings: GenProt setpoint – evaluated from the voltage and the frequency of the generator or from the state of GenReadyToLoad input. The conditions have to be fulfilled during time defined by AMF Settings: Max Start Del setpoint (which can be even unlimited). More info can be found in the setpoint description.

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. 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.

MainsHealthy
This input was created mainly for cascading applications, where slave controllers do not have usually Mains and Gen-set voltage measuring inputs connected to the respective power sources. Then this binary input tells the controller if Mains is healthy to be able to respond to Mains failure.
**Binary outputs IA-NT - default**

<table>
<thead>
<tr>
<th>BO1</th>
<th>GenStart/Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>BO2</td>
<td>Alarm</td>
</tr>
<tr>
<td>BO3</td>
<td>GCB Close/Open</td>
</tr>
<tr>
<td>BO4</td>
<td>MCB Close/Open</td>
</tr>
</tbody>
</table>

**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 0.1 sec.

**MCB Close/Open**
The output controls the mains circuit breaker.

**Ready To AMF**
The output is active, if the controller is able to start the engine and simultaneously the controller is in AUT Mode.

**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.

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

**Password**

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

**NOTE:**
There is only 1 level of a password.

**ChangePassword**
Use ↑ or ↓ keys to set and ENTER 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**
Nominal generator frequency (usually 50 or 60 Hz)
Step: 1Hz
Range: 45 – 65 Hz

**Prestart Time**
Time of closing of the Prestart and/or Prettransfer output prior to the engine start.
Set to zero if you want to leave the output Prestart/Prettransfer open.
Step: 1s
Range: 0 – 600 s

**Cooling Time**
Runtime of the unloaded gen-set to cool the engine before stop.
Step: 1s
Range: 0 – 3600 s

**MaxStartDel**
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 then 600 s it means there is NO TIMEOUT.
Step: 1s
Range: 0 – 600 s, 601 s = NO TIMEOUT
Engine start evaluation diagram:

<table>
<thead>
<tr>
<th>Bi: GenReadyToLoad</th>
<th>The BO: GCB close/open closes itself AND Gen Start Fail does not occur when:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configured</td>
<td>Gen V and Gen f are in limits AND Bi: GenReadyToLoad is closed until MaxStartDel is to be elapsed</td>
</tr>
<tr>
<td>Not configured</td>
<td>Gen V and Gen f are in limits until MaxStartDel is to be elapsed</td>
</tr>
<tr>
<td>Configured</td>
<td>Bi: GenReadyToLoad is closed until MaxStartDel is to be elapsed</td>
</tr>
</tbody>
</table>

**MinStabTime** [s]
Minimum time interval between defined generator voltage is reached to GCB is closed. If Bi: GenReadyToLoad is not configured, timer is not used.
Step: 1s
Range: 1 – 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: 1s
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)

**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
\(^*\) Available only in AMF8, 9.

**Test Duration** [min]
Time interval, when engine is running after expiring the Test Period setpoint.
Range: 0 – 240 minutes
\(^*\) Available only in AMF8, 9.

**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: 1s
Range: 0 – 6000 s

**MainsReturnDel** [s]
Delay after the mains return to the GCB opening.
Step: 1s
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: 0,1s
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: 1V
Range: (Mains <V) – 300V

Mains <V [V]
Threshold for mains undervoltage. All three phases are checked. Maximum out of three is used.
Step: 1V
Range: 50V - (Mains >V)

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)%

MCB Opens On [MAINFAIL / GENRUN]
MAINFAIL
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 be 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)

<table>
<thead>
<tr>
<th>State</th>
<th>Condition of the transition</th>
<th>Action</th>
<th>Next state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains operation</td>
<td>Mains failed(^1)</td>
<td>MCB CLOSE/OPEN off EmergStart Del timer started</td>
<td>Mains failure</td>
</tr>
<tr>
<td>Mains failure</td>
<td>Mains voltage and frequency OK</td>
<td>MCB CLOSE/OPEN on</td>
<td>Mains operation</td>
</tr>
<tr>
<td></td>
<td>EmergStart Del elapsed</td>
<td>Engine start sequence performed, then GCB CLOSE/OPEN on(^2)</td>
<td>Island operation</td>
</tr>
<tr>
<td>Island operation</td>
<td>Mains voltage and frequency OK</td>
<td>MainsReturnDel timer started</td>
<td>Mains return</td>
</tr>
<tr>
<td>Mains return</td>
<td>Mains failed</td>
<td>GCB CLOSE/OPEN off, then MCB CLOSE/OPEN on and then engine stop sequence performed(^3)</td>
<td>Mains operation</td>
</tr>
<tr>
<td></td>
<td>MainsReturnDel elapsed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Mains failed means mains over/under -voltage, over/under -frequency, voltage assummetry (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 an red alarm is present and the gen-set is in AUT mode, it can start by self after all red alarms becomes inactive and are acknowledged!!!
**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 (according 3., MainsReturnDel), MCB closes (1 sec)
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<sup>NT</sup> 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 AMF Setting: MaxStartDel setpoint description for more details.*
Voltage phase sequence detection

InteliATS<sup>NT</sup> controller detects phase sequence on both generator and mains/bus voltage terminals. These 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 InteliATS<sup>NT</sup> 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

<table>
<thead>
<tr>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MainsOper</td>
<td>Mains is present</td>
</tr>
<tr>
<td>MainsFlt</td>
<td>Mains cut off – immediate state</td>
</tr>
<tr>
<td>MainsFlt</td>
<td>Mains cut off – takes EmergStart del</td>
</tr>
<tr>
<td>IslOper</td>
<td>Island operation</td>
</tr>
<tr>
<td>MainsRet</td>
<td>Mains recover</td>
</tr>
<tr>
<td>Brks Off</td>
<td>GCB, MCB opened</td>
</tr>
<tr>
<td>MinStabTO</td>
<td>Minimal Stabilization Timeout</td>
</tr>
<tr>
<td>MaxStabTO</td>
<td>Maximal Stabilization Timeout</td>
</tr>
<tr>
<td>Trans Del</td>
<td>Forward return break delay. Delay between GCB opening and MCB closing</td>
</tr>
</tbody>
</table>

List of possible events

<table>
<thead>
<tr>
<th>Events specification</th>
<th>Protection type</th>
<th>Information on binary output available (See list of Binary outputs)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrn Batt Volt</td>
<td>WRN</td>
<td>YES</td>
<td>Battery voltage is out of limits given by Battery &lt;Volts setpoints.</td>
</tr>
<tr>
<td>Binary input</td>
<td>Configurable</td>
<td>YES</td>
<td>Configurable Warning/Shutdown alarms on the inputs of IA-NT.</td>
</tr>
<tr>
<td>Trp BatteryFlat</td>
<td>TRP</td>
<td>YES</td>
<td>If the controller switches off during starting sequence due to bad battery condition it doesn’t try to start again and activates this protection.</td>
</tr>
<tr>
<td>Trp Start Fail</td>
<td>TRP</td>
<td>YES</td>
<td>Gen-set start failed.</td>
</tr>
<tr>
<td>ParamFail</td>
<td>NONE</td>
<td>NO</td>
<td>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.</td>
</tr>
<tr>
<td>Trp GeRd Fail</td>
<td>TRP</td>
<td>NO</td>
<td>Signal BI GenReadyToLoad lost</td>
</tr>
<tr>
<td>Trp Gen &gt;Freq</td>
<td>TRP</td>
<td>YES</td>
<td>The generator frequency is out of limits given by Gen &gt;Freq Trp and Gen &lt;Freq Trp setpoints.</td>
</tr>
<tr>
<td>EmergencyStop</td>
<td>TRP</td>
<td>NO</td>
<td>If the input Emergency Stop is opened shutdown is immediately activated.</td>
</tr>
<tr>
<td>Wrn Stop Fail</td>
<td>WRN</td>
<td>YES</td>
<td>Gen-set stop failed. The alarm appears if the STOP command fails and the START command was issued before.</td>
</tr>
</tbody>
</table>
Remote Control and Data Logging

*Direct connection to the PC*

InteliATS\textsuperscript{NT} can be connected directly with PC via optional IL-NT RS232 interface. Use the standard serial cable to connect PC with InteliATS\textsuperscript{NT}.

**NOTE:**
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).

*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
Remote Communication

NOTE:
Refer to InteliCommunication guide for all additional information.

Internet connection

IA-NT controllers can be monitored from InteliMonitor or LiteEdit over the Internet using IB-Lite plug-in.

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)
- 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 IA-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.

NOTE:
It is strongly recommended to use the same type of modem on the both sides (IA and PC) of connection.

Mobile SIM card setting

- Adjust SIM card in GSM modem following way:
- enable data connection (when required)
- no PIN code
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 InteliATS<sup>NT</sup>, InteliLite<sup>NT</sup> 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<sup>NT</sup>, InteliLite<sup>NT</sup> 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 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 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.

![](image)

- 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\\textsuperscript{NT}, InteliLite\\textsuperscript{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, 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 56000 bps.

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 (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: Recommended to use our standard AT-LINK cable.
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:

<table>
<thead>
<tr>
<th>IA-NT/IL-NT/ID-Lite connector (D-SUB9 female)</th>
<th>IL-NT-RD connector (D-SUB9 female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxD 2</td>
<td>3 TxD</td>
</tr>
<tr>
<td>TxD 3</td>
<td>2 RxD</td>
</tr>
<tr>
<td>GND 5</td>
<td>5 GND</td>
</tr>
</tbody>
</table>

Remote RS485 and/or direct RS232 connection

HW module: IL-NT-RS232-485

Up to 1000 meters (only with RS485):

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 InteliATSNT, InteliLiteNT or InteliDrive 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 InteliATSNT standard software from ver. 1.0
- All InteliLiteNT standard software from ver. 1.1
- All ID-Lite standard software from ver. 1.0
- Chosen InteliATSNT, InteliLiteNT and ID-Lite customer branches

Some of the future InteliATSNT, InteliLiteNT, ID-Lite versions may require upgrade of the IL-NT-RD software.
Technical Data

Inputs/Outputs overview

<table>
<thead>
<tr>
<th>Model</th>
<th>BIN</th>
<th>BOUT</th>
<th>COM1</th>
<th>COM2</th>
<th>Gen. Voltage</th>
<th>Mains Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA-NT STD</td>
<td>4 (3**)</td>
<td>4</td>
<td>Y*</td>
<td>Y*</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

**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
Electromagnetic Compatibility EN 50081-1:94, EN 50081-2:96
EN 50082-1:99, EN 50082-2:97
Vibration 5 - 25 Hz, ±1.6mm
25 - 100 Hz, a = 4 g
Shocks a = 200 m/s²

Dimensions and weight

Dimensions 180x120x55mm
Weight 450g
**Mains and generator**

- Nominal frequency: 50-60Hz
- Frequency measurement tolerance: 0.2Hz

**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
  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)

**Binary inputs and outputs**

**Binary inputs**

- 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**

- 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: Up to 57.6 kBd (DIRECT), 38.4kBd Analog modem, 9.6 kBd digital modem

Recommend external converter:

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.


**IB-Lite interface (optional card)**

Plugs into IA-NT controller COMMUNICATION MODULE port.

- Interface to Ethernet: RJ45 (10baseT)
- Operating temperature: -30..+70°C
- Storage temperature: -30..+70°C

**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.